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An Optimized Spam Detection Technique for IOT Devices using CNN Algorithm

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Abstract— The Internet of Things (IoT) is a network of millions of connected objects with sensors and actuators that transmit data via wired or wireless channels. Over the past ten years, IoT has evolved quickly; by 2020, it is anticipated that over 25 billion gadgets will be connected. In the upcoming years, the amount of data released from these devices will multiply many-fold. The IoT devices produce a significant amount of data in addition to the increased volume, with a variety of distinct modalities having varying Data speed in terms of time and position dependency defines data quality. In such an environment, machine learning algorithms can be crucial in assuring biotechnology-based authorization and security, as well as improving the usability and security of IoT devices. Yet, hackers frequently use learning algorithms to attack the flaws in IoT-based smart systems. In this work, we suggest employing machine learning to identify spam in order to safeguard IoT devices. A machine learning framework is suggested for spam detection in the IoT to accomplish this goal. Five machine learning models are assessed in this framework utilizing a wide range of metrics and input feature sets. This rating illustrates an IoT device's dependability based on a number of factors. The proposed technique is validated using the smart home dataset REFIT. In comparison to other current schemes, the results demonstrate the effectiveness of the proposed method.

Index Terms— Internet of Things, Security, spam detection, authorization

I. INTRODUCTION

Email is a viable method of correspondence because it saves a lot of time and money, making it one of the most popular techniques for correspondence at home and in the workplace. Web clients may move data around effectively with the help of messages. Email is just a simple electronic information structure used to send messages from one client to the next. We have now entered the era of online social networks like Face book, Twitter, YouTube, and others. Internet users invest more of their energy into interpersonal organizations. Throughout the online life systems, data can be successfully spread. Sites can be vulnerable to various undesirable and vindictive spammer or coder operations as a result. A security arrangement for web-based living systems is required by the general public and industry. Email can be used to communicate with groups of people in the same way that it can with individuals. An email reflector can be used to manage a shared transportation list. Individuals can enroll in some mailing lists by making a request to the mailing list executive. A rundown server is an email list that is directed accordingly.

Sometimes we receive emails from mysterious sources, and the emails may also contain information that is the

irrelevant to the client. Spam mail is another name for these kinds of unwanted transmissions. Spam email is the practice of repeatedly sending unwanted information or a large volume of it to various email accounts. Spam mail is a form of electronic spam that consists of emails sent to various recipients that are nearly indistinguishable from one another. Sometimes we receive emails from mysterious sources, and the emails may also contain information that is irrelevant to the client. Spam mails are another name for these kinds of unwanted transmissions. Spam email is the practice of repeatedly sending unwanted information or a large volume of it to various email accounts. Spam Mail is a form of electronic spam that consists of emails sent to various recipients that are nearly indistinguishable from one another. Usenet spam undermines a framework director's ability to handle the issues that are acknowledged in their frameworks. Another type of email spam uses normal mail messages to target clients. Filtering Usenet postings and using Internet mailing lists allows for the creation of email spam reports. Any email that satisfies the three following conditions is considered spam.

- 1) Anonymity: The sender's address and identity are hidden.
- 2) Bulk Mailing: A significant number of people receive the email.
- 3) Unsolicited: The recipients did not ask for the email.

Unsolicited Commercial Email, more often referred to as spam, is produced by sending spontaneous business messages to many recipients. Spam messages lead to many issues, including decreased mail motor performance, control of extraneous space in the letter box, and destruction of the stability of mail servers. At times, they additionally include infections, Trojan horses, and other elements that could potentially be harmful to certain kinds of clients. Clients spend a lot of time deleting annoying correspondence and scheduling future sends because of spam messages. After a while, problems associated with spam mail have been growing tremendously. Email users receive numerous spam messages every day, many of which are automatically generated by robot programming and contain new information and new sources. It is practically absurd to channel spam using conventional methods, such as dark white records (areas, IP addresses, postal information). The problems associated with spam emails are getting worse as more people use the internet.

II. LITERATURE REVIEW

In order to develop a spam recognition model using a Random Forest for order and dynamic learning to refine the characterization model, grouping messages takes into consideration the productive marking of an agent test of messages. Findings for the 2007 TREC Public Spam Corpus are shown. The area below the Receiver Operating Characteristic (ROC) bend is concentrated with various configurations, necessitating multiple less significant preparation models [1].

The ability of email classification to gather messages and clients as a network that depends on communication strategy A customized system is used to understand each client's behavior in an email and to dissect the various or different parts of the network structure, such as the person who is likely to behave similarly in various social relationships. The proposed approach uses quantifiable analysis to focus on a single client or multiple clients from the email corpus. This method tracks the email client that should be assembled and employs a multi-client specialized email network recognition technique. It also depends on how closely connected they are on a basic and semantic level. An inadequate arrangement of email characteristics was utilized to uncover the network's structure using the multi-client personalization idea. The collaborations are shown as social diagrams [2].

A strong opponent of spam channel is now necessary due to the rising volume of spontaneous mass email, or spam. Today, AI techniques are employed to efficiently channel spam email. The absolute most popular AI techniques—Bayesian arrangement, k-NN, ANNs, SVMs, the artificial safe framework, and rough sets—and their relevance to the problem of spam email characterization are surveyed in this research. Illustrations of the calculations are presented, and a connection between their display and the Spam Assassin spam corpus is made [3].

Spammers that send incorrect data can easily abuse the setup of the email framework. An industry standard known as Simple Mail Transfer Protocol ("SMTP") is used to send all email over the Internet. SMTP is designed to gather information about the path an email message takes from its sender to its recipient.

Remark spam and blog spam are other names for link spam. It is the kind of spam that targets wikis as well as weblogs, guestbooks, exchange sheets, and other online journals. Any web application that displays hyperlinks created by visitors or the visitors' alluding URLs may serve as the target.

Here, this section looks at different spam's and their effects on various web zones. The layout of spam is shown in Fig. 1 below,

The hereditary calculation was developed to address bunching problems. The k-closest neighbor computation, which measures the expansion of similarity between messages in bunches, defines the goal capacity. The problem with using chromosomal support continuously to address required faults is that it slows down the assembly process.

In this way, a punishment method that prevents the occurrence of unfeasible chromosomes when running estimates of capacity for healthiness is used to speed up the intermingling of hereditary calculation. Characterization is followed by learning extraction, which is coupled to obtain information about classes. Using a multicolumn outlining method, the data picture of each spam message collection is obtained. It will also be possible to distinguish topical reliance from geological reliance (i.e., what topics prevail in spam messages transmitted from particular countries) by ordering and parameterizing spam layouts. In this way, if purposeful data attacks do occur, the provided framework will be able to detect them. By identifying and resolving the constituted informal networks of spammers, the origins of spam messages can be broken down from accumulation[10].

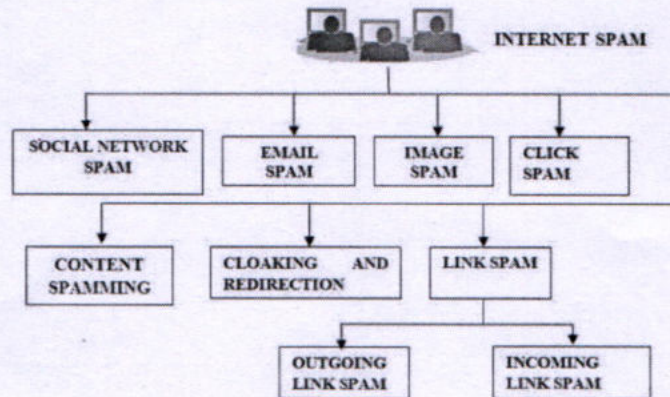


Figure 1. Classification of Spam's

III. PROPOSED WORK

The pre-processing of textual data is essential and crucial in the spam filtering process. The primary goal of text data pre-processing is to eliminate data that does not provide pertinent information about the document's class. Additionally, we also wish to eliminate redundant data. Remove stop words and perform stemming to minimize the vocabulary, which are the two most often utilized data cleaning stages in textual retrieval jobs. In addition to these two processes, we also eliminated words with a length of two or less. Stemming is one of the primary pre-processing techniques used in textual information retrieval jobs. By removing the plural form from nouns (such as "apples" to "apple"), the suffixes from verbs (such as "measuring" to "measure"), or other affixes, words are stemmed to their simplest form. Examples include applies, applying, and applied matches.

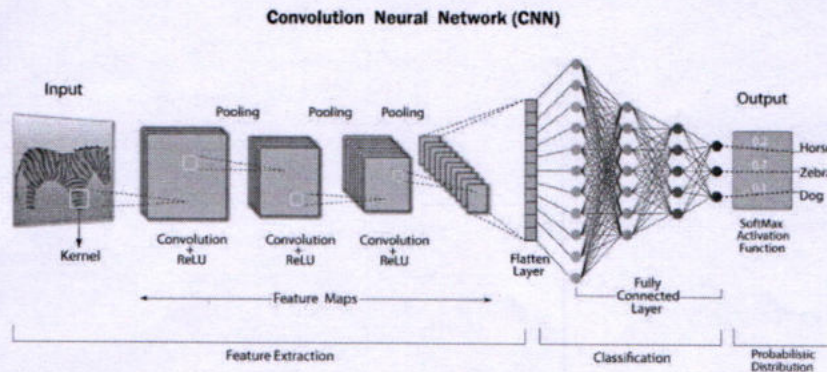


Figure 2. Convolution Neural Network

Sentence segmentation is the process of identifying boundaries and dividing raw text into sentences. The input query is tokenized, or broken down into individual words. By deleting the word "stop" by eliminating terms like

"is," "the," "for," and "an" from documents, which do not significantly contribute to the text of the document, processing costs are significantly decreased. Fig.2 shows the phases of CNN algorithm.

A supervised method of machine learning is the support vector machine (SVM). Building a hyperplane that is best for classifying patterns that can be linearly separated is the main concept behind SVM. In email spam detection, the aim is to divide the email into two categories: spam and ham email, using an optimal hyperplane. The idea is to distinguish the two classes to achieve the maximum marginal difference between the two classes, viz., spam and ham. SVM represents the information points in the workspace, mapped so that the information points of the other categories are partitioned by a maximum marginal difference. The same workspace is tagged with additional information points, and predictions are made to determine the category of the new information point.

To decode the message topic, body, and attachments for content-based mail filtering (the system mostly discusses text format), click here. The message content (including any attachments) is then expressed using natural language processing technologies. Pre-treating the message content, which includes feature extraction, segmentation, etc., is required in this step first. Then, in order to determine the message's trustworthiness, it is necessary to extend the characteristics items while merging them with the knowledge database, construct a vector, and match the matching categories in the vector database. Additionally, the system uses a self-learning feature to evaluate trust-email and non-trust-email, and it intelligently modifies the weight of key terms associated with particular themes to improve spam filters' accuracy.

IV. COMPARITIVE RESULTS

A quality output is one that shows the information clearly and complies with the end user's needs. Any system's outputs are how processing results are transmitted to users and other systems. It is decided during output design how information will be displaced for immediate demand as well as the hard copy output. The interaction between the system and user decision-making is improved by efficient and intelligent output design.

1. The process of creating computer output should be organized and well-thought out; the proper output must be created while ensuring that each output part is structured. Pick information presentation strategies.
2. Produce reports, documents, or other forms containing data generated by the system.

A. Database Design

The Database Management System (DBMS) consists of a number of related programs and a group of interconnected data. The main objective of a DBMS is to offer a setting that is both practical and effective for retrieving and storing data.

B. Code design:

A code design is a document that specifies guidelines for a new development's design. It is a tool that can be utilized in the design and planning process, but it goes beyond other forms of advice that have been often employed in the English planning system over the past few decades and is more regulated. It can be viewed as a procedure or document that operationalizes design principles or guidelines that have been established during the master planning process. The framework, or master plan, serves as the vision. It should be accompanied by a design rationale that explains why, then a code that is operational and provides instructions with the proper level of detail. In this approach, a design code might be a mechanism that ensures that the government's and other agencies' ambitions for housing developments' quality and quantity especially for large-scale projects are really realized in the projects' final designs. Table I shows the summary of the performance of Experimental Models.

TABLE I SUMMARY OF THE PERFORMANCE OF EXPERIMENTAL MODELS

Model	Precision	Recall	Accuracy
M1	0.650	1	79.81
M2	0.553	1	84.22
M3	0.537	1	85.35
M4	0.587	1	89.9
M5	0.523	1	92.8

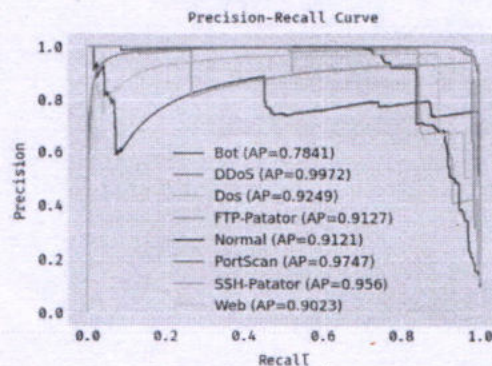


Figure 3. Precision – Recall Curve

Fig. 3 reveals the relation between the precision and recall curve. In comparison to KNN's 87.05% classification rate, the CNN algorithm offers a superior classification rate of 92.18%. With a significance value of 0.002 ($p < 0.05$), there is a significant difference between the two groups.

V CONCLUSION

Using CNN Algorithm, the suggested framework finds IOT device spam parameters. Deep learning algorithms are used to preprocess and classify the IOT dataset. These results show that the convolutional neural network technique (92.18%) performs better at accurately detecting spam emails than the KNN algorithm (87.05%) when the framework is put to the test. In order to increase the security and dependability of IOT devices, we intend to detect infiltration in the network framework in the future.

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Brain Tumor Classification from Magnetic Resonance Images using Routing Agreement Algorithm

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ABSTRACT: Cancer is the world's most common disease and the second biggest cause of mortality among humans. Brain tumors are protracted forms of cancer due to their aggressive nature, varied features, and dismal relative survival. Pretreatment, segmentation, and detection of infected tumor regions utilizing magnetic resonance (MR) images is a big issue, and radiologists or clinical personnel must complete time-consuming and arduous activities. The brain tumors differ in appearance and resemble normal tissue within the tumor, Convolution Neural Network (CNN) cannot fully exploit spatial correlations. The paper presents an approach to automatically detect brain cancers using deep learning techniques with capsule networks. The proposed strategy allows the capsule network to access the tissue surrounding the tumor without interfering with the tumor's primary function. A modified capsule network design for brain tumor classification has been developed in which a complete tumor boundary is used as an additional input to the pipeline to boost the capsule networks. The proposed method can efficiently classify the brain images with 98.5 percent sensitivity, 97.82 percent specificity, and 98.35 percent accuracy, according to the results of cross-validation.

KEYWORDS: Brain tumor classification, Tumor Boundary, Convolution Neural Network, CapsNet

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1. INTRODUCTION

According to World Health Organization statistics, most cancers is that the other maximum not unusual place disorders with inside the globe, with a predicted the 3.2 million deaths this year (One hundred sixty new most cancers instances and 608,570 deaths in India [1]. After maximum most cancers deaths with inside the 20th century, most cancers prognosis and remedy has been hampered through the 2019 coronavirus pandemic (COVID19). Among the varied kinds of most cancers, mind tumors have low aggressive, heterogeneous (kind), and relative survival rates [2]. This most cancers may have an extreme effect at the first-rate of lifestyles of sufferers and their families. Early prognosis and backbone of the correct kind are vital elements in treating mind tumors and enhancing survival. Brain tumors categorized based totally on their shape, pattern, and region (meningioma, pituitary, glioma, etc.). Determining the correct form of brain tumor is of utmost significance because it has an own large effect on remedy choices and prediction of

affected person survival, digital pix with inside the clinical subject used for diagnostics. Early detection of brain tumors is significant for powerful neoplasm remedy. Because of the excessive comparison of smooth tissues and zero publicity to radiation, MRI is that the maximum common approach for diagnosing human brain tumors. However, classifying mind tumors isn't a smooth task. The traditional approach of MRI detection and kind of brain tumors is human examination. This can be predicated closely at the assessment and evaluation of the photograph and, maximum importantly, the radiologist who assists with inside the manufacturing of the photograph. Systems are hardware / pre-processed can assist automate this technique with correct and well-timed effects. Image segmentation, on the choice hand, is that the primary reason for many pc imaginative and prescient and photograph processing implementations. The diagnosing of brain tumors early is significant for higher remedy. Once a neoplasm is clinically detected,

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Saranya & Sumathi

radiation assessments are come to a decision its location, size, and outcomes on the encircling area. Early detection of a tumor substantially will increase the possibilities of survival for an affected person inflamed with the tumor. The huge quantities of information, the user-assisted type system is impractical and irreproducible. Therefore, automated diagnostic gear is surprisingly suitable to resolve those problems. It additionally aids clinicians of their preceding choice system through facilitating fast, reliable, and proper evaluation. There are varieties of brain tumor categorized based totally on scientific application: (1) Brain pix are categorized as every day or unusual, looking forward to whether the photograph of the mind consists of a tumor. (2) Type inside unusual mind pix, i.e., differentiation among distinctive types of mind tumors [3]. The main contributions of this have a glance at accommodates a full evaluation of Capsule Neural Network (CapsNet) based methodologies, the event of a singular Caps Net topology, testing the proposed topology the utilization of mind scans to categorize the varieties of tumors, and evaluating the results of present methods with inside the literature

There are several studies reported in the literature aimed at improving the diagnosis of central cancer. Various machine learning processes are available for segmenting and classifying brain tumours using MRI. Hasane et al., [4] proposed a system for classifying MRI brain scans with deep handmade image features. Clinical studies have shown that autonomous processing systems have been developed to diagnose brain tumours [5-10]. The standard workflow for developing an automated or semi-automatic system are to first segment the tumour from the MRI image and extract a quantitative feature called "radiomics". Then use Radiomix to train a predictive / survival model for cancer classification. Aerts et al., [11] extracted 400 features from segmented tumours and investigated the relationship between image-based features and clinical outcomes. The relationship between the characteristics and patient survival was analyzed using various statistical models. Nevertheless, it can be concluded that there is a strong correlation between tumour annotations and extracted features. The Radiomix function is very sensitive to discrepancies between observers of tumour segmentation. In other words, hand-designed features appear to be

unstable [12], significantly reducing the reliability and applicability of the model. More importantly, this pipeline requires prior knowledge of the functions to extract, but they are not available. The inadequacy of traditional Radiomix workflows tends to use deep learning, especially CNN [13], for cancer diagnosis and classification. Sara Sobour et.al., [14] the classification of brain tumours, 4,444 features were extracted from brain images with six CNN layers. The main objective of the article is to classify brain tumors images and does not require detailed annotations.

2. MATERIALS AND METHOD

This method is separated into three steps: (1) Image pre-processing (2) Image Segmentation and (3) classification by CapsNet model. The current study has been conducted for the classification of oral biopsy images into benign or malignant. Figure.1 represents the diagrammatic illustration of the suggested method carried out in five stages:

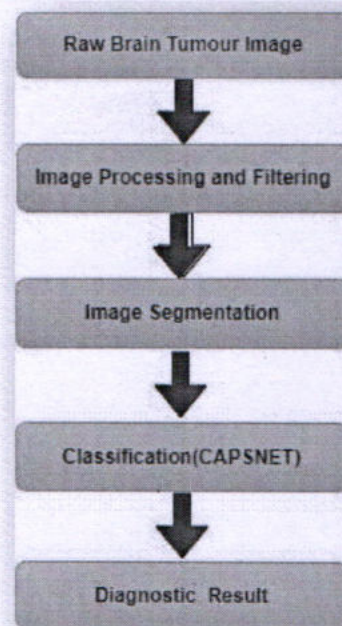


Figure 1: Proposed method for Image classification

2.1 PRE-PROCESSING AND FILTERING

Clinical brain tumors images are filtered through multiple stages to reduce noise. Each noise source is in a characteristic frequency band. Low conductivity between the skin and the electrodes creates a slowly changing

pixels and the number of pixels. The bar chart to display a histogram diagram (2.e). The histogram code works by first reading the grayscale value. The first entry is between pixel intensities 50 and 200. If increased the total number of pixels by then, proceed to the next row or column entry. Finally, the two histogram

of tumors (Figs. 2.e and 2.f), and comparison for tumor identification were presented. Figure 3 and Figure 4 shows Tumor segmentation is a basic step in Radiomix analysis because it transforms the original medical image into an extractable images.

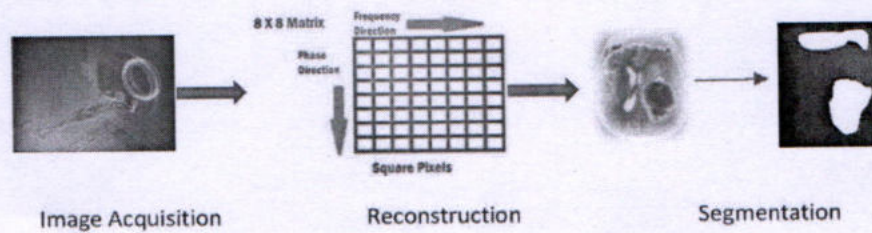


Figure 3: Brain Tumor Image Segmentation

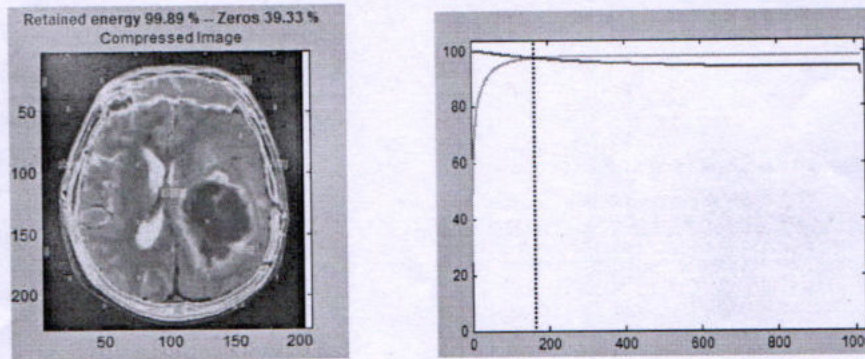


Figure 4: Compressed Image

Table 1: Dataset of Brain tumor considered for the study [26]

Algorithms	Classes	Precision	Recall	Accuracy
Convolution 3X3	meningiomas,	99.00	98.00	99.00
	pituitary glands	95.00	97.00	98.00
	gliomas	95.00	99.00	96.00
Densenet_Block Features A	meningiomas,	98.00	97.00	99.00
	pituitary glands	96.00	96.00	97.00
	gliomas	95.00	94.00	96.00
Concatenated	meningiomas,	95.00	96.00	98.00
	pituitary glands	95.00	97.00	98.00
	gliomas	95.00	99.00	96.00
Densenet_BlockFeatures B	meningiomas,	99.00	98.00	99.00
	pituitary glands	95.00	97.00	98.00
	gliomas	95.00	99.00	96.00
Concatenated	meningiomas,	99.00	98.00	99.00
	pituitary glands	95.00	97.00	98.00
	gliomas	95.00	99.00	96.00
Inception Features A	meningiomas,	99.00	98.00	99.00
	pituitary glands	95.00	97.00	98.00
	gliomas	95.00	99.00	96.00
Inception Features B	meningiomas,	99.00	98.00	99.00

Saranya & Sumathi

potential that manifests itself as image baseline movement. The output function of this WT is a The parameters of this filtering are the attenuation factor β , and the basic frequency f .

$$\Psi(t) = \exp\left(\frac{t^2}{\beta^2}\right) \cos(2\Pi ft) - \lambda \quad (1)$$

β - Attenuation factor, f - base frequency, $\Psi(t)$ -Wavelet Transform, λ - DC factor eliminator

Our goal is to find these parameter values and make the greatest contribution to a comprehensive demonstration of excellent datasets, preprocessing steps, and CapsNet. The fact that the values of all these parameters are selected is an additional calculation of the signal attenuation ratio that guarantees a significant percentage of the total defined in equation (1). The capsule network allows taking full advantages of unique spatial association and simulating the ability to perceive visual changes.

filtered signal. $\Psi(t)$ given in the equation (1).

Others have a clustered background, while others have an untouched, immutable background. Images should be preprocessed to remove contaminants and prepare them for subsequent processing such as segmentation and feature extraction. The Gaussian blur is used in the image preprocessor to remove the noises and smooth the edges before converting the image to grayscale. In automated diagnostic systems, accurate segmentation sends the actual data that leads to the correct classification of histological images. The proposed automatic segmentation of research typically involves the separation of homogeneous objects. To train a deep learning model, to provide enough training data and over fitting can occur if only a modest amount of training data is used. These data extension is to avoid missing data and over fitting of various class categories.

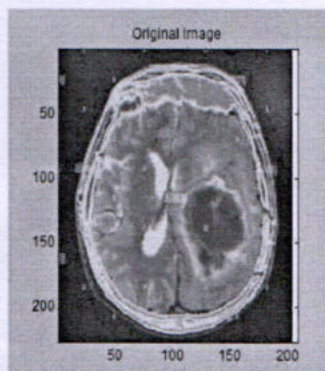


Fig (2.a): Original Image

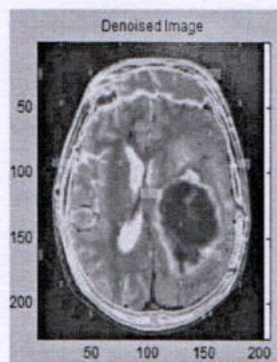


Fig (2.b): Denoised Image

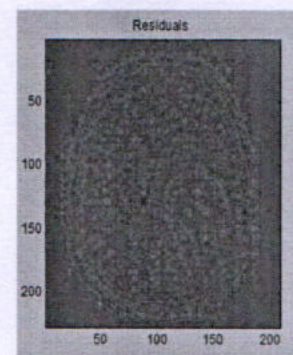


Fig (2.c): Residue Image

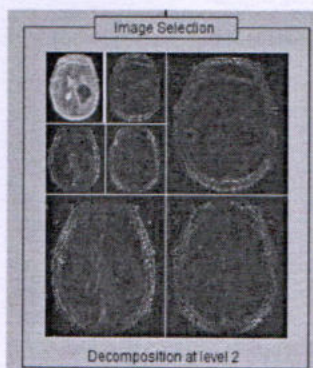


Fig (2.d): Decomposition at level 2

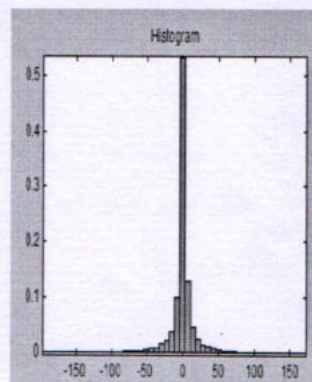


Fig (2.e): Histogram

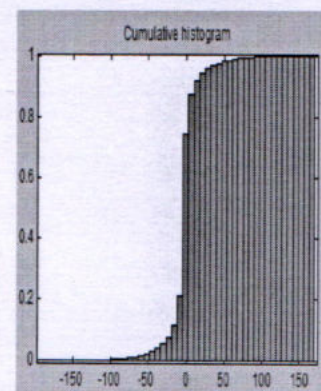


Fig (2.f): Cumulative Histogram

Figure (2.a) Image of the brain obtained by MRI. Figure (2.b) images converted to a gray color image. H-2D image, Gray color images

consist of an intensity of 50,200 pixels. 50 stand for black and 200 stands for white. The histogram is a graph between the number of

Saranya & Sumathi

	pituitary glands gliomas	95.00 95.00	97.00 99.00	98.00 96.00
Inception Features C	meningiomas,	99.00	98.00	99.00
	pituitary glands	95.00	97.00	98.00
	gliomas	95.00	99.00	96.00
Combined Inception	meningiomas,	99.00	98.00	99.00
	pituitary glands	95.00	97.00	98.00
	gliomas	95.00	99.00	96.00
Combined Densenet	meningiomas,	99.00	98.00	99.00
	pituitary glands	95.00	97.00	98.00
	gliomas	95.00	99.00	96.00

2.2 CAPSULE NETWORK

Capsule Network is an advanced machine learning architecture introduced to better model the hierarchical pose relationships. These capsules are "routed" to of the next capsule layer and a dynamic routing algorithm is used to determine the correspondence between these capsule vectors. This creates a partial traction connection that does not exist on traditional CNNs. According to the summary of current research, CapsNet is a network that can capture spatial information and more important features to overcome the loss of information due to the bundle process. "Dynamic routing between capsules" for training capsule networks. Convolution neural networks have made remarkable achievements in the field of

computer vision. Capsule networks are coming to overcome all the shortcomings of CNN. After training, the primary capsules recognize different types of individual shapes show in Figure 5 (squares, circles, vernier), and the secondary capsules group these shapes into groups 1, 3, or 5. The square will be the main square. The capsule recognizes three squares. In consensus routing, the second square capsule recognizes this group of three squares. For 5 circles during the presentation, the capsule of the main circle will recognize the 5 circles. When routed, the square circular capsule represents a group of five circles, and when a vernier is presented, it is recognized and sent to the second vernier capsule.

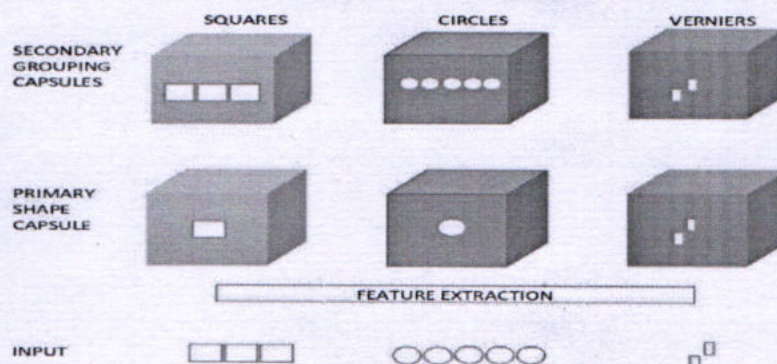


Figure 5: Grouping of Tumors in Primary capsule as Input

Capsule network makes to understands spatial information and more important features and can overcome the loss of information due to the aggregation process. In this process, low-level capsules predict the outcome of the mother capsule. This activates Mother Capsule only if the predictions match. Recent studies [16] have shown that CapsNets is superior to CNN in terms of classification of brain tumors. However, because CapsNet is very

sensitive to the background of the image, segmented tumor classification is compared to the scenario where the image of the entire brain is the input. A human expert manually performs tumor segmentation is a very time-consuming and difficult task, usually requires many steps, and the results are highly dependent on human expertise. Segmentation algorithms studied for a long time, but there is a need to improve fully automated segmentation algorithms, especially

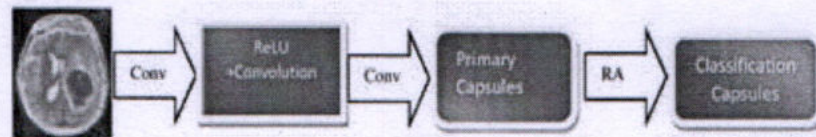
in the field of medical image analysis. However, there are two main problems with the need for segmented tumors.

(i) First, tumor segmentation is a time-consuming task that can only be performed by specialists.

(ii) Second, the tissue surrounding the tumor contains valuable information that would not be accessible if only segmented areas were delivered to the network.

Since the post specifically deals with the above topics, the capsule network shows a very

different way to solve the problems of image recognition and access to tissue around the tumor. In addition, neural networks have come a long way in recognizing images. Improving the robustness of CNNs requires large amounts of data that are not always available, especially when classifying brain tumors without diverting the need for detailed annotations of the tumor. This is the main motivation for this research's contribution.



* PA - Primary Capsules, RA - Routing by Agreement, CA - Classification Capsules

Figure 6: Routing by Agreement

CapsNet focus on important areas while providing information from the surrounding tissue shown in Figure 6. This information is sent to CapsNet at the final level before going through the final set of fully connected levels and the final SoftMax level that makes the decision.

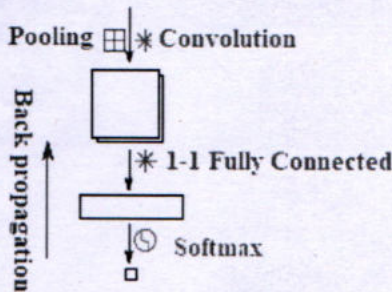


Figure 7: SoftMax for CAPSNET

SoftMax prevents the capsule layer from forming optimal bonds between low- and high-level capsules. SoftMax shown in Figure 7 limits the dynamic range of the routing factor, leading to the probability that it will remain about the same after several routing iterations. It is time efficient and is done by specialists and radiologists. The proposed method has been superior to CapsNet, which

only supplies brain or segmented tumor images.

2.3. CLASSIFICATION OF CAPSULE NETWORK

CNN [15] is basically a stack of convolution layers, pooling layers, and in some cases fully connected layers, benefiting from the fact that the weights are distributed across the input. This significantly reduces computational costs and allows the network to extract basic elements. These networks have become popular architectures in medical imaging since they do not require prior knowledge of the types of features.

Figure 8 is c layer of convolution process. It is the input neuron data extracting function. The size of the input feature map is $n \times n$ and is represented by X . The size of a matrix with a convolution kernel is $k \times k$, and the size of a matrix labeled Y on the output is $m \times m$. The three-dimensional relationships are as follows

$$m = n - k + 1 \tag{2}$$

The specific formula for the calculation is:

$$Y_{ij} = f_s (\sum_{i=1}^k \sum_{j=1}^k (X_{ij}C) + a) \tag{3}$$

where X_{ij} and Y_{ij} are the elements corresponding to the convolution kernel of the input and

output layers, a is the offset and f_s is the sigmoid. It is a function.

The sub sampling or pooling layer is integrated into the CNN to not only reduce the number of parameters, but also to make the network transformation immutable. However, these layers lose information about the exact location of the feature detector. This issue remains unresolved unless all possible

situations are included in the training data. The following CapsNets have features to help you solve this problem.

$$S_{ij} = 1c2(\sum_{i=1}^n c \sum_{j=1}^m F_{ij}) + b \tag{4}$$

$$\max_{i,j} = 1c(F_{ij}) + b \tag{5}$$

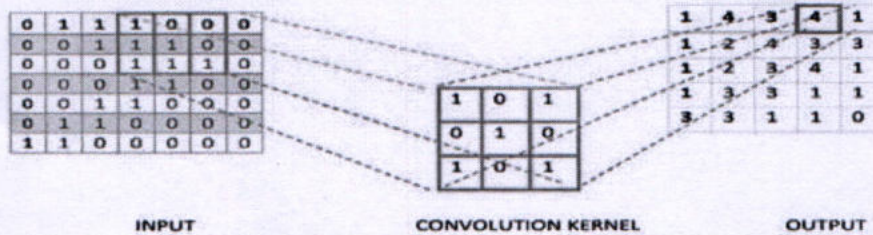


Figure 8: Principle diagram of convolution process.

2.4. CAPSULE NETWORKS (CAPSNETS)

Each CapsNet pill is used to understand the possibility of numerous instantiation parameters consisting of rotation and length for the underlying item. It is made from neurons. Shredder features are usually used to hold vector lengths much less than one. To clear up issues associated with CNN pooling ranges, those ranges had been changed through a technique called "contractual routing". This technique relies upon on how the pill contribution relies upon, in place of by chance under sampling the characteristic map.

More specifically, u_i is described because the output of a low degree pill

$i, u^{\wedge}j|i$ is defined as the prediction of the high-level capsule.

j, W_{ij} is defined as, and the weights connecting them are back propagation.

Learn through gating. Using this notation, u_{ij} can be calculated as follows:

$$u^{\wedge}j|i = W_{ij}u_i \tag{6}$$

The strength of the connection between the capsule and its parent depends on how well it matches the actual output of the parent. In other words, this correspondence between $u^{\wedge}j|i$ and the actual output of the mother capsule j labeled

s_j determines the coupling coefficient c_{ij} . Capsule i then sends its output to capsule j as follows:

$$s_j = \sum c_{ij} u^{\wedge}j|i \tag{7}$$

The strength of the connection between the capsule and its parent depends on how closely it matches the performance of the actual parent

The log probability of whether capsule i needs to be bound to capsule j is expressed in b_{ij} . This should be learned in the "Routing by Agreement" and is set to 0 in the initialization step.

Algorithm 1: The routing-by-agreement algorithm (CapsNet)

- 1: x_i : inputs
- 2: W_{ij} : weights
- 3: $u_{ij} = W_{ij}x_i$
- 4: $b_{ij} \leftarrow 0$
- 5: for r iterations do:
- 6: $c_{ij} \leftarrow P \exp(b_{ij}) / \sum_k \exp(b_{ik})$
- 7: $s_j \leftarrow \sum_k c_{kj} u_{kj}$
- 8: $y_j \leftarrow k_{sj} / (k_{sj} + 2)$
- 9: $b_{ij} \leftarrow b_{ij} + u_{ij} \cdot y_j$
- 10: return y_j

During routing in the consent process, this probability is updated based on the similarity between s_j and $u^{\wedge}j|i$. The basic approach to calculating this similarity is to take the inner product of the two underlying vectors. Each capsule j in the last layer (classification part) is

connected to the loss function l_j . This is intended to encapsulate capsules with large instantiation vectors (in the sense of standard values). The loss function l_j is calculated as

$$l_j = T_j \max(0, m^+ - \|s_j\|)^2 + \lambda (1 - T_j) \max(0, \|s_j\| - m^-)^2 \quad (8)$$

The terms m^+ and m^- are hyper parameters that must be specified before the learning process. Total loss is the sum of the losses from all output capsules. The original capsule network also has a set of fully connected layers called the decoder part. The decoder

part takes the final instantiation parameters of the true class as input and attempts to reconstruct the original image with the goal of having the network capture the actual representative features shown in Figure 9. Decoder loss is defined as a simple squared error and contributes to the final error compared to the loss of lightweight capsules. This is done so that it does not get in the way of the network from the main purpose of the network, the classification of objects. This concludes our brief introduction to CNN and CapsNet.

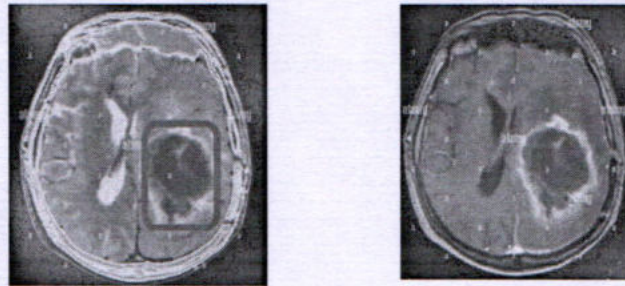


Figure 9: Original image Grey scale Defining the tumor boundary box

3. PROPOSED FRAMEWORK

The proposed method is to detect brain disease, meningioma, pituitary gland, and glioma using the most used MRI images. It can be divided into three categories of tumors. The CNN has one major drawback that limits its application to real-world problems. They do not fully consider the exact spatial relationships between objects caused by the loss of information in the pooling layer. Pooling layers,

on the other hand, cannot be deleted because networks without these layers are very sensitive to slight shifts in the image. The spatial information lost on the CNN is very important for the classification of brain tumors. This is because the relationship between the location of the tumor and the surrounding tissue can have a strong effect. Figure 10 shows the tumor classification method from brain image

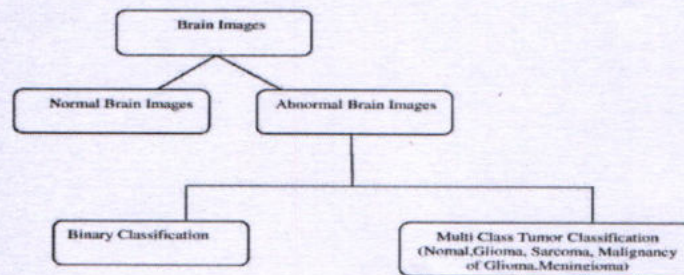


Figure 10: Tumor classification method from brain image

Previous studies [16] have shown that CapsNet out performs CNN on this issue. However, these networks are sensitive to the background of the image. With 4,444 detailed MRI images of the brain, this property can adversely affect network performance. Previous results show that CapsNet is more

accurate than whole-brain images of segmented tumors. In addition, annotating brain images is time consuming and not always possible. Consistent with the above issues, the CapsNet architecture was developed in this article. It leaves the capsule layer and passes through a series of fully

connected layers to make the final decision on the type of tumor. The result of this work is a feature map tensor 20x20x256, which is fed to core 256, 9x9, second stage, and second convolution layer (Primary Caps) using ReLU activation. This creates a 6x6x256 feature map tensor that represents the low-level capsules of the web. A set of eight scalar neurons in a 6x6x256 tensor are grouped by channel to form a low-level capsule i , a total of $6 \times 6 \times (256/8) = 1152$ low level capsules. The Primary Caps output is provided by the dynamic routing algorithm and becomes the DigitCaps output matrix. The partition function used to calculate v_i . Each row of the DigitCaps matrix represents a single instantiation parameter of the 16D class, and the vector length 16 represents the probability that a particular class exists. During training, the non-basic truth lines were masked with zeros, and the Matrix was fully connected with two fully connected layers in dimensions 512 and 1024 with ReLU activated, and the last fully connected in dimension 784. The output uses the longest row of the DigitCaps matrix as the predicted feature class. The input data to the routing algorithm is the prediction vector u_i . These prediction vectors are computed using the trained transform weight matrix and the capsule output of the Primary Caps layer. The prediction vector remains fixed within the algorithm while the bootstrap of the routing procedure uses the prediction vector to compute the DigitCaps capsule v_j . There is no gradient flow in the routing layer, but both the inputs and outputs of the routing layer are exposed to normal gradient flows during

training. DigitCaps capsules are passed to sub networks that learn to reconstruct the original input image. The prediction vector and the parent-level capsule tend to evolve, and the scaled sum of the prediction vector is like the parent-level capsule. In other words, in the forward path, the network calculates a high-level set of capsules used to restore the original image. Reconstruction network errors propagate to the prediction vector and the previous plane. During the next direct path, the prediction vector is extended by the transformation matrix to match the previously calculated high-level capsule. The routing procedure using Max-Min regularization is similar except that the Max-Min function replaces the Softmax function. Where p / q is the lower / upper bound of regularization. The first iteration initializes the routing arguments outside of the routing loop [14].

LOSS FUNCTION:

Loss of output of the capsule layer, as in (9),

$$\text{Loss} = \sum_{y=1}^K [y \log p(y)] + (1-y) \log(1-p(y)) \quad (9)$$

Item $p(y)$ is probability of, and there are class determined by the network. K is the number of output classes (tumor type). This loss is fed back to the entire network, including the layer fully connected to the capsule layer. This concludes the description of the proposed CapsNet architecture for the brain tumor classification problem.

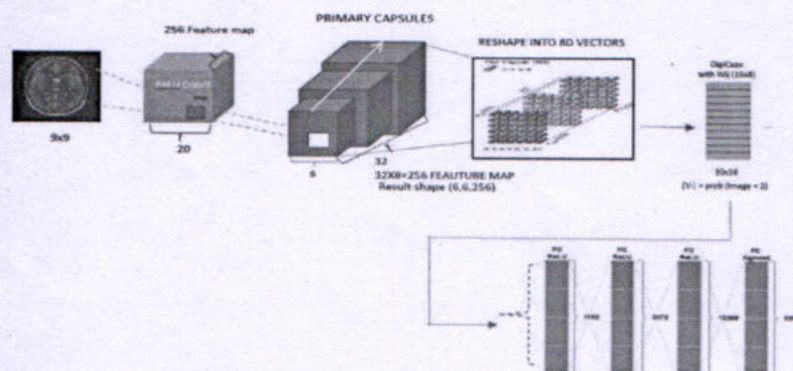


Figure 11: CapsNet architecture proposed for classifying brain tumors

4. RESULTS AND DISCUSSION

The scale on the right has various colors that represent the range of energy available for that waveform sector after removing the baseline. Sensitivity indicates the percentage of beats correctly recognized by the algorithm.

$$\text{Sensitivity (\%)} = \frac{TP}{TP + FN} \quad (10)$$

TP is true positive (correctly recognized)
 FN is false negative (unrecognized number)
 Positive Prediction shows the percentage of hit detection that was a real hit.

$$\text{Positive "Prediction" (\%)} = \frac{TP}{TP + FP} \quad (11)$$

False positive FP (number of additional entries) in QRS complex

The FN and FP values tend to drop sharply to the lower values of the record corresponding to (104, 203, 207). The ECG curve in the above record is characterized by a high level of complexity, which makes it internally difficult to recognize the QRS complex. This section briefly describes CNNs, and then intuitively explains why CNNs are transformation-invariant. It is not possible to locate another object from one object. Figure 12 and 13 shows the Tumor classification method from brain image and training and validation Accuracy across the Epoch.

Table 1: Cross - validation accuracy using Confusion Matrix

True Vs Predicted	Benign	Malignant	Pituitary gland
CNN	86.56	84.19	91.90
CAPSNET	99.34	99.51	98.69

Table 2. Performance Measurement for proposed System

MODEL	Sensitivity	Specificity	Accuracy	Precision
LONG BASED SOFTMAX	86.56	88.34	98.60	97.90
CNN	84.19	85.50	90.02	93.30
CAPSNET	91.90	99.51	99.62	98.53
COMBINED FEATURES	93.68	99.00	98.23	98.30

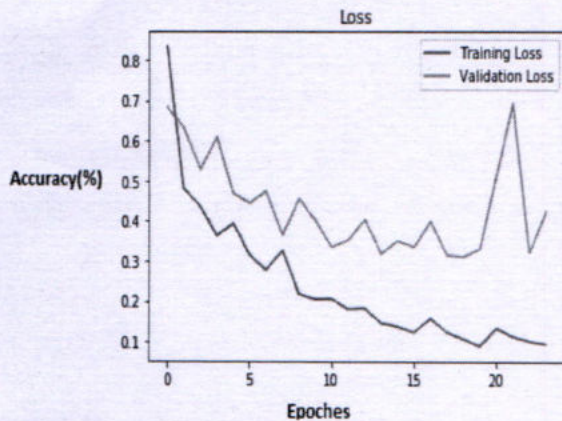


Figure 12: Tumor classification method from Brain Image

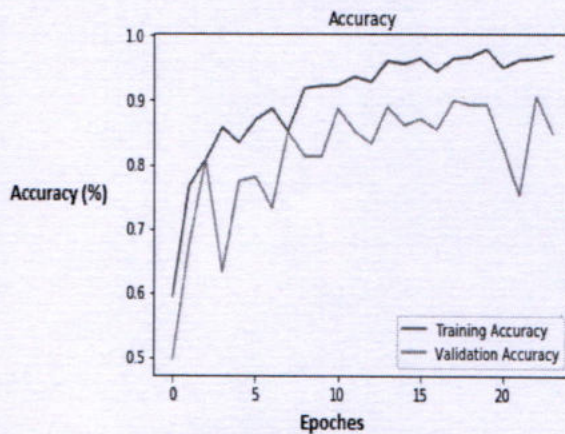


Figure 13: The Training and validation Accuracy across the Epoch

Below are the experimental results used to evaluate the effectiveness of the proposed architecture. The CNN proposed for tumor classification of the same mental disorders. The

CapsNet architecture presented in this post outperforms CNN in all situations and performs best when given the boundary between the brain image and the macroscopic tumor.

Table 3: Hyper parameter training for classification of brain tumors via optimizer

Hyper-parameter	Optimized Value
Number of images	100

Saranya & Sumathi

Number of Epochs	500
Batch size	4
Non-Augmented	128
Augment Routing iteration	3
Learning rate	0.0001
Learning rate decay	0.9
Loss	0.20
m+ (in Eq. (7))	0.8
m- (in Eq. (7))	0.2

Table 4: Comparison of the proposed approach with previous results

S.No	Approach	Accuracy
1.	Input of brain image in CapsNets	70%
2.	Segmented Tumor in CapsNets as input	86.56%
3.	CapsNet Architecture	91.43%
4.	Input of Brain Image in CNN	74.36%
5.	Segmented Tumor in CNN as input	78.44%
6.	Softmax normalization and routing coefficients	99.30%

5. CONCLUSION

A complete study of CapsNets is presented in this paper, and a new CapsNet topology for tumour classification is constructed and validated using brain MR images. Feature detection (if the feature exists in the image) is provided by the pooling function in CNNs, but the relationship between features is lost (i.e. spatial information of these features). CNNs, as a result, result in poor categorization results. CapsNet is a promising new method for resolving this issue. The dynamic routing technique in CapsNets saves all relevant detail information and improves learning. Existing brain classification methods use CNNs to classify images as abnormal or normal. However, a CapsNet model was used to classify photos into three tumour kinds in this study (pituitary, glioma and meningioma). The proposed topology's efficiency has been demonstrated by the use of information about tumours. According to the findings of the experiments, the proposed method can assist doctors in classifying pituitary, glioma, and meningioma from MR images. Experiments with enhanced CapsNet topologies may yield better results in the future. Comparative assessments

revealed that the suggested method outperforms a CapsNet with a segmented tumour image or a complete brain image as the input image. Furthermore, the suggested technology eliminates the need for radiologists to perform any manual operations in order to receive findings.

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Affording Conservation to Users' Particulars and Subside Power Capability of Sensor Nodes by Utilizing Cryptography and Clustering Algorithms

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Abstract

Although WSN is growing swiftly, and although mortals are utilizing it heavily, some cruel complications are impending up. There are two problems that are tremendously complex, one is the issue of security and the other is the issue of energy. The security problem is that it is exceedingly arduous for ordinary mortals or the government or the military to keep their data safeguarded against ill-use in online. This is because users' data is stolen or deleted or discharged by some ill-intentioned or vindictive person, namely hackers. To resolve this problem, the propound-mechanism utilizes the AES 256-Bits algorithmic regulation. This mechanism is much guarded than other AES and DES techniques. This paper said about another problem, it's all a tremendous problem, because the Internet pace up apportioning or viewing too much data, overabundance energy is compulsory. So when the pace of the network increases, so does the necessity for energy, this present paper utilize LEACH procedure to lessen the energy required to do so. So these manners diminish the energy that the sensor nodes take up. Therefore, this propounds design will give users a gratification response.

Keywords: Wireless Sensor Network (WSN), security, clustering, 256-Bits AES mechanism, LEACH (Low-Energy Adaptive Clustering Hierarchy).

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1. Introduction

A lot of WSNs collect a variety of important information; by unnoticed actions on sensor nodes can cause a variety of harmful problems. These problems are growing ever more massive. Because wireless networks are

less secure than other networks, so, this requires security mechanisms. Sensor measurements must be routed to the network's sink with a certain probability, because if the sensor measurements are missing, some unnecessary activity can prevent it from



happening. Even so, the need for energy increases as the reliability increases. To break the purpose of attacks, there are a variety of systems. However, in some organizations, there will be data communication, storage requirements and calculations, the sensor nodes cannot deal with them. So we need to increase the credibility of Network.

Due to the high power consumption of the inherent properties of individual sensor nodes, for communication protocols, there is a tremendous challenge. The methods used for WSN's applications provide high energy efficiency. Sensor nodes have a limited range of energy sources that are powered by a battery. If the energy in the battery is low, they must be recharged or replaced that battery. For a few sensor nodes, no battery is suitable; At that point they are rejected. The strategy used for energy consumption is affected by the question of whether or not to recharge the battery. Therefore the methods used for WSN should focus on energy conservation.

This [1] focuses on the notion that Battery's lack of durability can cause great distress when sending video data. The author of this paper, therefore, used the Leach method to get more energy, but while energy concerns are over, there is also concern about safety. This [2], they are proposing to filter out unnecessary data, so they have used the GDA system and

the quality of that system is very poor. In [3], Sensor nodes take up a lot of energy when collecting data, As a result, energy problems are becoming increasingly common to mortals. So this author thought he could solve this problem, solar system was his decision. But even though these are very common, this is not the occurrence all the time. In [4], two issues have been proposed, such as the lifetime and energy consumption of the network. So they used the RF energy harvesting technique, but which takes up a lot of space. In [5], they used eDC-NC technique that worry concerns energy problem, but requires a lot of cost. In [6], the energy is reduced by using the LEACH and neural network, But insecure.

Therefore, our paper is proposed to deal with all these problems.

2. Proposed Methodology

In this proposed manner, First encrypts the sensed data from the sensor nodes, Then, the sensor nodes are divided into a number of clusters, All encrypted data's are send into the cluster head of the each cluster. All data is aggregated and then passed on to the key generation, So here, the key is generated, and then the data, is sent to the base station (BS). All particulars from the BS is then decrypted, Then it checks that the data is secure, and finally sends it to the database securely.

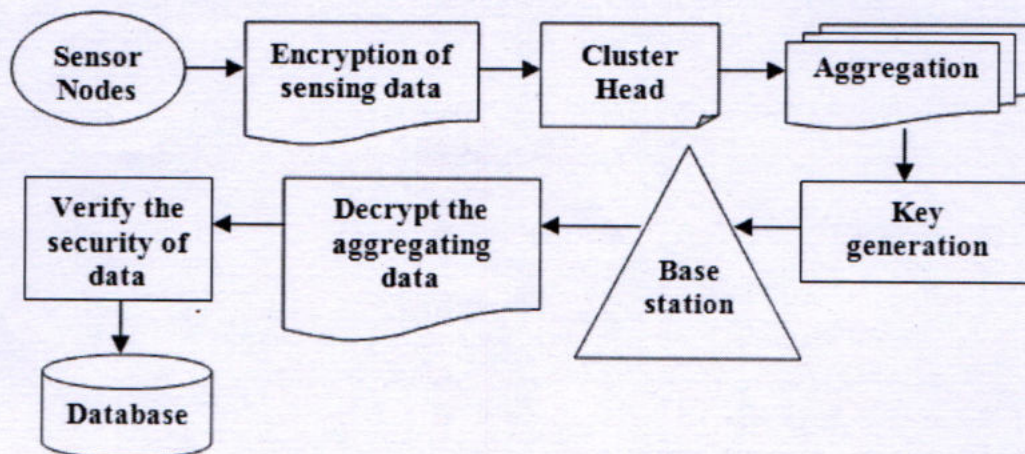


Fig.1. Flow of this paper

256-bit AES



256-bit encipher is a file or encryption of data; it also uses the 256-bit key to decrypt or encrypt the file or data. After 192-bit and 128-bit cryptography, the most secure encryption is called 256-bit encryption. It is used in one of the most used AES methods in this period. To enter a cracker or hacker break the 256-bit encrypted key, Different 2^{256} combinations will be considered essential, which cannot be shattered by any other computers. Thus, any sensitive and confidential data can be more secured by this method. Even government or military-owned data can be kept secure in this system.

Operation

AES is a modification process and it is based on a substitution-permutation method. It

composed of a series and linked functions, in them, the inputs are replaced by a specific output, and other outputs do permutations around them. The AES do it all categories of computations without doing it in bits, makes in bytes. That is, AES consisting a normal data of 256 bits, converts into 32 bytes, then it will take that to process.

These 32 bytes are then formed into a matrix, The matrix is compatible with 32 bytes, so it is containing 5 rows and 5 columns, The no. of rounds are differs depending on the length of the key. So these 32 bytes are adapting to the length, and utilizing 14 circuits. Here, in each round, the 256-bit kind of key is utilized.

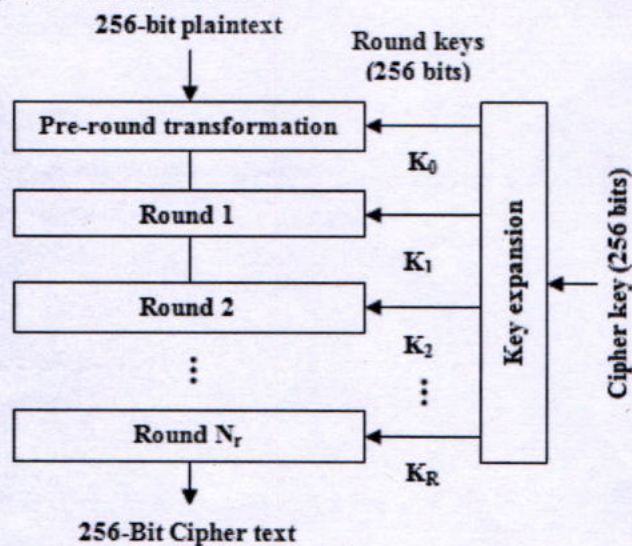


Fig.2. Diagram of AES steps

Encryption steps

There are four sub-processes in each round that require to the AES. Those processes can be seen in Figure 3.



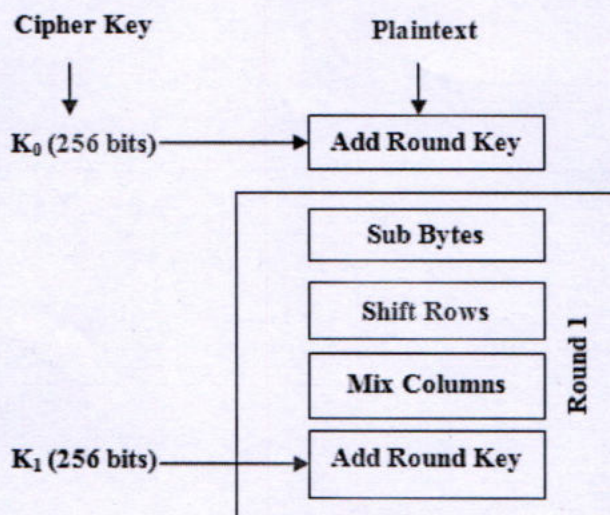


Fig.3. Steps of Round 1

STEP 1: Sub Bytes

When viewed with a given in static table or S-box, 32 input bytes are converted. As a result, there is a matrix of 5 columns and 5 rows.

STEP 2: Shift Rows

The five rows of matrices go together, each step, to the left. Other entries go to the right side and sitting in the rest on the place. The shift is processed as follows:

1. Only the first row is static and cannot be changed.
2. In the second row, only 1 byte shifts to the left.
3. In the 3rd queue, it displaces the 2 bytes to the left.
4. The 4th row replaces 3 bytes to the left.
5. In the 5th queue, 4 bytes displaces to the left.
6. Then a new 32 bytes array is created.

STEP 3: Mix Columns

Each column of 5 bytes has been replaced with a better mathematical function. This function takes one 5 bytes as input and releases 5 new bytes. These will change the original column. Due to this a new array of 32 bytes is formed again. No need to perform this function in the final round.

STEP 4: Add Round Key

The 32 bytes of the matrix are now taken as 256 bits, They are then XORed to 256 bits of the key required for the round, Turns out to be cipher text in the final round, Another round is initiated if not the final round.

Decryption Steps

The assignment of decryption is the reverse steps of encryption. Also these four processes are utilized in each round. Those move backwards processes are organized below:

1. Add round key
2. Mix columns
3. Shift rows
4. Byte substitution

Because the proceedings in each round are in backwards, the decipher and encryption processes must work separately.

Clustered WSN

Cluster architecture of WSN is a cluster formatting of sensor nodes; each node is managed by a cluster-head. The nodes in each cluster are Exchanging information with their respective cluster-heads. Also, these heads are sending that all the details to the BS. It's usually the access connected to the wired network are the point. Fig.4 Refers to the structure of a cluster of WSN, to any details, two hops is



enough to reach the BS, for clustering steps, Can be extended to greater depth.

Given the inherent applicability of data fusion for sensor networks the clustered architecture in particular is very useful. All members of cluster, the collected data can be combined with the cluster head. Only the

resulting information can be sent to the BS. Sensor Networks should automatically self-regulate, so optimization of cluster heads and cluster formation, should be automated system. So this process can be done by LEACH.

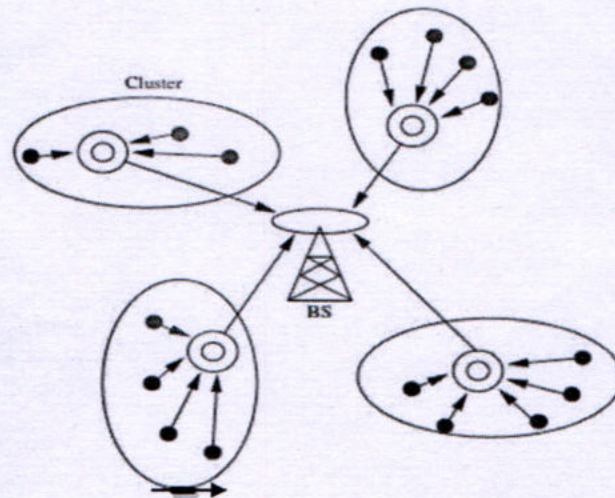


Fig.4. Structure of the clustered WSN

LEACH

LEACH is cluster based protocol; it is used to reduce the energy scatter of sensor networks. LEACH is a selecting the node in random and synchronizing periodically. Thus, when the cluster-heads interact with the BS, The more energy dissipated, the more it spreads to all the nodes in the network, every iteration does, select cluster heads, and this is called the round.



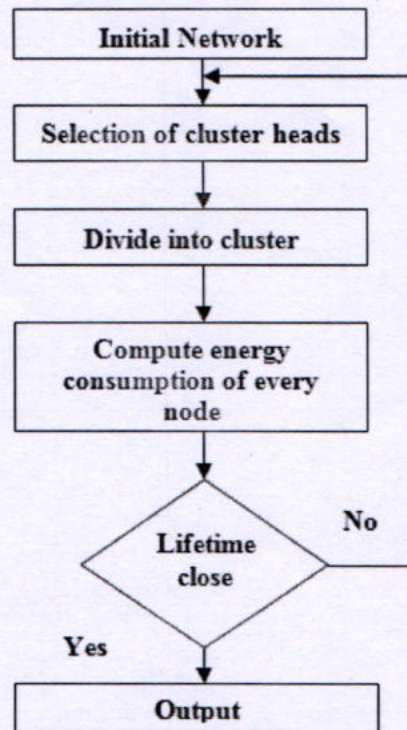


Fig.5. Flow of LEACH

The LEACH's activities are divided into two organizations:

1. set-up
2. Steady.

During the setup phase, each sensor point is between 0 and 1, a random opt for the

$$\text{If } n \in G, T(n) = \left\{ \frac{P}{1 - P \left[r \bmod \left(\frac{1}{P} \right) \right]} \right\}, \text{ otherwise, } 0,$$

Where,

P = percentage of nodes,

r = current round,

G = set of nodes.

This ensures that all sensor nodes end up spending an equal amount of energy. After the selection, their choice of cluster-heads to do inform all nodes, Based on the strength of the signal received, all nodes and select nearby cluster heads when they receive the information. Cluster heads, for their cluster members, analyzing a TDMA Table.

To lessen the overhead of cluster emergence, the steady phase is long. During the

3. Results and Discussions

number. If this random number is much fewer than the threshold for point n, T (n), the sensor point becomes a cluster head. Its threshold T (n) is computed as follows,

stationary phase, Based on the TDMA table, Data transfer takes place. Furthermore, cluster heads perform functions, such as merging or aggregation of data, by local computation. The BS is gets only information that is linked together from the cluster heads. This appears the principal way to conserve power. After a definite session in the stable phase, cluster heads are nominated by the set-up stage.



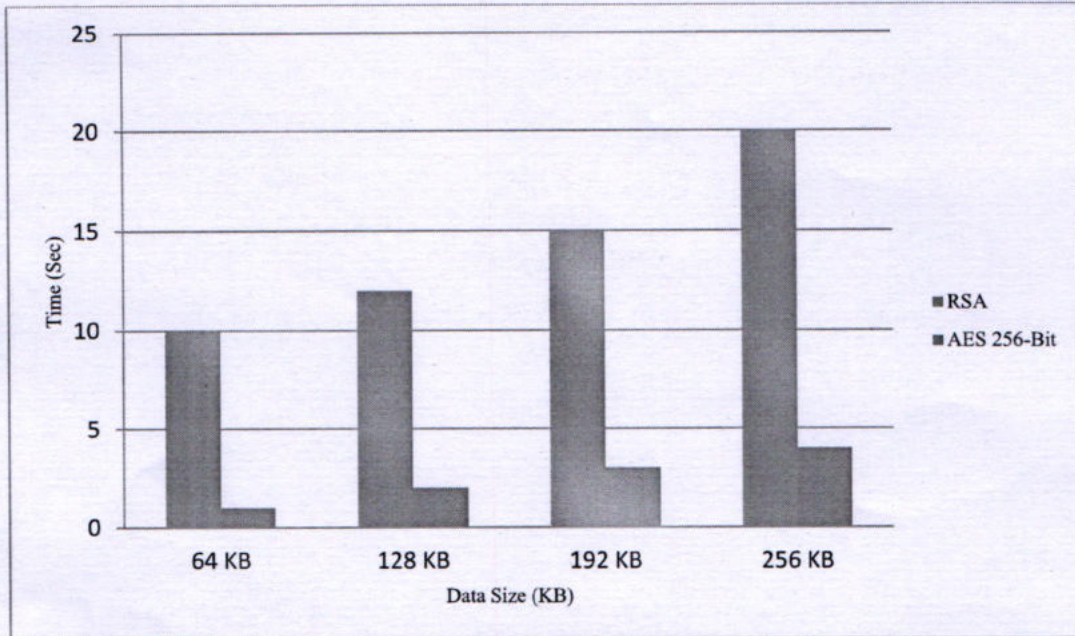


Fig.6. Comparison of Process time

This figure 6, shows how long time these two algorithms took to process the specific data. In it, the RSA system took nine seconds for the 64 KB data, and then the AES 256-bit, taking one second. Finally, the 256 KB, the RSA process, the 19 sec, and the AES 256 bit process took four seconds. So from this, the AES algorithm has taken much less time than the RSA process, and it has worked more accurately.

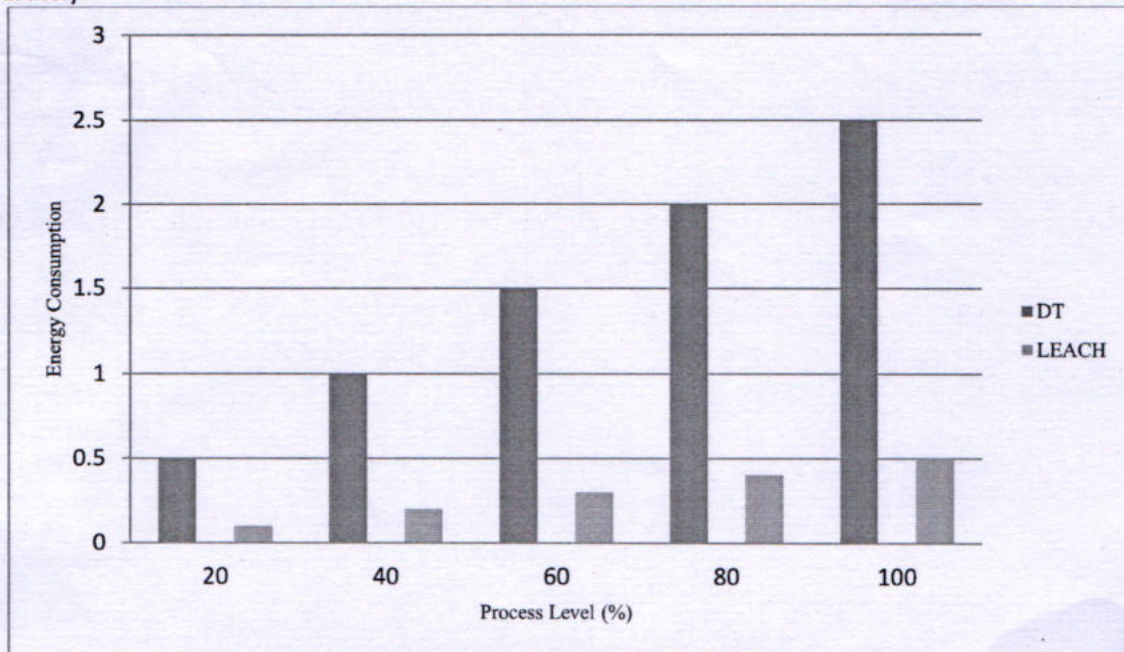


Fig.7. Difference of energy utilization

As shown in the figure 7 here, the two algorithms show how much energy their processes took. In it, to 20% of the processes,

the DT algorithm takes 0.4W energy, and the LEACH algorithm takes 0.1W energy. Finally, to 100% of the processes, the DT algorithm takes

2.4W energy and the LEACH algorithm takes 0.4W energy. Therefore, the Leech algorithm takes far less energy than the Thread method and its creation is very simple and easy to handle.

4. Conclusion

In this paper have looked at about some problems from in WSN and the steps taken to fix it, the two primary concerns in this manner are safety and power consumption. For these two types of problems, two methods were used, The AES 256-Bit algorithm is designed with the purpose of keeping most of the information more secure. Such a design, although provides a lot of protection, but because it takes up so much energy, uses the LEACH algorithm, which reduces the consumption of power and saves energy. So this paper is clearly believed to be very useful for users who are using WSN.

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A High Availability Algorithm for HSDC Architecture using Pipelining Technique

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Abstract— The rapidly expanding network connection requires that the data be maintained with more concurrently linked ports being switched in order to solve the storage issue, which can be overridden by physical systems to prevent storage allocation. Additionally, introduce the idea of n-port switching here. Using the high availability algorithm, this system can determine the optimal time for the system as well as automatically adapt the storage. In the past, they could allocate storage by using an n-port switch, but the proposed notion might take precedence and work in parallel. With the aid of intelligence, it serves as its predefined storage device. Consider a real-time data centre that has created invoices for its clients and sold things. In this situation, management must maintain a lot of data on the products, their prices, and customer information in addition to managing all the data about the resources. To store this amount of information, they therefore require a lot of storage space in addition to an on-premise server. Here, our algorithm will employ the idea of the on-premises server with decision-making and zero downtime to lower the entire infrastructure. This idea can greatly benefit from the high availability algorithm in terms of lowering downtime. Each data storage unit can be set up as a port so that several checks can be made on the storage and storage space can be allocated to store the data. We can also avoid downtime in the vast majority of situations. Use the fault tolerance algorithm in existing systems. It should be taking care of each component, minimising errors, preventing incorrect communication, and showcasing the high availability technique that was just presented.

Index Terms—Data center, Interconnection network, Network topology, Hypercube, Incremental scalability, Routing algorithm.

INTRODUCTION

Data centres, which are exploding in bulk, are the foundation of cloud computing over the Internet. The design of the network topologies and protocols necessary to connect tens of thousands or even hundreds of thousands of servers, storage devices, and networking components within a single data centre constitutes the data centre network. While this is going on, the data centre can provide inexpensive equipment costs, a large and balanced network capacity, ease of expansion, scalable communication performance, and robust fault tolerance.

While offering a wide range of online applications including search, gaming, Web mail, and others, data centres typically entail infrastructure services like GFS Map-reduce and Dryad. Server-centric and switch-centric are the two broad categories into which the data centre network (DCN) architectures can be categorised. Servers act as both a network or warder and a server in server-centric designs. These approaches increase the server's packet relay overhead. A switch-centric network often uses multiple switch trees to link the servers together. The interconnection intelligence in switch-centric systems depends on switches, whereas servers do not need to be changed for connectivity purposes. This group includes the networks Fat-Tree and VL2. Recursively specified network architectures for data centres such as FiConn, DCell, and BCube show that the k th level structure is built by connecting multiple. As the layers rise in these architectures, the number of servers also rises dramatically. For instance, if we build the D-Cell structure using 16-port switches, there are 272 servers when $k = 1$. The number of servers can rise to 74256 when k is raised from 1 to 2. As a result, the network structures that are defined recursively are unable to achieve a fine-grained expansion so that servers can be progressively added to the system in

accordance with the needs of applications.

Another server-centric data centre network architecture is HCube. Enhancing the effectiveness of searching for related data items in datacenters similar to Torus is the main driver behind HCube. When the Hamming distance between the identifiers of two data items is low, HCube considers them to be comparable. On physically close-by servers, related data items can be kept in HCube. By doing this, all related data items stored on these servers may be found using a single search request. A new class of data centre network topologies, known as dual-centric architectures, has just been proposed.

The routing intelligence in a dual-centric data centre network architecture can be installed on servers as well as switches. The dual-centric architectures combine the benefits of switch-centric and server-centric designs, and they provide a number of useful features for real-world data centres. To accommodate the exponential development of data, several data centres have been built recently all over the world. A large number of businesses, including Microsoft, Google, Facebook, Yahoo, and Amazon, have made considerable investments to build data centres. These massive data centres are capable of dynamically allocating vast quantities of hardware, software, and database resources to millions of Internet users at once. More storage space is required to keep the growing volume of data. Adding new components as opposed to swapping out gold ones is a traditional method of increasing storage. In reality, a few storage hosts are usually added on occasion as opposed to introducing a large number of servers all at once. Expect little to no impact on the system operator or the system itself during the addition.

By adding a small number of servers, a data centre architecture with high incremental scalability can be made

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larger while maintaining its topological characteristics. In order to retain the topological features of modern data centre network architectures as the size of the data centres continuously increases, it is becoming increasingly difficult to achieve incremental scaling. The performance of data centres is known to be greatly impacted by the network topology. An interconnection network should have certain characteristics, such as low diameter, scalability, large bisection width, and others.

One of the most adaptable and effective networks for parallel computation is the hypercube, which can effectively replicate any other network of a comparable size. The hypercube and its associated networks, including the Twisted, Folded, Generalized, and Hierarchical cubes, as well as the Exchanged, Crossed, and Crossed cubes, are all strong contenders for the architecture of parallel computer systems. By combining two n -dimensional hypercubes, one can create a $(n + 1)$ -dimensional hypercube. The n -dimensional hypercube can only link exactly $2n$ vertices, severely limiting the range of system sizes and creating a significant discrepancy between the two permitted sizes. As a result, incomplete hypercube, a modified hypercube topology with greater system size flexibility, is suggested. By combining numerous hypercubes of smaller dimensions, an incomplete hypercube is created. The main topological characteristics of the incomplete hypercube are comparable to those of the complete hypercube, and it can have any number of vertices. Additionally, the incomplete hypercube can grow by continually adding hypercubes of various dimensions.

RELATE WORK

We describe many data centre network topologies in this section. [1] Sprint Net, a cutting-edge server-centric network architecture for data centres, was designed, put into use, and evaluated. In terms of network bandwidth, fault tolerance, and latency, Sprint Net performs well. Sprint Net is a scalable, low-diameter network architecture that is independent of the number of layers and has a maximum shortest distance between any pair of servers that cannot exceed four.

[2] Data centre networking aims to connect a large number of server machines while requiring little in the way of capital expenditures, while also offering a high network capacity and high bisection breadth. It is common knowledge that the way servers are currently connected through a tree architecture of network switches cannot satisfy these needs. [3] Many big data applications depend on data aggregation; for instance, during the shuffling phase of a map-reduce assignment, data from multiple source racks (mappers) must be combined into one or more specified racks called aggregators (reducers) in the data centre network. In this study, we investigate methods for data aggregation to two aggregators in a data centre network under the restriction that data must be transported from a source rack to each aggregator via a single path.

Energy consumption makes up a sizable portion of operating costs in modern data centres. Only workload- or thermal-based job distribution amongst computing servers is the focus of current data centre energy optimization research. The communication fabric's impact on data centre energy use is highlighted in this research, which also introduces the DENS scheduling method, which combines network awareness and energy efficiency. The DENS technique strikes a balance between a data center's energy usage, employee productivity, and traffic demands. The suggested method maximises the trade-off between traffic pattern distribution and job consolidation (to use fewer compute servers) (to avoid hotspots in the data centre network).

THE PARALLEL ARCHITECTURES

The two types of parallel architectures—complete architecture and incomplete architecture—can be created by m -port switches and 2-port servers.

In order to speed up the processor, pipelining method is added. Pipelining is a method for carrying out the final function in parallel. Using the pipelining technique, high speed is possible.

A type of computation known as parallel computing involves running several calculations or processes concurrently. Large issues are typically divided into smaller ones that can be resolved all at once. Bit-level, instruction-level, data, and job parallelism are some of the several types of parallel computing. Due to the physical limitations prohibiting frequency growth, parallelism, which has long been used in high-performance computing, is now attracting more attention from the general public. Parallel cloud computing, mostly in the form of multi-core processors, has emerged as the dominant paradigm in computer architecture as power consumption and, subsequently, heat generation by computers have been a concern in recent years.

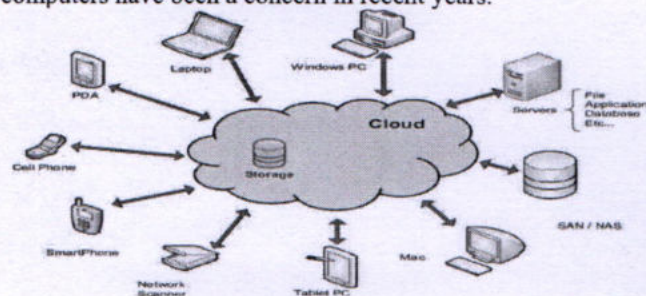


Fig 1 User Devices or Application of Cloud Storage

HSDC ARCHITECTURE

HSDC is a hypercube network-based system. 2-port servers and inexpensive commodity m -port switches make up the HSDC. After determining the internode distance that is the shortest, we create a fault-tolerant routing method for the

HSDC. Any vertex in the network can use the routing method to build a path between any two vertices. With the addition of the High availability Algorithm, we additionally examine the topological characteristics of HSDC.

The architectural model that describes a system design's structure, behaviour, and other aspects. It is made up of a number of modules that will operate in concert to implement the whole system. Process owner, user, create storage, port, and search module are among the modules that are included.

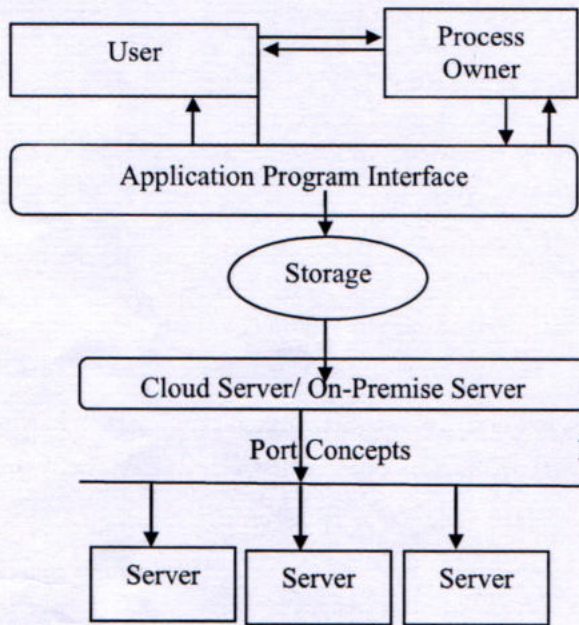


Fig 2 High Scalable Data Center (HSDC) Architecture

End user and process owner authentication is present in the module. It is capable of adding new users to our application interface, registering them, and

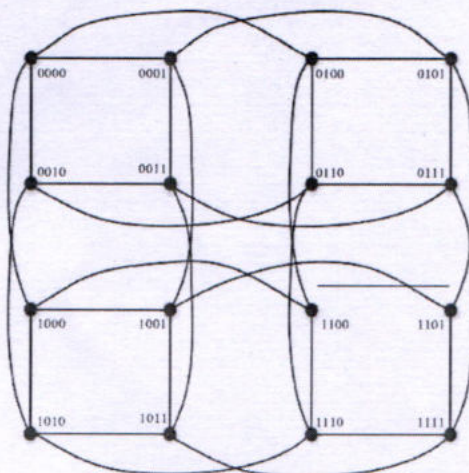


Fig 3 HYPERCUBE H4

enabling them to do other functions. It might be able to generate an end user and separate their user role at the same time. Normally, admin has the authority to perform this kind of function.

The registration data that the administrator can create can be stored in the user module. The end user can be used to refer to these users. They can take the whole game infrastructure for applications and other things. The event handler can carry out this action.

The end user's storage allocation can be served by the storage module. This might be the centralised application component. Only our major process begins here. Once the user has access to the designated storage, he or she may be able to carry out the necessary tasks for using the application.

The port module specifies how a server can carry out the necessary operation and switch from one server to another. Moreover, how the files that the end user registered were managed. It might be able to adjust the general application state as well as the current circumstance.

The system makes it possible for a data owner to effectively share his data with a defined group of users who adhere to a sharing policy. The data will retain its searchability, but the related search keyword(s) can also be altered after the data sharing. Users obtain the searchable keyword from the owner and use specific keywords to search documents, returning the results to the user.

Exc... Complete HSDC Architecture

A graph is typically used to represent an interconnection network, with the vertices being processors and the edges denoting links residing between processors. A set V of vertices and a set E of directed edges make up a graph, where $V = (V, E)$. A subset of the elements (u, v) of $V \times V$ is the set E . If $(u, v) \in E, (v, u) \in E$, then E is said to be symmetric, in which case the undirected edge is represented by these two opposing arcs (u, v) and (v, u) . If all of a graph's edges are undirected, the graph is said to be undirected.

We define an m -dimension hypercube H_m as follows since the entire HSDC architecture is built using hypercube networks.

Definition 1. In H_m , defines the vertices and edges are as follows:

- i) The vertices are identified as $(x_m...x_1)$;
 - ii) The edges are defined as $((x_m...x_1), (x_m...x_{y+1}x_yx_{y-1}...x_1))$;
- where $x_i \in \{0, 1\}$ and x_y the complement of x_y .

Definition of Complete HSDC Architecture

The HSDC_m(n) architecture is built utilising m-port switches and is based on the n-dimension hypercube.

Since every server port in the complete HSDC architectures is fully utilised, the HSDC architecture built using m-port switches has achieved its maximum number of servers, and we are unable to add any more servers to it.

We first define the term "full HSDC architecture" in this section. We suggest three different types of incomplete HSDC architectures after thoroughly examining the topological characteristics of the complete HSDC architecture. Based on the topological characteristics of the full architecture, the topological characteristics of the incomplete architectures are inferred.

The hamming distance between $x_m...x_1$ and $u_m...u_1$ is represented by the parameter d . The function $Valid(x_m...x_1; y)$ returns false if the vertex $(x_m...x_1; y)$ has a bug; otherwise, it returns true. The server $(x_m...x_1, \bar{p})$ is not defective, and the switch $(x_m...x_1, 0)$ executes the function $VDB(x_m...x_1, u_m...u_1)$ and returns a different bit of p between $x_m...x_1$ and $u_m...u_1$.

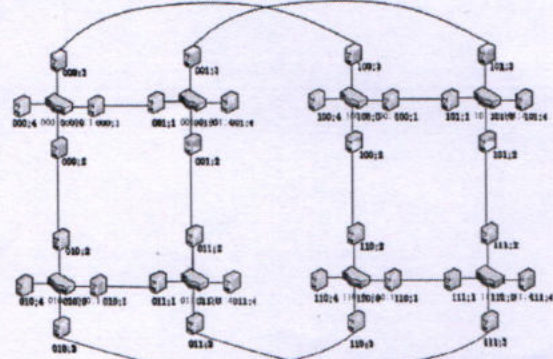


Fig 4 Hamming Distance

Algorithm 1: The routing algorithm for HSDC_m(m).

```

1 Function Route( $(x_m...x_1; y), (u_m...u_1; z)$ )
2   if  $d = 0$  then
3     ; /* The vertices  $n$  and  $t$  is in the same block, and
4     the path can be constructed in the block. */
5     if  $y! = 0$  then
6       if  $Valid(x_m...x_1; 0)$  then
7         return  $(x_m...x_1; 0)$ 
8       else
9         return  $(x_m...x_1; y)$ 
10    else
11      return  $(x_m...x_1; z)$ 
12  if  $d \geq 1$  then
13    ; /* The vertices  $n$  and  $t$  is in different block, and
14    the path will make the hamming distance  $d$ 
15    reduce to zero. */
16    if  $y! = 0$  then
17      if  $Valid(x_m...x_{y+1}x_yx_{y-1}...x_1; y)$  then
18        return  $(x_m...x_{y+1}x_yx_{y-1}...x_1; y)$ 
19      else
20        return  $(x_m...x_1; 0)$ 
21    if  $y = 0$  then
22       $p = VDB(x_m...x_1, u_m...u_1)$ 
23      return  $(x_m...x_1; p)$ 
    
```

Routing Algorithm

The routing algorithm is a crucial communication method for any network of connections. In this part, we propose a fault-tolerant routing method for HSDC_m(m), as illustrated in Algorithm 1, to handle switches or servers failing in a real-world simulation. This approach is fully distributed, therefore it can be applied to any vertex $n = (x_m...x_1; y)$ and may quickly identify the following unflawed vertex on the path.

Algorithm 2: The algorithm for HSDC_m(n).

```

1 Function InCom_Routing1( $(x_n...x_1; y), (u_n...u_1; z)$ )
2   ; /* Except the special case of  $y > n$  or  $z > n$  the path
3   can be constructed in HSDCm(n)
4   according to algorithm Route. */
5   if  $y > n$  then
6     return  $(x_n...x_1; 0)$ 
7   else if  $z > n$  then
8     return  $(x_n...x_1; 0)$ 
9   else
10    return  $(x_n...x_1; z)$ 
    
```

COMPARISON

The number of switches and links, scalability, diameter, and bisection breadth of the topologies of the Fat-Tree, DCell, BCube, and FiConn have all been thoroughly investigated in [8], [9], [14], and [10]. According to the number of switches, edges, diameter, bisection width, and scalability, HSDC is compared to various well-known data centre network architectures as Fat-Tree, DCell, BCube, and FiConn in Table 1. The performance of a data centre network design is significantly impacted by the characteristics used to do the comparison.

A measurement metric for network communication latency could be diameter. One of the desirable characteristics of an interconnection network is low diameter. The minimum number of edges that must be eliminated for a network to be divided into two identically sized sections is known as the bisection width. High network capacity and a more resilient structure against faults are implied by a wide bisection. The quantity of switches and links can be used to calculate the cost of building a data centre network when there are a set number of servers in the architecture. We also provide a simulation to assess how much money and energy HSDC uses in comparison to other standard data centre network architectures.

We use the assumption that all five structures support the same number of servers (N) in data centres and make use of the same kind of switches in order to conduct a fair comparison (m ports).

Diameter

The diameter of the Fat-Tree is $2\log_2 N$, which is equal to two times its height. DCell and FiConn's exact diameters are currently unknown. These two structures' upper bounds are both $2\log_2 N + 1$. The diameter of BCube, which is equal to $\log_2 N$, is the smallest of these server-centric systems. The diameter of the HSDC, which was examined in Section 3, is 2 m, making it relatively modest but significantly larger than the diameters of DCell and FiConn. Applications having real-time requirements can be supported by the HSDC.

Cost and energy consumption

In this part, we contrast HSDC's cost and energy usage with those of the other data centre network architectures when we employ them to build a network with an identical number of servers. We only consider the cost and energy consumption of the switches and NICs because the overall cost and energy consumption of the servers are the same.

SIMULATION RESULTS

A. Memory Pipelining

Figure 5 demonstrates how four inputs—datain1, datain2, datain3, and datain4—along with four address lines, four read/write pins, and four erase pins are stored simultaneously in memory. If the write/read pin is set to 0, writing has occurred; otherwise, reading has occurred.

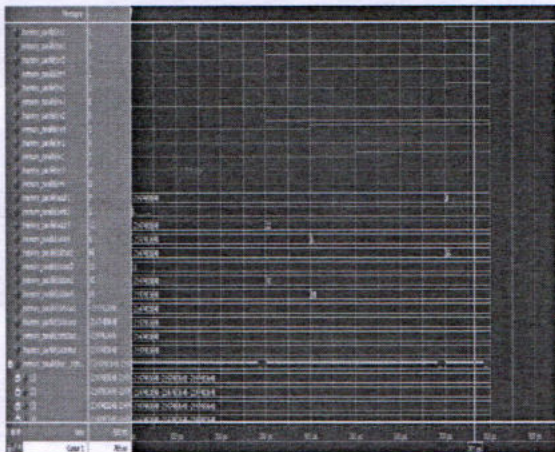


Fig 5 Memory Pipelining

B. File Handling

In Fig. 6, file handling manages the inputs stored in the system path and produces the output based on the user input file that was previously stored.

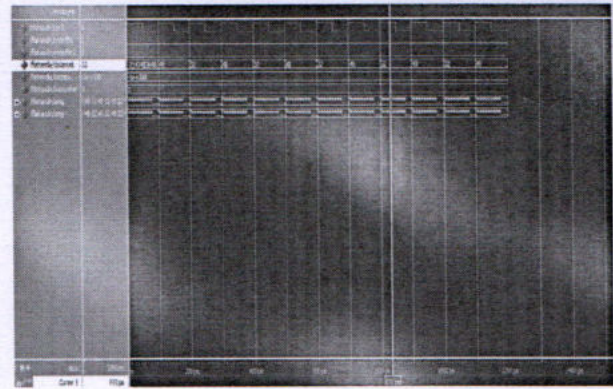


Fig 6 File Handling

CONCLUSION

In this study, we present HSDC, a brand-new hypercube network-based data centre network architecture. 2-port servers and inexpensive commodity m-port switches make up the HSDC. We create a fault-tolerant routing strategy for the HSDC after determining the shortest internode distance. 2-port servers and inexpensive commodity m-port switches make up the HSDC. Create a fault-tolerant routing strategy for the HSDC after determining the shortest inter-node distance. Any vertex in the network can use the routing method to build a path between any two vertices. Offer the HSDC a brand-new class of algorithm dubbed High availability. the HSDC's topological characteristics once the High Availability Algorithm was added.

This idea can greatly benefit from the high availability algorithm in terms of lowering downtime. Each data storage unit can be set up as a port so that several checks can be made on the storage and storage space can be allocated to store the data. Can also avoid downtime in the vast majority of situations. Use the fault tolerance algorithm in existing systems. It should be taking care of each component, minimising errors, preventing incorrect communication, and showcasing the high availability technique that was just presented.

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Fused medical image classification based on Neighboring pixel centered sparsity classification method with Artificial Bee Colony Optimization

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Abstract.

In the research area of clinical diagnosis, several types of medical images are provided by information processing of medical imaging and it is growing tremendously. The necessary information cannot be provided by single sensor image and the observed information also not sufficient to the doctors in clinical diagnosis. Images with different modalities are combined to obtain the comprehensive information of affected organs or tissues and the efficient results makes it possible to achieve complete evidence on the tissues or organs affected and it is called as medical image fusion. The computer tomography (CT) images and Magnetic Resonance Imaging (MRI) images are taken for fusion in this paper and the obtained images produces better visualization as compared to single images. But still, the fused image is needed to enhanced in quality of visualization. To improve the fused image quality, classification process is needed. So, neighboring pixel centered sparsity classification method with Artificial Bee Colony Optimization (ABC) has been proposed in this paper to enhance the quality of visualization in the fused image. Sparse representation of the pixels in the fused images are considered in this algorithm by using some of the training samples from the fused image. From the sparse vector and training samples with respective weights, the process of sparse representation is proceeded. Approximation errors present in the sparse vector is eliminated by Artificial Bee Colony Optimization (ABC) optimization. By using this algorithm class label of the test sample have been estimated. The proposed method achieved 96% of accuracy, 95% of precision, 95% of recall and 94% of F1 score. From the results of experiments, it is obtained that this algorithm performs well as compared to the conventional classifiers like support vector machine (SVM), K-neighbors and fuzzy.



Keywords.Fused image, sparsity, classification, sparse vector, Artificial Bee Colony Optimization, Neighboring pixel

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1. Introduction

The wider approaches of medical image fusion and general data fusion for addressing the medical problem reflected by the human body images, organs and cells. In the medical diagnostic area, the imaging technology application are growing and there is a historical documentation. As computer aided imaging approaches starts to assess the images quantitatively under examination, it aids towards the efficiency improvement of medical practitioners at the arrival of objective and unbiased decision in small timing span [1,2].

Medicinal diagnosis has also been improved by the image fusion application. CT, MRI, PET, ECT, and SPECT are some of the applications used for medical image fusion. These several images have its individual range of application. Lower spatial resolution is relatively present in this process and produces information with respect to blood circulation and visceral metabolism. High spatial resolution like CT, MR, B-mode, ultrasonic etc., are the anatomical images present in this process. Anatomical images and functional images are combined in medical fusion image as an image. Numerous information is comprised in the fused image and it is used for diagnosing disease by the doctor [3,4].

The Signal sparsity are the highly extreme powerful tool in several traditional applications of signal processing like denoising and compression as maximum natural signals are represented compactly by some coefficients which carries highly important data in some dictionary or basis. Later, representation of sparse data applications has prolonged to the computer vision's area and pattern recognition having the compressed sensing (CS) framework enhancement and the images and signals are sparse modelled [5]. The observation of natural signal's highest dimensionality and the signals with similar

class lying in low-dimensional subspace forms the basis for these applications [6,7].

One of the meta-heuristic algorithms based on swarm intelligence called Artificial Bee Colony (ABC) to optimize the mathematical issues. Intelligent honey bee's behavior was inspired by these optimization techniques. The foraging honey bee colonies behavior used by this model and forms the basis for this algorithm. Three necessary components are comprised in this model: Unemployed foraging bees and employed foraging bees for rich sources of food, that the 3rd component are closer to their hives. This algorithm describes 2 necessary behavioral modes of collective intelligence: forager's recruitment for rich sources of food resulted in positive feedback and desertion of poor source by foragers producing negative feedback [8]. However, this paper is contributed towards the design of classification model for fused CT and MRI image by using Neighboring pixel centered sparsity classification method, optimize the results of classification using ABC Optimization algorithm for enhancing the classification accuracy and the performance of classification is compared with the existing methods like SVM, K-means and fuzzy logic.

9052

The rest of the paper is organized as follows: Section 2 describes the related works. The system model is determined in section 3. Section 4 demonstrated results and discussion. Finally, Conclusion and future scope is presented in section 5.

2. Recent research works

In [9] multi-mode medical image fusion depending on deep learning was presented as per the multi-modal medical image characters, technology with respect to medical diagnosis and practical implementation for meeting the necessities of



medical analysis. From the results of experiments, this model's superiority is achieved depending on the visual quality and a diversity of estimation principles.

In [10], the algorithm for multimodal medical image fusion was presented for the problem of medical diagnosis in the wider range. The strategy of pulse-coupled neural network fusion is measured by boundary application and the strategy of energy attribute fusion in the domain of non-subsampled shearlet transform. This algorithm is validated qualitatively and quantitatively and it performed superior to the existing algorithm comprising significant medical diagnosis ideas.

The hyperspectral pixels are analyzed effectively by RNN method was presented in [11] and the categories of information are determined by the reasoning network. PRetanh was used by modified gated recurrent unit for hidden representation and it is accepted towards the recurrent layer construction in this network for efficient processing of hyperspectral data and entire no. of parameters are reduced. From the results of experiment, 3 airborne hyperspectral images propose modest performance in this mode.

For the classification of hyperspectral images, convolutional filters called Gabor filters are presented in [12]. Spatial information was extracted efficiently by Gabor filtering incorporating edges and textures that decreases CNN's FE burden. The results obtained revealed the method providing the outcomes with respect to accuracy of classification, particularly available with limited number of training samples.

The procedures of pre-trained and fine-tuning are regularized by a novel diversified DBN was presented by [13]. Efficient implementation are pretrained and fine-tuned with regularization by the framework of normal recursive greedy and back-propagation learning. The real-world experiments of hyperspectral images described by previously promoted diversity in both pretrained and the process are fine-

tuned leading to DBNs learnt with highly diverse latent factors, that directly making diversified DBNs for obtaining more results than initial DBNs and it is compared and best performance results are obtained with the existing methods of classification.

The method of deep feature extraction depends on siamese convolutional neural network (S-CNN) was used in [14] for the performance evaluation in classifying the hyperspectral image (HSI). Margin ranking loss function in S-CNN is present in this technique and it is considered as a significant characteristic with the extraction of highly discriminative features for the task of classification. From the results of experiments, feature extraction method with linear SVM classifier with improved performance of classification than the traditional approaches.

PCA-based EPFs (PCA-EPFs) technique for classifying HSI is presented in [15]. The stacked Edge-preserving features (EPFs) with spectral dimension is decreased by means of PCA that denotes EPFs in mean square sense and also pixel's separability is highlighted by EPFs.

Dimensionality Reduction Regression (DRR) method was established in [16]. Several techniques of dimensionality reduction with respect to the accuracy of classification and feature extraction for HIS. Most of the feature extraction approaches are used commonly like PCA, LPP, MDS, kernel PCA, DRR were utilized for HIS.

Multiple deeconvolutional neural networks (DCNNs) by means of synergic deep learning (SDL) was presented in [17]. End-to end model by the error's classification from DCNNs and synergic errors from DCNN's each pair. This SDL technique provides better performance than the existing system in the tack classification of medical images.

The algorithm dependent on CNN based on the dataset of chest X-ray was used for classification of pneumonia was presented



in [18]. The SVM classifier with orientation free features, local rotation, transfer learning on two CNN models called VGG16 and InceptionV3 and the training of capsule network from scratch. From the experimental results, it is proved that data augmentation was an efficient manner as compared to the existing algorithms for performance improvement.

An algorithm for classification of medical image dependent on multi-scale non-negative sparse coding was presented in [19]. The features obtained by features of multi-scale non-negative sparse coding are fused to achieve a histogram feature at multi-scale because of medical image representation. From the results of experiments, it is demonstrated that this method efficiently use contextual spatial information and multi-scale of medical image decreases the semantix gap with larger degree and the performance of classification of medical image was improved.

Multiscale geometric examination of nonsubsampling contourlet transform (NSCT) was adopted by multimodal medical image fusion approach by the techniques of type-2 fuzzy logic was presented in [20]. High-frequency sub bands fusion with an efficient type-2 fuzzy logic was presented. High-frequency coefficients are selected automatically by the local type-2 fuzzy entropy. Both the objective and subjective evaluation obtained efficient contrast, accuracy and versatility in this technique as contrasted with existing methods.

In most of the existing system image smoothening is performed to achieve the improved accuracy and achieves accuracy up to some extent. To improve the classification accuracy Neighboring pixel centered sparsity classification method with artificial bee colony optimization was proposed in this method.

3. System Model

In the proposed method, the feature extraction is performed by Non parametric weighted feature extraction and feature

vectors are obtained. Afterwards, the classification is performed by Neighboring pixel centered sparsity classification method with the training data and feature vectors. Artificial Bee Colony (ABC) Optimization is used to optimize the data. Figure 1 represents Proposed Classification Architecture based on Neighboring pixel centered sparsity classification method with artificial bee colony optimization.

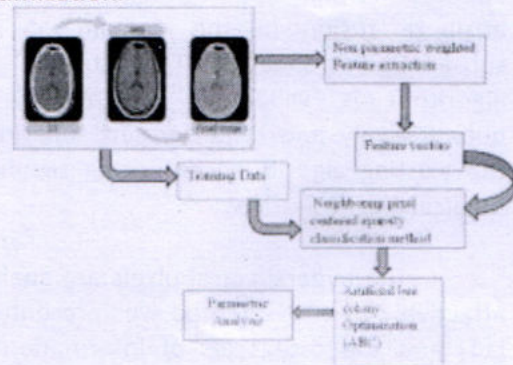


Figure 1: Proposed Classification Architecture based on Neighboring pixel centered sparsity classification method with artificial bee colony optimization

9054

3.1.1 Non-parametric Weighted Feature Extraction(NWFE)

A discriminant analysis feature extraction (DAFE) forms the basis for nonparametric weighted feature extraction (NWFE) and it is also considered as Nonparametric Discriminant Analysis (NDA) model.

The class-scatter matrix has the nonparametric characters in NWFE for L classes and are defined in equation (1) as

$$Y_i = \sum_{i=1}^L R_i \sum_{j=1}^L \sum_{k=1}^{n_i} \frac{\lambda_k^{(i,j)}}{n_i} (x_k^{(i)} - W_j(x_k^{(i)}))(x_k^{(i)} - W_j(x_k^{(i)}))^T \quad (1)$$

where, the i^{th} class at sample k forms $x_k^{(i)}$. The alterations based on the definition of weight and definition of local mean. The $\lambda_k^{(i,j)}$ is called as weight of scatter matrix which is the of $W_j(x_k^{(i)})$ and $x_k^{(i)}$ function are described in equation (2) as



$$\lambda_k^{(i,j)} = \frac{\text{dist}(x_k^{(i)}, W_j(x_k^{(i)}))^{-1}}{\sum_{l=1}^n \text{dist}(x_l^{(i)}, W_j(x_l^{(i)}))^{-1}} \quad (2)$$

where the distance from a to b is denoted by $\text{dist}(x_k^{(i)}, W_j(x_k^{(i)}))$. When the distance among $W_j(x_k^{(i)})$ and $x_k^{(i)}$ is smaller then $\lambda_k^{(i,j)}$ is very nearer to one; or else $\lambda_k^{(i,j)}$ will tends to zero and the total sum for i^{th} class is on. $x_k^{(i)}$ has the local mean $\lambda_k^{(i,j)}$ in j^{th} class are described in equation (3) and (4) as below

$$W_j(x_k^{(i)}) = \sum_{l=1}^{n_j} Z_{kl}^{(i,j)} x_l^{(j)} \quad (3)$$

$$Z_{kl}^{(i,j)} = \frac{\text{dist}(x_k^{(i)}, x_l^{(j)})^{-1}}{\sum_{l=1}^{n_j} \text{dist}(x_k^{(i)}, x_l^{(j)})^{-1}} \quad (4)$$

The class-scatter matrix has the nonparametric characters is defined in equation (5) as

$$Y_i = \sum_{i=1}^L R_i \sum_{k=1}^{n_i} \frac{\lambda_k^{(i,j)}}{n_i} (x_k^{(i)} - W_j(x_k^{(i)}))(x_k^{(i)} - W_j(x_k^{(i)}))^T \quad (5)$$

From the equation (5) feature vectors are obtained.

3.2 Classification of fused image by sparse representation

In this section, we first introduce a classification of medically fused CT and MRI image by the representation of the test sample with a linear combination of training samples from previous research and sparse vectors. The typical algorithms are utilized for solving the sparse representation, and also the process utilized to determine the test pixel's label.

In the sparsity prototype proposed, the pixel's spectral signatures fit with the similar class considered and it present within a low-dimensional subspace approximately. Consider the number of distinct classes as M, and consider N_m training samples are present in the class m are defined in equation (6)

$$x \approx \alpha_1^m a_1^m + \alpha_2^m a_2^m + \dots + \alpha_{N_m}^m a_{N_m}^m \quad (6)$$

$$= \underbrace{[\alpha_1^m a_1^m \dots \alpha_{N_m}^m]}_{A^m} \underbrace{[\alpha_1^m \alpha_2^m \dots \alpha_{N_m}^m]}_{\alpha^m} = A^m \alpha^m$$

here the fused image produces A^m that is in $B \times N_m$ class in which the training samples constitutes the columns of class m. The unknown dimensional vector of N_m is α^m , each and every entry of α^m are the equivalent atom's weights in A^m . The sparse vector is α^m in the sparsity model and it possesses only some nonzero entries. Thus, the modeling of unknown test sample present within the M subspace's union are related to M classes. Through the combination of fused image class value of m $\{A^m\}$ is $m=1, \dots, M$ for x test sample is defined by equation (7) and (8)

$$x = A^1 \alpha^1 + A^2 \alpha^2 + \dots + A^W \alpha^W \quad (7)$$

$$= \underbrace{[A^1 \dots A^W]}_A \underbrace{\begin{bmatrix} \alpha^1 \\ \vdots \\ \alpha^W \end{bmatrix}}_{\alpha} = A \alpha \quad (8)$$

9055

In the above equation, the training samples with structured data $B \times N$ from each and every classes having $N=M$; $m=1^{\text{st}} N_m$. is represented as A and sparse vector in N dimension is α designed by the concatenation of sparse vectors $\{\alpha^m\} m=1, \dots, M$. It is noted that x ideally belongs to the class m, then $\alpha_j = 0, \forall j = 1, \dots, M, j \neq m$. The x is a sparse representation and it is also known as linear combination of K active data α_k with respect to K and its values will not be zero entries like $k = 1, \dots, K$ and it is defined in equation (9) and (10)

$$x = \alpha_{\lambda_1} a_{\lambda_1} + \alpha_{\lambda_2} a_{\lambda_2} + \dots + \alpha_{\lambda_W} a_{\lambda_K} \quad (9)$$

$$= \underbrace{[a_{\lambda_1} \dots a_{\lambda_K}]}_{A_{\lambda K}} \underbrace{\begin{bmatrix} \alpha_{\lambda_1} \\ \vdots \\ \alpha_{\lambda_K} \end{bmatrix}}_{\alpha_{\lambda K}} = A_{\lambda K} \alpha_{\lambda K} \quad (10)$$

Where α with sparsity level or 0-norm is denoted by $K = \alpha_0$ in which the number of nonzero entries are denoted by α ; $\lambda K = \{\lambda_1, \lambda_2, \dots, \lambda_K\}$ is the index set that provides support to α ; $B \times K$ matrix is $A_{\lambda K}$, K atoms $\{\alpha_k\}$ are the



columns and K-dimensional vector is denoted by $\alpha \in \mathbb{R}^K$ that consists of α entries Λ_K . "A" data comprises the collected training samples directly from the fused image. The learning approaches are used to obtain more data or dedicated subspaces are created for every class by the analysis of principal components. Succeeding to this process, the test samples are classified and α is obtained.

The problem of reconstruction to find α as sparse vector for x test samples. Provided with the training samples of fused image A , α representation satisfies the statement $A\alpha = x$ which is acquired from the solution of optimization and it is defined in equation (11):

$$\hat{\alpha} = \underset{\alpha}{\operatorname{argmin}} \|\alpha\|_0 \text{ subjected to } A\alpha = x \quad (11)$$

For decreasing the errors of approximation in the empirical data, the constraint of equality is accounted and it is relaxed by inequalities defined in equation (12)

$$\hat{\alpha} = \underset{\alpha}{\operatorname{argmin}} \|\alpha\|_0 \text{ subjected to } \|A\alpha - x\|_2 \leq \sigma \quad (12)$$

where error tolerance is represented by σ . The problem mentioned above was calculated by the approximation error minimization occur inbetween a certain sparsity level is defined in equation (13)

$$\hat{\alpha} = \underset{\alpha}{\operatorname{argmin}} \|A\alpha - x\|_2 \text{ subjected to } \|\alpha\|_0 \leq K_0 \quad (13)$$

where upper bound on the sparsity level provided is denoted by K_0 . The problems mentioned above are NP-hard and it was solved approximately through algorithm of greedy pursuits like Subspace Pursuit (SP) or Orthogonal Matching Pursuit (OMP). Both the algorithms SP and OMP are utilized for locating the sparse vector's support that is used for solving the problem approximately and the selection of atoms from the data are in several ways. The augmentation of OMP algorithm includes support set with a single directory at every iteration till K_0 atoms are chosen, the error of approximation is present

inside threshold preset. K_0 indices set are maintained by SP algorithm. At every iteration, the set of index is obtained by refining the new candidates of K_0 and it is added with the present list and insignificant samples of K_0 from discarded the $2K_0$ candidate's list. Based on the mechanism of backtracking, K_0 is obtained by SP and it is considered as significant atoms. $O(BNK_0)$ order for computational complexity in OMP and $O(BNK_0)$ order for computational complexity in SP

The linear programming issue is the problem of relaxation for NP-hard problem and it is known as basis pursuit (BP) and it is replaced by zero and one and it is expressed in equation (14) as

$$\hat{\alpha} = \underset{\alpha}{\operatorname{argmin}} \|\alpha\|_1 \text{ subject to } A\alpha = x \quad (14)$$

9056

Likewise, the equation (15) and (16) follows the same problems and problems of convex programming are used for relaxation as

$$\hat{\alpha} = \underset{\alpha}{\operatorname{argmin}} \|\alpha\|_1 \text{ subject to } \|A\alpha - x\|_2 \leq \sigma \quad (15)$$

and

$$\hat{\alpha} = \underset{\alpha}{\operatorname{argmin}} \|\alpha\|_0 \text{ subject to } \|\alpha\|_1 \leq \tau \quad (16)$$

The greedy algorithms like OMP and SP are employed for solving the problem of sparsity-constrained optimization in (15) and (16) and BP denoising problem is solved. The x class was directly demonstrated by recovered sparse vector characteristics represented by $\hat{\alpha}$. The residual of m is defined as the error among the training and test sample reconstructed in the class m and it is expressed in equation (17)

$$r^m(x) = \|x - A^m \hat{\alpha}^m\|_2 \quad m=1,2, 3,\dots,M \quad (17)$$

here, the coefficient of recovered sparse part is denoted by $\hat{\alpha}^m$ with respect to the class m in the training samples. The x class is demonstrated with minimal residual is defined in equation (18)



$$\text{Class}(x) = \arg \min_{m=1,2,\dots,W} r^m(x) \quad (18)$$

From the equation classification results of fused image has obtained. Though the fused image is classified, it has some optimization errors and it is rectified by ABC Optimization.

4. Optimization Algorithm

The strategy of swarm intelligence optimization to solve multivariable problems of optimization, Artificial Bee Colony (ABC) algorithm was utilized. This model is taken as self-organization method based on bee colonies. Three major elements are comprised in this ABC optimization, they are sources of food, employed bees and it is also called as leading bees and unemployed bees. Scouts and onlookers are the two unemployed bee types. Three different behavior patterns are produced, they are food searching bees, attract bees, bees that unrestraint sources of food. A particular source of food related to employed bees as they are exploited and employed. In the hive, onlookers are provided with the food source's evidence by the food searching bees and the onlookers share the information with other bees. In the area of dance, the onlookers wait to select the source of food. By the method of roulette wheel selection, the source of food is assigned. The food source abandoned by the employed bee and this turns in to scout bee and random search is started for searching the new source of food in the surrounding areas. The population based on iteration was formed by incessant iteration, good individuals are retained by this algorithm and inferior individuals are eliminated and the global optimal solution was approximated. Depending on ABC benefits, fused image classification is done.

4.1 Steps involved in ABC optimization are as follows:

1st Step: Individual Representation: Position of bee or particle composes the individual and D-dimensional vector is represented by X called

$X = x_1, x_2, x_3, \dots, x_D$. The extracted features from the fused image are represented by D. The feature values are represented by $x_1, x_2, x_3, \dots, x_D$

2nd Step: The initial population is initialized in the random searching space. The original population is collected of N individuals; every X individual is in D dimension.

3rd Step: Fitness values evaluation: Fitness value is estimated on the classification basis and accuracy of classification is accomplished.

4th Step: The condition of termination is encountered and then optimum solution was selected. Or else, continue. Favorite accuracy was acquired by the condition of termination or extreme number of cycles.

5th Step: Update the population as per ABC: New positions were assigned to first half bees in random manner and last position and new position was selected as per the least fitness. Select the bee's position with least fitness.

6th Step: 5th Step is executed repeatedly till meeting the condition of termination. Condition of termination with desired accuracy or maximum number of cycles.

Step 7: Stop the algorithm when the maximum possible accuracy is achieved.

4.2 Pseudo Code for the proposed system

Step 1: Initialize weights and local mean $x_k^{(i)}$ and $W_j(x_k^{(i)})$

Step 2: Initialize scatter matrix weight $\lambda_k^{(i,j)}$

Step 3: Calculate mean distance from a to b

Step 4: If scatter matrix weight $\lambda_k^{(i,j)} < 1$

{
 $\text{dist}(x_k^{(i)}, W_j(x_k^{(i)})) < 1$

Else

$\lambda_k^{(i,j)} < 1$

{

$\text{dist}(x_k^{(i)}, W_j(x_k^{(i)})) > 0$

}}

Step 5: Calculate the function of local mean



Step 6: Calculate nonparametric within-class scatter matrix

Step 7: Obtain the N_m dimensional vector from feature vectors

Step 8: Obtain the training samples in the class m

Step 9: Initialize the sparse vector

Step 10: Classification of test sample x by α

Step 11: Calculate problem of reconstruction and search the " α " sparse vector for a test sample x

Step 12: Define optimization problem as $\hat{\alpha} = \text{argmin} \|\alpha\|_0$

Step 13: Calculate error tolerance

Step 14: Calculate the computational complexity by $\hat{\alpha} = \text{argmin} \|\alpha\|_1$

Step 15: Reconstruct the training samples by

$$r^m(x) = \|x - A^m \hat{\alpha}^m\|_2$$

Step 16: Calculate minimal residual from Classification results

$$\text{Class}(x) = \arg \min_{m=1,2,\dots,W} r^m(x)$$

Step 17: Optimize the classification results by ABC

5. Results and Discussion

The performance assessment of the proposed system is performed by comparison of the existing classifiers like SVM, K-means and fuzzy logic. Accuracy, Precision, Recall and F1 score are the parameters used for performance evaluation.

5.1 Accuracy

It is defined as the measurement of accurate values. The value measured should be close to the true value or standard values and the provided equation (19)

$$\text{Accuracy} = \frac{TP+FP}{TP+TN+FP+FN} \quad (19)$$

Table 1 describes Accuracy comparison of proposed method with the existing SVM, K-means, Fuzzy Classifier and Proposed method

Table 1: Accuracy comparison of proposed method with the existing SVM, K-means, Fuzzy Classifier and Proposed method

No of Samples	Accuracy(%)			
	SVM [19]	K-means [20]	Fuzzy Classifier [21]	Proposed
100	77	80	83	90
200	82	84	87	91
300	86	88	90	92
400	90	92	93	94
500	92	93	94	96

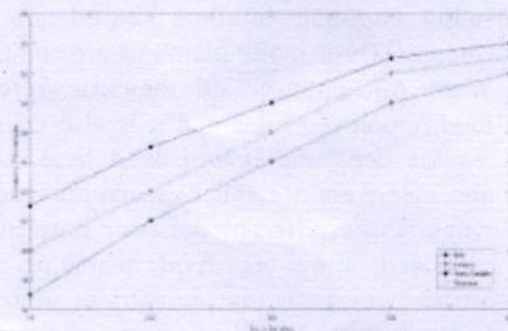


Figure 2: Comparison of Accuracy

9058

In figure 2 accuracy comparison of the proposed method with SVM, K-means and fuzzy classifiers are performed. In X-axis number of samples are represented and Accuracy in percentage is represented in Y-axis. In this figure, SVM is indicated in red color, k-means is indicated in green color, fuzzy logic is denoted by blue color and the yellow color represents the proposed method. In this method highest accuracy if 96% is achieved by proposed system and it is superior to the existing system.

5.2 Precision

The closeness of more than two measurements connected to each other is called as precision and it is defined in equation (20).

$$\text{Precision} = \frac{TP}{TP+TN+FP+FN} \quad (20)$$



Table 2 represents Precision of proposed method is compared with the existing SVM, K-means, Fuzzy Classifier and Proposed method
 Table 2: Precision of proposed method is compared with the existing SVM, K-means, Fuzzy Classifier and Proposed method

No of Samples	Precision(%)			
	SVM [19]	K-means [20]	Fuzzy Classifier [21]	Proposed
100	76	79	82	89
200	81	83	86	90
300	85	87	89	91
400	89	91	92	93
500	91	92	93	95

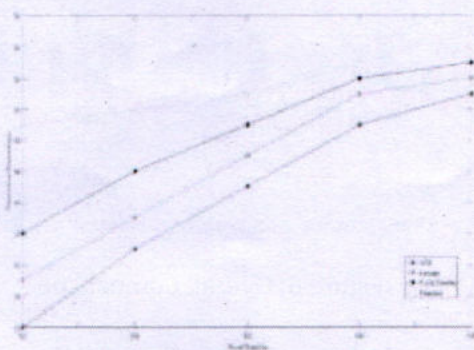


Figure 3: Precision Comparison

In figure 3 Precision comparison of the proposed method with SVM, K-means and fuzzy classifiers are performed. In X-axis number of samples are represented and precision in percentage is represented in Y-axis. In this figure, SVM is indicated in red color, k-means is indicated in green color, fuzzy logic is denoted by blue color and the yellow color represents the proposed method. In this method highest accuracy if 95% is achieved by proposed system and it is superior to the existing system.

5.3 Recall

It is defined as the ratio of true positives divided by the total number of samples are defined in equation (21).

$$\text{Recall} = \frac{TP}{TP+FP} \quad (21)$$

Table 3 shows Recall comparison of proposed method with the existing SVM, K-means, Fuzzy Classifier and Proposed method
 Table 3: Recall comparison of proposed method with the existing SVM, K-means, Fuzzy Classifier and Proposed method

No of Sample s	Recall(%)			
	SV M [19]	K- mean s [20]	Fuzzy Classifie r [21]	Propose d
100	78	81	84	91
200	83	85	88	92
300	87	89	91	93
400	91	93	94	95
500	93	94	95	97

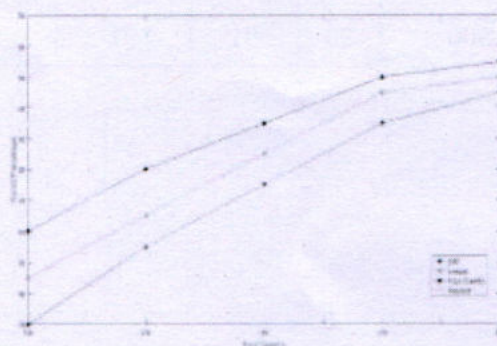


Figure 4: Recall Comparison

In figure 4 recall comparison of the proposed method with SVM, K-means and fuzzy classifiers are performed. In X-axis number of samples are represented and recall in percentage is represented in Y-axis. In this figure, SVM is indicated in red color, k-means is indicated in green color, fuzzy logic is denoted by blue color and the yellow color represents the proposed method. In this method highest accuracy if 97% is achieved by proposed system and it is superior to the existing system.

5.4 F1 score

It is called as **mean representation between precision and recall**. Performance rate is measured by this parameter.



$$F1 \text{ score} = 2 \times \frac{\text{Precision} \times \text{recall}}{\text{Precision} + \text{recall}} \quad (22)$$

Table 4 describes F1 score comparison of proposed method with the existing SVM, K-means, Fuzzy Classifier and Proposed method

Table 4: F1 score comparison of proposed method with the existing SVM, K-means, Fuzzy Classifier and Proposed method

No of Samples	F1-Score (%)			
	SVM [19]	K-mean s [20]	Fuzzy Classifie r [21]	Propose d
100	75	78	81	88
200	80	82	85	89
300	84	86	87	91
400	88	90	90	92
500	90	91	91	94

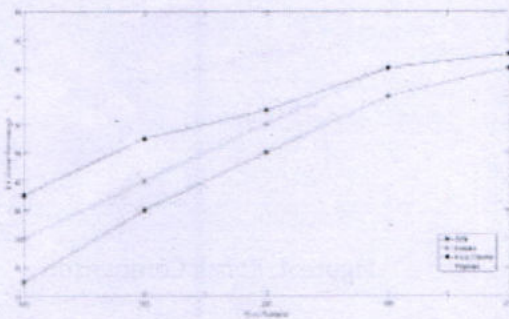


Figure 5: Comparison of F1 score

In figure 5 F1 score comparison of the proposed method with SVM, K-means and fuzzy classifiers are performed. In X-axis number of samples are represented and recall in percentage is represented in Y-axis. In this figure, SVM is indicated in red color, k-means is indicated in green color, fuzzy logic is denoted by blue color and the yellow color represents the proposed method. In this method highest accuracy if 94% is achieved by proposed system and it is superior to the existing system.

5.5 Overall Comparison

Table 5 describes Overall comparison of proposed method with the existing SVM, K-means, Fuzzy Classifier and Proposed method

Table 5: Overall comparison of proposed method with the existing SVM, K-means, Fuzzy Classifier and Proposed method

Parameters	SVM [19]	K-means [20]	Fuzzy Classifier [21]	Proposed
Accuracy	92	93	94	96
Precision	91	92	93	95
Recall	93	94	95	97
F1-score	90	91	91	94

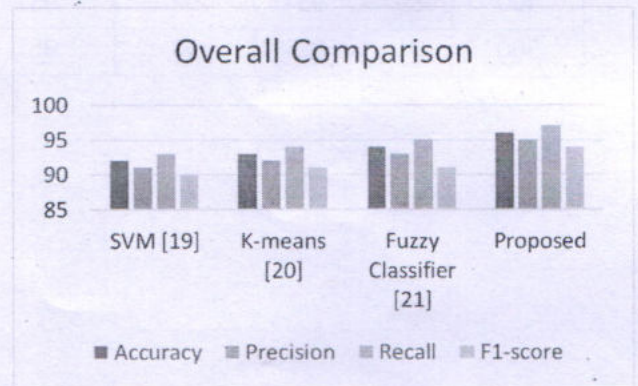


Figure 6: Overall Comparison

In figure 6, Overall comparison of the proposed method with SVM, K-means and fuzzy classifiers are performed. In the overall comparison clue color indicates accuracy, orange color represents precision, grey color represents Recall and yellow color represents F1 score. The proposed method achieved 96% of accuracy, 95% of precision, 95% of recall and 94% of F1 score.

6. Conclusion

In this paper, CT images and MRI images are taken for fusion and the obtained images produces better visualization as compared to single images. But still, the fused image is needed to enhanced in quality of visualization. Neighboring pixel centered sparsity classification method with ABC has been proposed in this paper to enhance the visualization quality of fused image. Spare representation of the pixels in the fused images are considered in this algorithm by



using some of the training samples from the fused image. From the sparse vector and the training samples with its respective weights, the process of sparse representation is proceeded. Approximation errors present in the sparse vector is eliminated by Artificial Bee Colony Optimization (ABC) optimization. By using this algorithm, class labelling of the test samples have been determined. The proposed method achieved 96% of accuracy, 95% of precision, 95% of recall and 94% of F1 score. From the results of experiments, it is obtained that this algorithm performs well as compared to the conventional classifiers like support vector machine (SVM), K-means and fuzzy. In future studies, the classification accuracy is further improved by the artificial intelligence methods

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Verification And Key Agreement In View Of Mysterious Character For Shared Cloud

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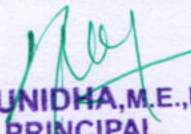
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Abstract—One of the most common issues faced by mobile customers is cross-cloud data migration, which is a necessary process when consumers switch their mobile phones to a new provider. However, due to a lack of local storage and compute power, it is frequently very difficult for people to understand the possibilities of smartphones. users should back up all data from the original cloud servers to their personal computers. mobile phones to continue efficient data movement paradigm between cloud providers, as well as mutual authentication and key agreement technique, to address this issue. For P the peer-to-peer cloud, we used cryptographic certificate-free cryptography. The recommended plan aids in the development of mutual trust. different cloud providers and establishes the basis because of its implementation. of data movement from one cloud to another Our scheme's mathematical verification and security accuracy are compared to well-known data migration strategies, demonstrating that ours is superior. In terms of the achieved reduction in both the cost and the time, the suggested plan outperforms previous state-of-the-art schemes. Costs of computation and communication Cloud computing, data transfer, elliptic curve, authentication, and key agreement are all terms that can be found in the index.

I. BEGINNING

With the rapid expansion of the smart phone and mobile terminal sectors, smart phones have become increasingly popular. People find it vital. China had an estimated population of 847 million people. In December 2018, there were 99.1 crores mobile users. % of them use their mobile phones to access the Internet [1].

Due to the computer's limited storage and processing capabilities, Users of cell devices frequently want to save huge data files (video and audio files, as well as streaming media) on their mobile terminals. files) stored on a cloud server This has sped up the study of different viewpoints on the cloud computing paradigm [3]. Manufacturers of smartphones are increasingly introducing and releasing new models. developing their own cloud computing services in order to give services to users, [5] and provide efficient data storage services. People are using hand-held devices like smartphones, tablets, and other such devices in record numbers. It's worth noting that a single person can own and use multiple properties. a number of smart devices Recycling is also very frequent. Given the fact that new technology is being introduced, people use their smart devices rather regularly. Arrivals are marked by more appealing innate characteristics from a wide range of manufacturers When customers want to use a new smart device from a different manufacturer, the data from the prior phone or tablet provider's cloud server should be transferred to the new phone or tablet provider's cloud server. The new smart device provider's cloud server. The Logging onto to the internet is a regular way to implement such transfer. Copy the original data center to the smart device .connect to the new cloud server via terminal devices, and finally transfer the information to the new server As seen in Figure 1 The procedure is inefficient and time-consuming. For this purpose, a more efficient and secure method of data movement from one cloud server to another is required. An optimal data migration model for transferring user data Figure illustrates data exchanged directly between cloud servers. Because models have varied requirements, they cause huge compatibility concerns. Multiple users function is given by


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cloud service providers In the process control process, there is both confidence and privacy risks. This ideal data migration model is based on transmission tough to put into practice. In past years, just few researchers that sought to solve data migration problems. For instance, Dana Petcu claimed in 2011 that the largest difficulties in cloud computing is figuring out what to do with all of the data. is cloud interoperability, and has proposed the new model. a method for achieving cloud portability Binz et al. [7] presented a cloud-based computing system. The migration of composites is supported by a motion framework. cloud-based applications or cloud-to-cloud applications Shirazi et al. published a study in 2012. created a system to facilitate data storage portability databases.

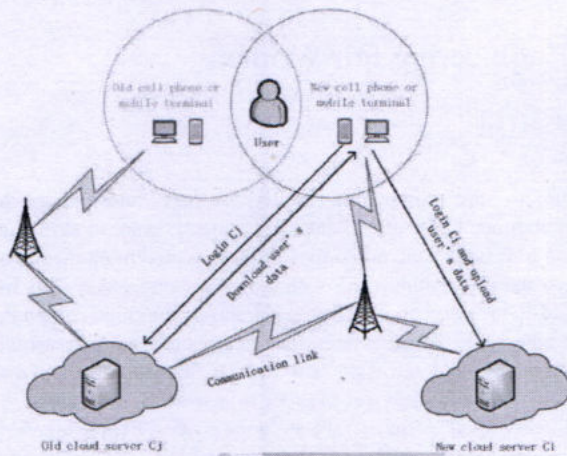


Fig. 1. Original data migration model

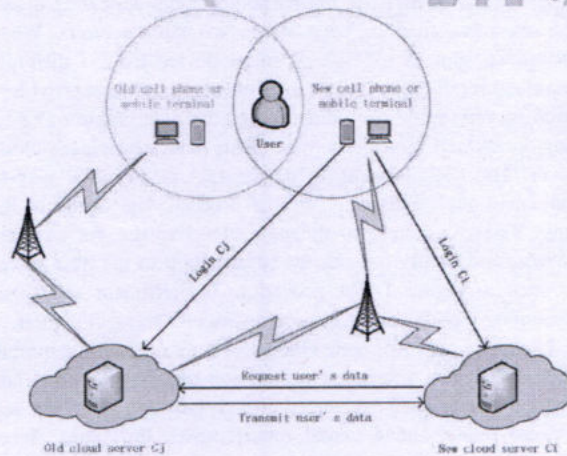


Fig. 2. Ideal data migration model

What Motivates Us

For starters, we learned that studying data migration across cloud platforms had a lot of practical implications. There are several unmet data transformation vulnerabilities between the clouds. challenges that could arise the Efforts that have already been made in the domain of cloud data Migration has clear drawbacks that limit its effectiveness. To put it in another way, further research into the context of cloud data is needed. Migration is a necessary and urgent necessity, particularly in the United States. That to allow faster and easier the data movement between cloud services After users switch cellphones, the servers are updated. Second, in the In practice, multi-cloud trustworthiness is difficult to establish. Especially in situations containing sensitive data, this has been accomplished. More security constraints are associated with transfers. As an example of obtaining mutual authentication and the constructing a communication transferring data safe and secure while avoiding potential cyber-attacks There are certain issues to consider. Authentication and key agreement mechanisms can be used to solve these issues in this case. Under light of this, this study provides a different solution. Using anonymous data as a basis for authentication and key agreement. identification for peer-to-peer cloud, with the goal of making it simple and accessible. data transfer between the many clouds in a secure manner

Our Contributions (B)

This is the first authentication and key agreement technique for peer cloud servers that we are aware of. The following are some of papers with most significant contributions.

- A peer-to-peer cloud authentication and key management system is proposed. agreement (PCAKA) mechanism based on the anonymous identity to address the issue of cloud server trust. The encryption is based on the elliptic curve certificate-free cryptography. Our system can create secure session keys between two parties. Session security must be ensured by cloud service providers.

- Our approach is unique in that it does away with the necessity for a trusted authority (TA) and simplifies operations while retaining security. Cloud hosting, under this design, allow data owners who require it to access their data. As a reliable third party, data migration services are available. so that they can trust each other and check each other keys between cloud service providers to ensure session security Our system is unique in that it does away with the necessity for a trusted authority (TA) and streamlines operations while retaining security. The cloud hosting in our scheme allow data owners in need of data migration services to operate as trusted third authorities, allowing them to authenticate each other and establish



trustworthy session keys once each of the participating users has individually performed some calculation. To secure the privacy of service providers and users, our approach employs site obscurity. It is worth noting that both cloud servers participating in the migration process use anonymous identities for mutual authentication and key agreement. This technique is not only protects the privacy of one's identity, but it also protects privacy of others. of the cloud service providers, but this also makes it almost impossible for such service providers to obtain superfluous information, such as the user's IP address Old and new mobile phones belong to Similarly, the users As a result, our process remains consistent. by not disclosing personal information about customers' privacy choice We use our approach to track down malicious cloud servers as it enables us to identify and trace them. If the cloud service providers show up, it'll be a good sign. Any mistakes or illegal actions made during the service procedure Based here on an anonymized profile, users can trace back to the real identity of the related data center. The Structure of the Rest of the Paper We introduce the few pieces related to the data migration and key exchange in Section II. Section III discusses our strategy's key prerequisites as well as their system model. Then we go over the specifics of our PCAKA scheme that we've proposed. Sections V and VI of the fourth section show how to encrypt data. Validate the proposed security level and ensure that it is correct. As an example, strategy This paper comes to a close with Section VII. We begin by sketching out our long-term research goals.

WORK IN CONNECTION WITH THE SECOND

A few approaches [9] through [13] have used techniques to facilitate the sharing of data in the cloud. Liang and Cao [9], for example, proposed the property-based proxy, a re-encryption mechanism that allows users to gain authorization. When it comes to access control, Lian and Au [10] disagree. It was pointed out that this system lacks adaptive security, as well as the CCA security features. Sun et al. [12] proposed the new concept. PBR is a proxy broadcast repeat encryption system that has been proven to work. In a CCA (selective decryption attack), its security The decision n -BDHE assumption generates a random oracle model. Ge and Liu [13] suggested a removable The agency in this circumferential scheme will use the re-encryption key to modify a collection of the representatives that the principal has defined. They also mentioned that the broadcast agent re-encryption is identity-based (RIB-BPRE). As a result, schemes do not make use of cloud computing. Cloud service services are inconvenienced. Liu et al. [14] suggested a method for securely transferring data across several owners. strategy for their cloud-based dynamic groupings. On the basis of the group Any solution that includes signatures and variable broadcast encrypting is appropriate. Users of the cloud can share their data with others anonymously. Yuan et al. [15] proposed a system to validate the quality of cloud user data. It depends on the updating of the polynomial authentication tag and their agent tag. technology that allows for multi-user modification in order to combat Other capabilities involve collusive attack. [16] Ali et al. based broadcast agent encryption (RIBBPRES) security paradigm to overcome the problem. The main revocation issue Se Da SC

is a secure data sharing cloud approach that encrypts information using a single encryption key. Data confidentiality and integrity, forward and backward access control, data exchange, and other services are all provided by this scheme. Li et al. [17] offered a fresh way of looking at things. a data-sharing mechanism based on attributes to help mobile users. Cloud computing has a finite amount of resources. Authentication and key agreement is a technique that allows you to authenticate and agree on a set of keys. Both participants must calculate the session key in secret on a public computer. channel, which has been extensively investigated [18][31]. As early as possible, Maurer [18] argued in 1993 with simply a change in the use of received signals aids in the achievement of full cryptographic security. no matter how powerful the enemy's computer is. However, they have not taken into account the benefits of authorized communicants. notwithstanding, suffices for establishing absolute cryptographic security notwithstanding. The adversary's computer power [19] Lu and Lin proposed a medical key negotiation scheme is based on the symptoms of the patient. matching He et al. [32] pointed out, however, that Lu's No identification, tracking, or resistance is provided by the scheme. As well as the cross-domain A handshake mechanism that can be used in a medical mobile social network as well as an Android app for experimentation. Liu and Ma [20] later discovered that He et cetera. did not work. fend off a repeat attack. and Lo [21] suggested a distributed mobile cloud computing service authentication technique with a variety of features, including user anonymity. Irshad and Sher [23] improved [the 21] technique to make a it more suited. for use in a variety of wireless mobile access scenarios. Networks, on the other hand, were mentioned by Jia and He [33]. The system proposed by et al. is vulnerable to impersonation and man-in-the-middle attacks. In addition, Irshad et al.'s Perfect forward privacy isn't supported by the scheme. Love and adoration Abbas [24] presented a strategy for fog verification. In the context of user anonymity, users and fog servers interact. The Mahmood et al. [26] presented an anonymous key negotiation. A Smart Meter can connect to providers surreptitiously using this protocol for power systems. However, Wang and Wu [31] pointed out that Amor et voila. susceptible to thIt is vulnerable to verifier attacks. Attacks such as man-in-the-middle and impersonation are common

[III. PRELIMINARY CONFERENCE]

Elliptic Curve (A)

An elliptic curve $E(F_p)$ is supported by a finite field FP , where p is positive integer. is a significant prime number. Y FP is defined as:

$$x^2 + 23 + x + \text{output and equals } 4 \text{ are constants. } 27 + 2$$

$2 + 6 = 0$. After modifying We refer to the point of infinity as O . I . and all other points as P . The multiplicative cycle group Meghan exists in the $E(FP)$ form.

B. Difficulty Issue



Any probabilistic linear time adversary has yet to solve the following complexity problem: We'll make use of them. Later on in the process of management and access control The problem of the Elliptic Curve Computable Discrete Logarithm (ECCDL) is as follows: Allow GQ to speak for itself. P is the GQ generator. The most important thing is to figure out $Z \cdot q$ which is not well-known and to Ensure that the criterion P is met. After each of the people interested has individually computed anything, the session keys are created.

• To preserve the privacy of consumers, you utilize network anonymity. Providers and users of services. It's worth noting that both of their cloud servers that will be used in the migration For mutual cryptographic verification, organizations use anonymous personalities. [6] discussed because of various appealing focal points, agreeable correspondences have been broadly viewed as one of the promising systems to enhance throughput and scope execution in remote interchanges. The System's Representation Due to the uniqueness of our concept, we substitute a trusted authority (TA) for the typical trusted authority (TA). the users, in order to generate system parameters and partial results. distribution of keys Our approach includes three entities, including a smartphone user U and two cloud servers C_i , C_j , as shown in Fig. 3.

• U: The consumer of either a cell phone who makes system parameters public. This sends out partial private keys to both the cloud and the user servers.

• Cloud or C_i

The cloud server for requesting data. This website's server verifies the user's identity and performs reciprocal check With the help of C_j , I was able to verify my identity and negotiate a key.

• C_j or Cloud j: The online cloud which also holds their source data. This website's server verifies the user's identity and performs reciprocal checks Using C_i for authentication and key negotiation Users should register and connect to both the cloud server C_i (the new provider) and the cloud server C_j (the original mobile device) while changing their mobile devices in our model. telephone service provider). The two cloud servers are now in a peer-to-peer relationship. scenario. The user shares a portion of the private key with both parties over a secure link to the cloud servers Then there were C_i and C_j . C_i sends a request message, and they exchange information. to C_j to start the mutual authentication and key exchange process.

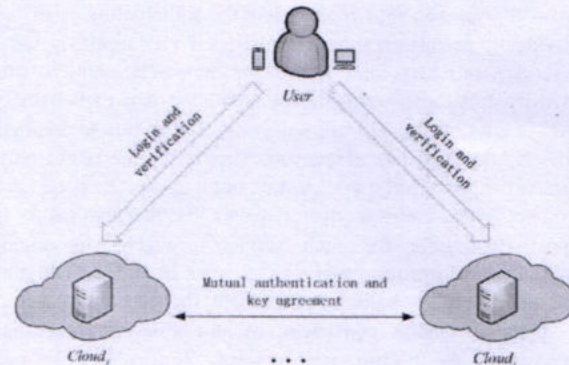


FIGURE 3: SYSTEM MODEL IV. THE PACKAGE PROPOSED SCHEME

This section goes over the specifics of our proposed strategy. There are three phases to the proposed PCAKA project. The PCAKA scheme employs the symbols listed below.

- IIDA Intelligent Design) C_i 's real name is c_i
- C_j 's identity (ID j) the page C_i 's alter ego
- C_j 's pseudonym is paid.

FIGURE 3: THE PCAKA PROPOSED SCHEME FOR SYSTEM MODEL IV

The specifics of our recommended plan are discussed in this section. The intended PCAKA project is divided into three parts. The symbols used in the PCAKA scheme are mentioned below.

- ID I (Intelligent Design) (Intelligent Design)

C_i is C_i 's true name.

- C_j 's real name (ID j)

C_i 's doppelganger

- PIDJ is C_j 's pseudonym.

Phase B: Log in

The user logs in and assigns a key to the cloud server at this point. This process is carried out by the user and the cloud server as indicated in Figures 4 and 5.

C_i Participate in Phase

- 1) User U accesses the C_i cloud server. computes $X_i = x_iP$, and saves (x_i, y_i) as its private key if all else fails. Finally, C_i makes R_i and the public key public (S_i, X_i) .

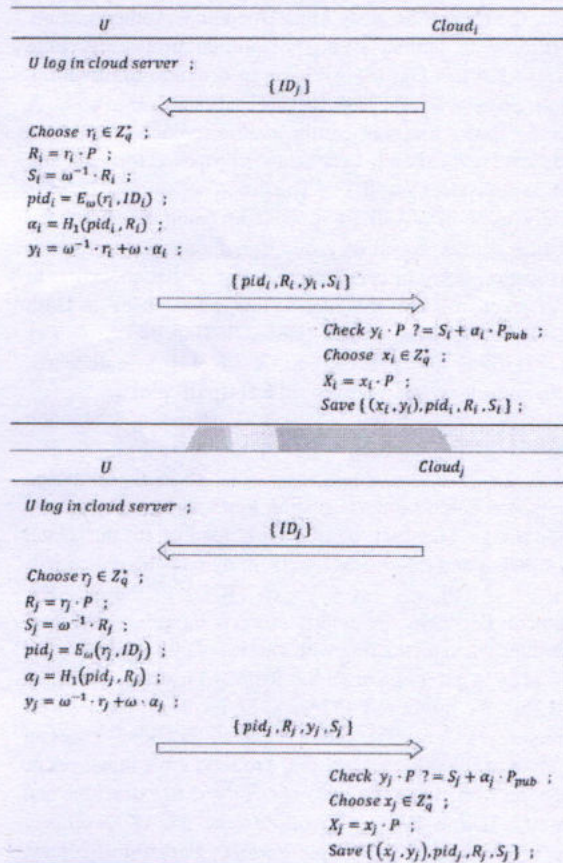
C_j Participate in the Phase

- 1) log in to the cloud server C_j as user U.



2) C_j uses the encrypted channel to convey its identify ID_j to U.

3) U selects an element r_j ∈ Z_q at random and saves it secretly. U creates C_j's pseudo identity pid_j = E by computing R_j = r_j · P, S_j = 1R_j and R_j = r_j · P, S_j = 1R_j (r_j, ID_j). Then U computes j = H1(pid_j, R_j), y_j = 1r_j + j as j = H1(pid_j, R_j). Finally, U uses a secure channel to communicate pid_j, R_j, y_j, S_j to C_j. [8] discussed that Helpful correspondence is developing as a standout amongst the most encouraging procedures in remote systems by reason of giving spatial differing qualities pick up. The transfer hub (RN) assumes a key part in agreeable correspondences, and RN choice may generously influence the execution pick up in a system with helpful media get to control (MAC),

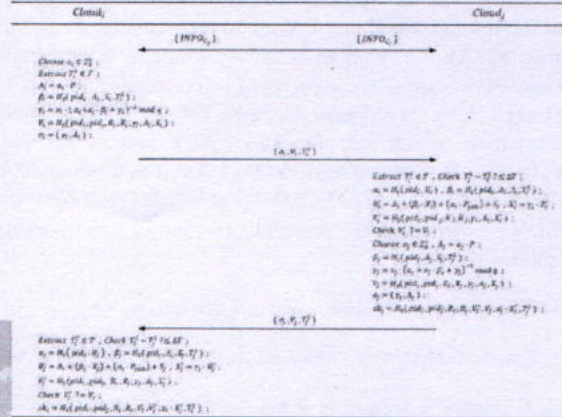


A phase of the C. Cloud Handshake

Proof. Assume that adversary A can fabricate a lawful login or the related response information with a non-negligible probability. Now we'll show how challenger C can solve the ECCDH problem with a non-negligible probability. nm. C chooses the request cloud C_i at random and then considers the responder cloud C_j as the challenge cloud, both of which have ID_i and ID_j as their identities. C generates four integers at random at the start of the P and sends Pub, H1, H2, H3, H and 4

to A as arguments. The following is how challenger C interacts with adversary A:

• H_k MK_k k): When A runs the query with message me, C checks if the tuple is in the list L H_k k (MK_k, nk).



If it exists, C returns nk to A; Otherwise, C randomly produces a number nk ∈ Z * q, and insert the tuple (mk, into L_k, where k = 1, 2, 3, 4. Finally, C gives nk to A as the return value. • SymEnc MK_k k, ck): Upon receiving the symmetric encryption query on message MK_k and key k_k, C checks if the list L_{se} has the tuple MK_k k,). If it exists, C returns CK_k to A; Otherwise, C randomly produces a string CK_k ∈ ZCK_q, (m k, n into to L where k = 1, 2, 3, 4. Finally, C gives n k to A as the return value. • Extract Sec(ID_k): Upon receiving the extract query with cloud identity ID_k, C checks if the list L₁ cloud has the tuple (ID_k, x_k, X_k). If it exists, C returns x_k to A; Otherwise, C randomly selects a number x_k ∈ Z *, computers X_k = x_k · P. Finally, C stores the new tuple in L₁ cloud and returns it to A. • Extract P are (ID_k): Upon receiving the extract query with cloud identity ID_k, C checks if the list L₂ cloud has the tuple (ID_k, R_k, y_k)YKIf it exists, C returns y_k to A; Otherwise, C executes as follows: - If ID_k = ID, C selects random numbers I, pidI ∈ Z * q And then, C inserts the tuple (rII ⊥, pidI) into the list L_{se}. C computes RI = rIP and sets yI = ⊥. Finally, C stores (pi d I, I aI) an (and I, pride, RI, ⊥) into LH1 and L₂ cloud respectively. - If ID_k = ID_j, C selects random numbers RJ, pidJ ∈ Z * q. Now, C inserts the tuple (rJ ⊥, pidJ) into the list L_{se}. C computes RJ = rJP and sets yI you. Finally, C stores (piDJRJ, aJ) and (ID_j, pidJ, RJ, ⊥) into LH1 and L₂ cloud respectively herewise, C selects random numbers rk, pidkpink * q . Now, C inserts the tuple (rk, ⊥, pidk) into the list L_{se}. C selects a random number ak ∈ Z * q, comutes Rk = rkP - akPpub and sets yk = rkak. Finally, C stores (pidkpinkk) and (ID_k, pidk, Rk, yk) into LH1 and L₂ cloud respectively. • Send(Πk Λ, m): When receiving the query of message m, C responds as follows: - If m = (σ_i, i): he query is message m, which is from C_i to C_j. * If C_i = C_i, C terminates the session. * If C_i 6= C_i, C_j 6= C_j, C per cooperates to the protocol's specification. - If m = (σ_j, V_j): The query is message m, which is from C_j to C_i. * If C = C_j, C terminates the session * If C_j 6= C_j, C_i 6= C_i, C terminates the session. * If C_j 6= C_j, C_i 6= C_i, according to



the protocol's specification. • **Reveal**($\Pi_k \Lambda$): When receiving the query, C checks if $\Pi_k \Lambda = \Pi_k C_i$ or $\Pi_k \Lambda = \Pi_k C_j$. If yes, C aborts the session. Otherwise, C gives the session key of $\Pi_k \Lambda$ to A as the return value. • **Corrupt**(ID_k): When receiving the query, C looks up the tuple (ID_k, x_k, X_k) and (ID_k, pink, pinky) from the list L₁ cloud and L₂ cloud respectively. At last, C returns (x_k, X_k, R_k, y_k) to A. Now, A outputs a legal login message σ_i or respond message σ_j of its correspondent. If (C_i, C_j) = (C_i, C_j), C terminates the game. Otherwise, C randomly selects a tuple (*, pidi, pidj, R_i, R_j, γ_i , X_{0i}, *) or (*, pdi, pidj, R_i, R_j, γ_j , A, X_{0j}, *) from the list LH₃. Then C outputs X_{0i} or X_{0j} as the solution of ECCDH problem. If C can solve the ECCDH problem with the probability 0, the system to satisfy the following events.

- E1: C does not terminate any Extract Sec query.
- E2: C does not terminate while responding to Send query.
- E3: C outputs a legitimate login message or its responder's message.

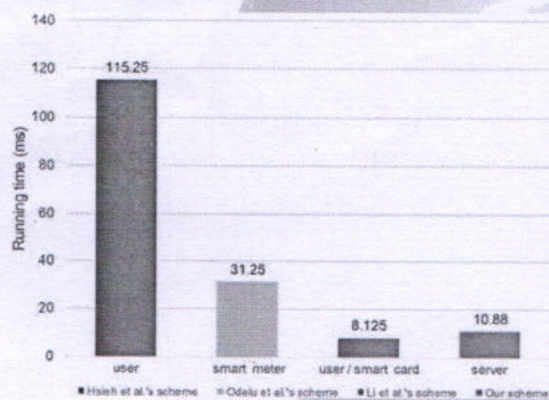
• E4: response C_j = (Π_k C_i, Π_k C_j). • E5: C selects a right tuple from the list LH₃. Let thesend , denotes of Extract Sec queries, Send queries, Hash queries and instance $\Pi_k C_i$ (or $\Pi_k C_j$). n denotes the number of, cloud service providers registered by users in the system. Then we obtain: $P_r[E1] \geq (1 - 2q + 1) qes$ $P_r[E2|E1] \geq (1 - 2\text{send} + 1) \text{send}$ $P_r[E3|E1 A E2] \geq P_r[E4|E1 A E2 A E3] \geq 1$ $m[E5|E1 A E2 A E3 A E4] \geq 2 qH3$ Therefore, the probability 0 that C can solve the ECCDH problem is calculated as below. $0 = P_r[E1 A E2 A E3] A E4 A E5 = P_r[E1] \cdot [P_r[E2|E1] \cdot P_r[E3|E1 A E2] \cdot P_r[E4|E1 A E2 A E3] \cdot P_r[E5|E1 A E2 A E3 A E4] \geq 2 \cdot (1 - 2qes + 1) qes \cdot (1 - 2qsend + 1) qsend \cdot n \cdot qins \cdot qH3$ (1) This is the opposite of the difficulty of send ECCDH problem. Thus we obtain the conclusion that any PPT adversary C can not fake a legal login information or the corresponding response information with a non-negligible probability. Theorem 1. When the ECCDH problem is hard, the proposed PCAKA protocol P is MA-secure. ng to lemma 1, we know that there no polynomial adversary can fake a legal login information a corresponding response information that on while the ECCDH problem is hard. Hence, we to confirm that the PCAKA protocol is MAsecure. Theorem 2. The proposed PCAKA protocol P is AKA-secure if the underlying ECCDH problem is hard. Proof. We assume that a PPT adversary A can correctly guess b with a non-negligible probability during the T est query. A challenger C solves the ECCDH problem with a non-negligible probability as follows. Let ESK represents the event that A acquire the right session key about C_i and C_j. We can et $P_r[ESK] \geq 2$, due to the probability that A guesses a right b is at least 1/2. Let ET est_i and ET est_j represent the event that A usthe T est query to C_i and C_j and obtains their session key, respectively. If A can forge a legal login message, then A can break the C_i - to - C_j authentication. This event is denoted by E_i→_j. Thus, we obtain the below. $P_r[ESK] = P_r[ESK A ET est_i] + P_r[ESK A ET est_j] = P_r[ESK A ET est_i] + P_r[ESK A ET est_j A$

E_i→_j] + P_r[ESK A ET est_j A \neg E_i→_j] ≤ P_r[ESK A ET est_i] + P_r[E_i→_j] + P_r[ESK A ET est_j A \neg E_i→_j] (2) That is to say, $P_r[ESK A ET est_i] + P_r[ESK A ET est_j A \neg E_i→_j] \geq 2 - P_r[E_i→_j] (3) Because ET est_i A \neg E_i→_j and ET est_i are equivalent, we get $P_r[ESK A ET est_i] \geq 4 - P_r[E_i→_j] (4) Thus, the probability that A breaking the authenticated key agreement is P_r[ski = H4(*, *, *, *(xi · xj) · P, *)|xi, xj ∈ Z * q] \geq 4 - P_r[E_i→_j] (5) According to the above, we know that P_r[E_i→_j] is negligible and is non-negligible. Thus, 4 - P_r[E_i→_j] (2) is non-negligible. Namely, the adversary A can solve the ECCDH problem. This conclusion contradicts with of the ECCDH problem. Thus, we conclude that PCAKA protocol is AKAssecure on the premise that ECCDH problem is hard. C. Security Analysis In this section, we analyze the security characteristics of the PCAKA scheme under the above "Security Model". Mutual Authentication. According to lemma 1, no polynomial probability time adversary A can fake a legal login or response information. [2] proposed a secure hash message authentication code. A secure hash message authentication code to avoid certificate revocation list checking is proposed for vehicular ad hoc networks (VANETs). The group signature scheme is widely used in VANETs for secure communication, the existing systems based on group signature scheme provides verification delay in certificate revocation list checking. In order to overcome this delay this paper uses a Hash message authentication code (HMAC). Thus thesession key ski = H4(pidi, pidj, R_i, R_j, xi · X_{0j}, T_{1j}) is calculated. In the same way, C_j figure out skj = H4(pidi, pidj, R_i, R_j, xXj · X_{0i}, T_{1j}).X_j according to section 4, however, Xi = X_{0i} (Xj = X_{0j}), xi · X_{0j} = xi · xj · P = xj · X_{0i}. WeX_jan obtain ski = skj. Thus, the proposed PCAKA scheme supports session key negotiation. Identity Anonymity. The two parties participating in the cloud handshakes and interactions with anonymous identities pidi = E_ω(ri, ID_i) apickidj = E_ω(rj, ID_j) in the PCAKA protocol. For them, anonymity protects the privacy of their identities when interacting with data on public channels. The adversary A can not extract the ID_i(ID_j) from the pidi(pidj). Thus, the proposed PCAKA protocol supports cloud anonymity. Identity Traceability. Cloud_i (or Cloud_j) uses an anonymous identity pidi (or pidj) to send error messages or illegal information tothe, user U can use ω to extract the real identity ID_i(or ID_j). Therefore, the PCAKA scheme supports identity tracking. Perfect Forward Secrecy. Suppose the adversary A can access the current private keys (xi, yi) and (xj, yj) of the cloud servers, respectively. However, the random numbers xi and xj are generated by C_i and C_j, respectively, and are updated with the process of building the session key each time. In addition, in order to obtain the previous xi and xj, A needs to them from the previous Xi and Xj, so that Xi = xi · P, Xj = Xj · P. That means A needs to be dealt with the ECCDL problem. Therefore, the PCAKA scheme provides perfect forward secrecy. Replay attack. Timestamps (T_{1i}, T_{1j}, T_{2i}) are used in the authentication process of the PACAKA protocol.$$



Communications from both the side generate fresh random numbers (a_i, a_j) and compute $A_i = a_i \cdot P, A_j$

computationally trivial hash operation and modular exponentiation operation when designing operations for the session sponsor. However, in our scheme, although the session sponsor is the cloud server, it used the elliptic curve point multiplication operation with cross computational overheads, so the sponsor's computational overhead is still greater than that of the side the session, both Hs et al.'s Odelle and Odelu et al.'s scheme used point-to-points and bilinear pairing operations that require an intense computation, so their schemes characterize high computational overheads. In Li et al. scheme, although their computationally intensive contains contains only one bilinear operation and one hash-to-point operation, the responder side still comprises high computational overheads. Our scheme only uses five point multiplication and other low-computational operations, a the lowest characterizes overhead among the studied four schemes. [4] discussed that the activity related status data will be communicated consistently and shared among drivers through VANETs keeping in mind the end goal to enhance driving security and solace. Along these lines, Vehicular specially appointed systems (VANETs) require safeguarding and secure information correspondences.



CONCLUSION

This paper proposed a novel scheme to transfer user data between different cloud servers based on a key agreement protocol. Through the mathematical analysis and comparative evaluation presented in this paper, the advantages of our scheme are proved from three aspects: security performance, calculation costs, and communication costs. Our proposed scheme can efficiently solve the primary problem of trust during data migration between cloud servers and further can provide anonymity for the identity of cloud servers. On the premise of protecting the privacy of cloud service providers, our proposed scheme indirectly protects the privacy of users. In addition, the identity traceability provided by our proposed scheme

also enables users to effectively constrain the cloud service providers. In future work, we plan to explore and develop a protocol that allows multiple users to share data across different cloud servers, with the motivation of enhancing the efficiency of data sharing among multiple users.

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NETWORK SLICING WITH E2E LATENCY

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Abstract

Network function virtualization is a promising solution for providing numerous services with varying characteristics and capabilities in 5G and beyond networks. At the same time, you must meet all of the conditions. Each service, in its way, Follows a set of instructions in particular. The service is excellent. A function chain (SFC) is a collection of routines that run on a computer. the cloudy atmosphere Various service slices to be made in good working order It's crucial to select the appropriate music. for the appropriate mood To install the features in the SFC, follow the steps below. The SFC requires cloud nodes to route them flexibly. the service flow that makes it possible for certain functions to be performed processed In, the end-to-end path is followed. In the appropriate SFC, a sequence is defined. All services are available. Latency limits (E2E) are guaranteed. budget cloud and communication resources have constraints. respected.

I. INTRODUCTION

Network function virtualization is an important technology for the fifth generation (5G) and beyond. B5G (beyond 5G) networks (NFV). As opposed to the networks where specialized service operations are the norm fixed NFV can be effectively replaced with processed NFV. Cloud technology can be used to set up some gear. network nodes with unique settings that process network traffic on-demand service functions, and then construct a flexible environment for each service request on the network, a virtual environment is created. network NFV-enabled networks NFV-enabled networks NFV-enabled networks NFV-enabled networks NFV-enabled networks NFV-enabled networks traditional networking is combined with network nodes. nodes. Each service is made up of several nodes (cloud nodes) as well as a collection of services The functions of a virtual network in a [3], [5], referred to as the predefined order (VNFs). SFC stands for service function chain. Node (computational) capability is limited. Without taking into account the restricting link/node capacity constraints in the [12] and [13] solutions, Depending on how the problem is phrased, it

may result in resource allocation constraints. infringements [14] were found on a shared site. investigated as a source of Virtual Network Functions (VNFs) and Traffic Flow Routing. It was a battle between the data centers that host the VNFs and called for a reduction in the number of VNFs. due to deployed VNFs' latency constraints [15] [4] discussed that the activity related status data will be communicated consistently and shared among drivers through VANETs keeping in mind the end goal to enhance driving security and solace. Along these lines, Vehicular specially appointed systems (VANETs) require safeguarding and secure information correspondences..

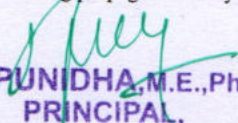
(B) What We've Done

In this paper, we present two new mathematical formulations of the network slicing problem that take into account the demand for E2E latency, the resource budget, and the flow at the same time, routing and functional instantiation are performed. The most crucial

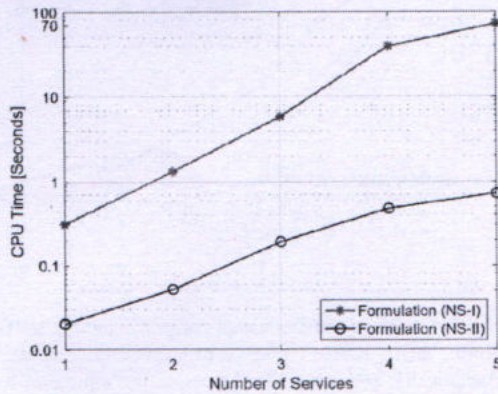
- First, we present a mixed binary linear model that incorporates traffic routing flexibility into the equation. formulation (MBLP) of programming in [21]. formulation (MBLP) of programming in (NS-I) ahead, which is natural (in terms of its nature). traditional solvers) and can be solved by design Gurobi [30] is an example of a variable. The issue is stated as follows: in such a way that the weighted average of the results is minimized overall power usage of the system across the entire cloud network (equivalent to the number of cloud servers in total) nodes in the cloud that have been deployed) as well as the overall latency of all of them based on the services

II. DEFINITION OF THE PROBLEM

Consider the directed network $G = (I, L)$, where $I = I$ is the initial condition. The total number of nodes in a network. The collection of linkages $L = (i, j)$ The set of nodes is $N = (i, j)$. Each connection must be active. C_i is the upper limit on the total data rate I_j , and j is the lower limit on the total data rate I_j . capacity. As a result, the queuing delay for each link has increased. [31] can be presumed to be insignificant. As a result, we can assume that each link's projected value is the same. delay (in the communication) She has a long propagation delay. Let V ,


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We create 100 problem scenarios at a time. For each fixed number of services in our system, at random results provided below are based on simulations. those outcomes

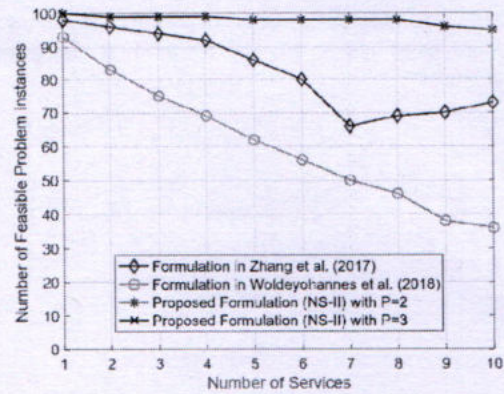


The CPU time required to solve formulations (NS-I) is shown in Figure 3. (NS-II).

The average amount of time it takes a computer to solve a problem (NS-I) Figure 1 shows the relationship between (NS-II) and the number of services. 3. There's a lot more, as you can see in Fig. 3. The NS-II formulation is more efficient to solve than the NS-I. constructing (NS-I). When the quantity of services equals the number of people, especially from 1 to 5. The amount of CPU time required to solve the NS-I formulation is more than the amount of time required to tackle the problem. The time required to solve the (NS-II) is 70 seconds, however, the time required to solve the takes less than a second to formulate (NS-I). We can make a diagram. Based on the simulation results, the following conclusions can be drawn: The formulation (NS-II) outperforms the formulation by a significant margin. In terms of content, option. As a result, we shall only use and discuss formulation in the following (NS-II). [2] proposed a secure hash message authentication code. A secure hash message authentication code to avoid certificate revocation list checking is proposed for vehicular ad hoc networks (VANETs). The group signature scheme is widely used in VANETs for secure communication, the existing systems based on group signature scheme provides verification delay in certificate revocation list checking

B. Actual Formulation vs. Proposed Formulation

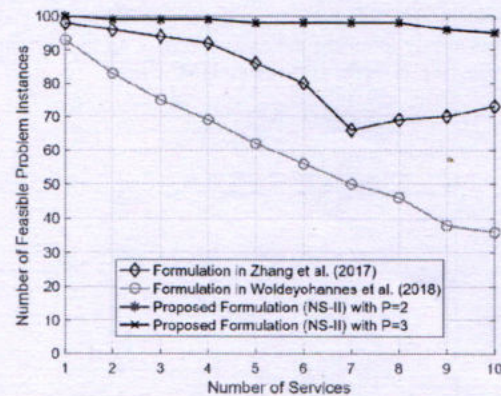
In this paragraph, we offer simulation data to demonstrate the efficacy of our proposed solution. in compared to the formulations in [21]. the topology of the fish network studied in [10] is considered. consideration. There are 112 nodes and 440 connections in this network. There are 86 nodes in this network that could be useful. There is only one node that can be chosen as the source node. be designated as the flow's origin. The currents' for further information on the destination node. Six Service functions may be handled by cloud nodes: Five of them are assigned to two services at random. The last of f's functions, f 4, is chosen. every function of the service



The number of problem cases that can be solved utilizing the formulations in [6, 21], as well as our proposed formulation, is shown in Figure 4. (NS-II).

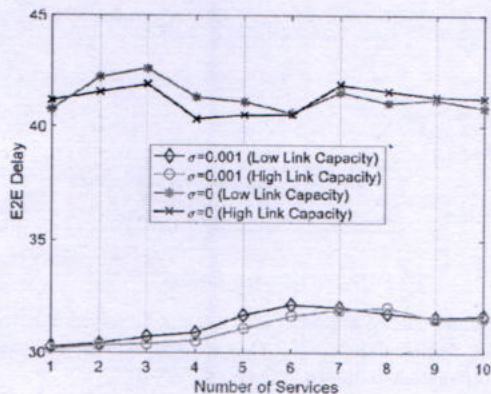
The number of possible problem cases is depicted in Figure 4, [21], and our suggested model as a function of time. (NS-II) with $P = 2$ and $P = 3$, where P is the principal component. the maximum number of transportation routes that can be used given to any two cloud nodes that process two data streams functions that are closely related to a service type because it isn't stated explicitly, The diamond in blue The E2E delay is used to produce the curve in Fig. 4. taking constraints into consideration We figure out a way to solve the problem. Replace the result with the resulting solution to the limitations on E2E energy usage or service E2E delay). The efficiency of the solution is compromised. Then we compare the original to our problem formulation (NS-II).

Formulations can be found in a variety of forms. To begin, as seen in Fig. 4. There is a great deal of flexibility. Our suggestion for a formulation (NS-II) enables traffic routing. for coping with a much larger number of people's difficulties that can be handled using the formulation of [21] (This can be thought of as a variation of our formula) (NS-I), or formulation (NS-II), as indicated, with $P = 1$ Section III), particularly if the number is significant. The quantity number of services accessible is impressive. For instance, if the number

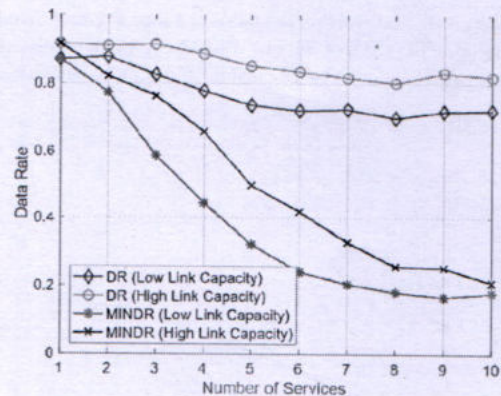
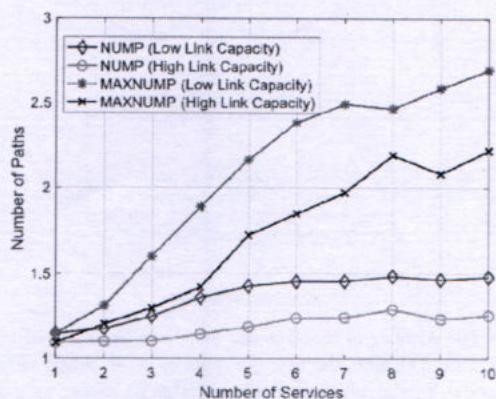


• The number of cloud nodes that have been turned on. Figure 5 depicts the average number of activated cloud nodes in the physical network. That is clear. as was

expected, More cloud nodes to be activated for both More cloud nodes must be triggered as the game progresses



The number of services on offer is increasing. Furthermore, the number of activated cloud nodes in the two groups is virtually equal when the number of services is modest (e.g., $|K| \leq 6$). equal. When the population grows, however, more services are necessary. The number of services is large (for example, $|K| \geq 7$). Cloud nodes must be connected in the low-difficulty problem. Take part in activities, when contrasted to individuals that have a strong connection. capacity This can be explained in the following way. As the number of services grows, the number of users on the network grows, and so does the amount of traffic on the network. This leads to the situation where some cloud is triggered. Due to the nature of some services, nodes are unable to process their functions. because the capacity of some lines is insufficient to route the traffic flow of information As a result, more cloud nodes are required in general. [6] discussed because of various appealing focal points, agreeable correspondences have been broadly viewed as one of the promising systems to enhance throughput and scope execution in remote interchanges. [8] discussed that Helpful correspondence is developing as a standout amongst the most encouraging procedures in remote systems by reason of giving spatial differing qualities pick up. The transfer hub (RN) assumes a key part in agreeable correspondences, and RN choice may generously influence the execution pick up in a system with helpful media get to control (MAC).



the data rates on the associated pathways and the traffic from their source nodes to destination nodes. Specifically, following We determine the minimum for each problem instance when we solve it. the number of paths [47] and the minimum data rate that corresponds to these routes, marked by the letters NUMP and DR, required realization. the traffic flow routing technique for each service ForLet MAXNUMP and MINDR stand for MAXNUMP and MINDR, respectively, for each problem case. the highest NUMP and lowest DR among all the associated services results of the average NUMP and the outcomes of the average NUMP are plotted in Figures 7 and 8. MAXIMUM, as well as average DR and MINDR, are used. In general, as the number of services grows, so does the number of NUMP. MAXIMUM grows in size, indicating that there are more traffic there is, or the smaller the link capacity, the more traffic routing flexibility is normally used and used in our proposed formulation (NS-II)

VI. CONCLUSIONS AND NEXT STEPS

In this research, we looked at the network slicing problem, which is critical in 5G and B5G networks. For the network, we have proposed two novel MBLP formulations. common slicing problem that can be addressed optimally Gurobi, for example, is a problem solver. The formulations we propose reduce the weighted sum of the entire system's overall power usage cloud network (equal to the number of cloud instances that have been activated) nodes and the overall latency of all SFC affected services requirements, all services' E2E latency constraints, and capacity limits on all cloud nodes and linkages While we're here to demonstrate that the two formulations we've given are mathematically sound when compared to the first formulation, the second formulation is comparable. The first has a huge advantage.

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OPTIMIZING INFORMATION LEAKAGE IN MULTI CLOUD STORAGE SERVICE

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ABSTRACT:Distributing data over multiple cloud storage providers automatically provides users with a certain degree of information leakage control, for no single point of attack can leak all the information. However, unplanned distribution of data chunks can lead to high information disclosure even while using multiple clouds. In this paper, we study an important information leakage problem caused by unplanned data distribution in multi cloud storage services. Then, we present StoreSim, an information leakage aware storage system in multi cloud. StoreSim aims to store syntactically similar data on the same cloud, thus minimizing the user's information leakage across multiple clouds. We design an approximate algorithm to efficiently generate similarity-preserving signatures for data chunks based on MinHash and Bloom filters, and also design a function to compute the information leakage based on these signatures. Next, we present an effective storage plan generation algorithm based on clustering for distributing data chunks with minimal information leakage across multiple clouds. Finally, we evaluate our scheme using two real datasets from Wikipedia and GitHub. We show that our scheme can reduce the information leakage by up to 60% compared to unplanned placement. Furthermore, our analysis on system attackability demonstrates that our scheme makes attacks on information more complex.

INDEX TERMS :Cloud computing, data dispersion, data encryption, key management, storage security.

I.INTRODUCTION

Cloud computing has shown remarkable development in recent decades. When stored as a service, it occupies the center stage and backbone for many applications, such as pattern recognition, image forensic [2] and forgery detection [3]. As a result, larger volumes of data will be a part of the cloud area. In the cloud industry, Amazon WebService (AWS) has become the de facto standard. As the core component of the OpenStack that follows this standard,Storage has become one of the most popular cloud storage mechanisms [5].However, Openstack Swift mechanism still faces many real security threats [9]–[11] while providing convenient services. According to Cloud Security Alliance's top threat case analysis report [9] released in 2018, two thirds of the cases will cause user data leakage, mainly due to management negligence and malicious attacks. For instance, under default configuration, OpenStack Swift mechanism typically stores data in plaintext for the sake of performance. That will lead unauthorized access to user data at the storage layer. In addition, security Report released by

Openstack Vulnerability Management Team VMT, the Swift mechanism may leak user data or configuration information in virtue of security vulnerabilities [11], [12].

Shah *et al.* [13] proposed a cloud-oriented data security storage mechanism under the framework of Apache Spark, which prevents data leakage and improves the security of the Apache Spark framework. To protect user data on the cloud, different encryption schemes [14]–[17] have been adopted to avoid information leakage during the machine learning process. Nevertheless, above research requires secure key management mechanisms to prevent cryptographic material exposure [18], [19].

Zerfos *et al.* [20] constructed a secure distributed storage system based on Hadoop system, which keep the confidant tiality of cloud data through data dispersion and encryption. It performs the data decryption and assembly tasks before reading data. To prevent the keys from being stolen, this method requires key cache server and all keys should be stored in memory only. Some approaches [21], [22] introduced independent third party to manage the key. It is assumed that third parties stay trusted. However, the assumption cloud not always exists in the real cloud storage environments [23].

Wang *et al.* [24] presented a data privacy preserving scheme for sensor-cloud system, based on edge computing

and differential storage method. In this scheme, user data would be divided into different parts and stored in local, edge and cloud layers respectively. But the scheme relies on the characteristics of data from wireless sensor networks, and requires skilled users to manage the edge servers. To improve the efficiency and decrease the redundancy, Zheng *et al.* [25] provided a cloud data deduplication scheme to detect and remove identical user data in the cloud. However, from the perspective of preventing data loss due to disaster, a certain number of copies should be sent to multiple regions.

In a word, to protect cloud data from leakage at the storage layer, this paper presents CSSM, a Cloud Secure Storage Mechanism. CSSM combines data dispersion with data encryption, so that large-scale cloud data and keys would be stored in chunked cipher texts. On this basis, user password and secret sharing are introduced to further protect key security. We implemented CSSM based on OpenStack Swift Mechanism and made several tests.

The major contributions of this work are listed below:

1) *Data Secure Storage*: In order to prevent data leakage and increase the difficulty of attack, this paper presents a method combining data distribution and data encryption to improve data storage security.

2) *Hierarchical Key Management*: To protect the key and prevent the attacker from using the key to recover the data, this paper introduces secret sharing and key hierarchy derivation algorithms in combination with user password to enhance key security.

3) *Experimental Evaluation and Analysis*: The security analysis and experimental results show that CSSM can effectively guarantee the security of data storage, and the increased performance cost is acceptable to users. Remainder of the paper is organized as follows: A brief overview of CSSM mechanism is made in Section 2. Section 3 explains the proposed mechanism, and Section 4 introduces the implementation of CSSM. The Experimental evaluations have been shown in Section 5. We discussed several variants and extensions of CSSM in Section 6. Finally, Section 7 concludes our work.

II. CSSM OVERVIEW

A. REQUIREMENTS ANALYSIS

The main objective of the proposed mechanism is to secure cloud storage against data breach, which may be the result of targeted attack (e.g. disk cloning) or management negligence (e.g. misconfiguration), in case hackers or even some malicious administrator is able to steal user data.

Aiming at this goal, data dispersion or encryption is the most commonly adopted way in numerous cases. Both techniques could provide privacy-preserving, but they also come with inherent risks. Data dispersion spreads data pieces across different storage areas, but there still lies an opportunity to recover data when attackers obtain enough

pieces. Data encryption technology stores data in cipher texts by encrypting data with cryptographic keys. However, attackers can still recover the original data by stealing the keys. That raises the problem of key protection and management. Therefore, to maximize the confidentiality of cloud data storage, the proposed mechanism should make full use of the advantages of the method and effectively control its disadvantages. Meanwhile, the increased cost of the mechanism should be within a reasonable range. Specifically, following properties should be met:

Property 1: From the perspective of protecting cloud data confidentiality, any user data stored in the cloud would not be released, viewed, stolen or used by unauthorized individuals, such as hackers or some malicious administrator.

Property 2: On the basis of property 1, any parameters like cryptographic keys, which are related to keep cloud data confidential, should also be protected.

Property 3: The additional performance overhead of deploying proposed mechanism should be within the user's acceptance.

B. ARCHITECTURE OVERVIEW

To realize primary object and properties above, this paper presents CSSM, a cloud secure storage mechanism. As shown, in Figure 1, CSSM could be divided into three layers: The user layer, the proxy layer, and the storage layer.

Specifically, the main functions of each layer are as follows:

1) *User Layer*: This layer is deployed on the user's machine, and the user operates (upload, download, etc.) cloud data through the client.

2) *Proxy Layer*: This layer is deployed in the cloud and composed of proxy nodes with trusted execution environments, such as Intel SGX technology [26] and ARM Trust Zone technology [27]. In trusted execution environment, CSSM programs could perform as expected. CSSM in the proxy layer includes four modules: data encryption/decryption, data dispersal, key management and distributed storage.

③ *Encryption/Decryption*: This module is used to encrypt user uploaded data and decrypt user downloaded data.

③ *Data Dispersal*: According to the data dispersal model, the cipher text is divided into several small blocks.

③ *Key Management*: This module is not only responsible for the generation and maintenance of the key, but also uses the hierarchical key management approach to protect the key.

④ *Distributed storage*: This module distributes chunked and encrypted data to the storage layer.

3) *Storage Layer*: This layer consists of a number of storage nodes that are used to store chunked and encrypted data. Considering data loss or unavailability caused by accident like equipment damage or natural disasters, cloud service providers divide large number of storage nodes into several zones, each of which acts as a failure boundary between multiple copies of the same data.

III. CSSM DESCRIPTION

From the perspective of improving the confidentiality of user data in the cloud, this paper presents CSSM, a cloud secure mechanism to ensure data security and avoid data breach. The Core idea of the CSSM mechanism is to increase the difficulty of stealing data. To this end, CSSM process data before storing to cloud storage nodes through two aspects of work.

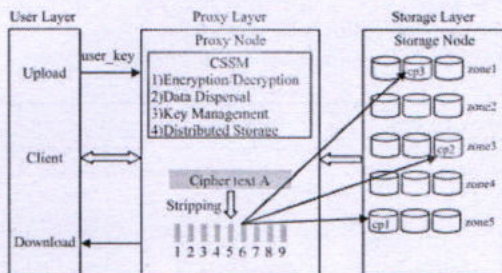


Figure 1: CSSM system model architecture

First, CSSM uses data dispersion to divide uploaded files into several parts, and each part is called a fragment. When users upload files into the cloud, files will be divided and stored as fragments into different storage nodes. Compared with an undivided way, our mechanism would contribute to protect data, making it difficult for attackers to obtain complete data. On the other hand, although user files are stored in fragments, it is still possible for attackers to recover the fragments to complete user files according to the logical relationship between the contents. Therefore, our mechanism introduces data encryption. The introduction of data encryption technology is helpful for fragmentation cipher-text storage, and it further increases the difficulty for attackers to steal data.

A. DATA DISPERSION

In order to prevent attackers from stealing complete user data, CSSM first uses data dispersion technology to split data into fragments, and then distribute the fragments to different storage nodes. Due to the uncertainty of the location where data was stored, attackers could hardly locate all fragments and recover user files. To further reduce system overhead, CSSM selected DDS—Stripping(1,n,n) [28] as the dispersal model. However, cloud storage mechanism still needs to restore each fragment when the user downloads files. And CSSM needs to keep the record of the composition relationship between user file and

fragment. By stealing the record, attackers have the opportunity to obtain the complete user file.

In addition, the code stored in the proxy nodes may be viewed or tampered with by malicious entities, and the sensitive information in CSSM may be maliciously spied on or stolen during the operation of the system. In response to the above security threats, we believe those can be dealt with by trusted computing technology (such as trusted execution environment and remote attestation technology). The problems that trusted execution environment addresses can be twofold. One is to prevent the code of the proxy service node from being tampered, which usually adopts integrity measurement and remote attestation technology to determine whether the code should be trusted.

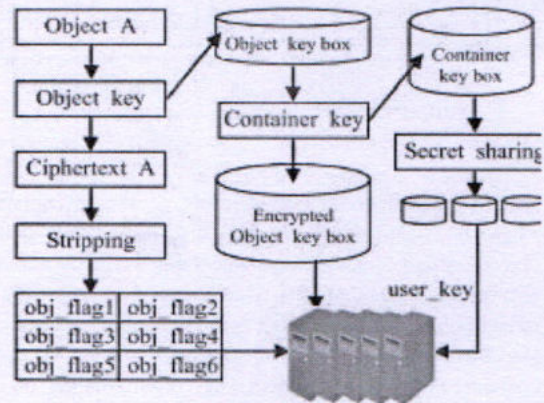


FIGURE 2. CSSM system mechanism

On the other hand, trusted execution environment could ensure that CSSM code runs without interference. We assume CSSM is implemented in a trusted execution environment on proxy nodes. Detection mechanisms and monitoring mechanisms are needed to prevent code tampering and ensure the trusted execution of programs in case of malicious behavior. Nowadays there are many achievements that can be used for reference [29], [30]. The CSSM mechanism is based on the research of trusted computing.

B. DATA ENCRYPTION

Encryption is the most common way to secure user data. In order to reduce time overhead, 128 bit AES symmetric encryption algorithm is selected to implement the encryption and decryption for user data. Key generator should be required in the proxy layer to generate the symmetric key for encryption and decryption. Due to the introduction of data encryption, it brings the necessity and importance of key management. As shown in Figure 2, we put forward the key hierarchical management method to

protect various keys. In cloud storage system, user data is usually regarded as an object and stored in some

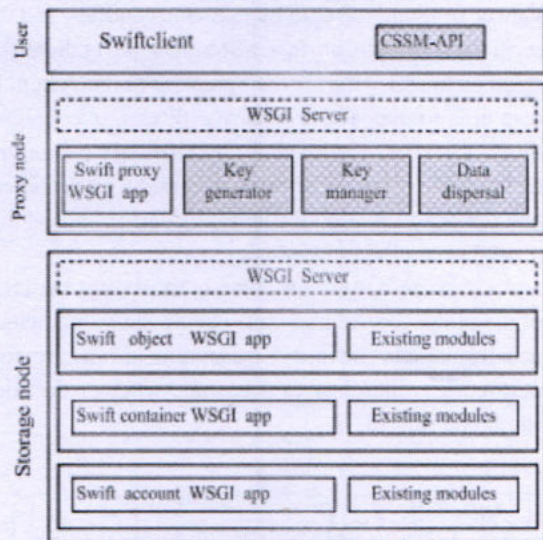


FIGURE 3. CSSM system implementation architecture.

specified container. In CSSM, each object and container would be assigned a symmetric key, respectively called object key and container key. Object key would be used for encrypting assigned objects. That is to say, the confidential issue of objects will be turned to the same number of object keys. Besides, we design an object key box for each container, in which the object keys of all objects in the container are stored. Then, all the object keys in the object key box are encrypted by their container key and stored in the cloud. Similarly, the confidential issue of object keys will be changed to fewer containers. In order to guarantee the security of the container key, all the container keys of a user are integrated to form a container key box. A secret sharing algorithm [31] is used to divide a container key box into n -block secret sharing blocks whose threshold value is (m, n) . To locate these secret sharing blocks, we use the hierarchical key derivation algorithm [32] to establish the index tree whose root node is $user_key$ set by the user. Because the $user_key$ is considered to be a secret only known to the user, it is difficult for attackers to obtain the container key without the $user_key$, thus ensuring the confidentiality of the container key. In addition, we regard the problem of updating the index tree caused by the change of $user_key$ as a problem to be solved in the future. As shown in Figure 2, CSSM adopts the "dispersion and encryption" strategy for all objects: 1) each object is encrypted to cipher-text first, and then divided into several cipher-text fragments that would be stored in the cloud sepa-

rately; 2) the object key box consisting of a number of object keys is encrypted by the container key and stored in the cloud;

3) by secret sharing and hierarchical key derivation algorithm, secret sharing blocks are generated and stored in the cloud.

IV. PROTOTYPE IMPLEMENTATION

We implemented a CSSM prototype based on the OpenStack Swift mechanism. The implementation architecture of CSSM is shown in Figure 3. Swift mechanism follows Client/Server

TABLE 1. Prototype system experimental environment

Item	Proxy Server	Storage Server
Server Model	PowerEdge R230	System X3650 M3
Numbers of Node	1	4
CPU	8 cores	4 cores
Network Bandwidth	1000Mbps	1000Mbps
Storage Capacity	10TB	292GB per node
Operating System	Ubuntu 14.04 LTS	Ubuntu 14.04 LTS

architecture. The Swift client consists of a swiftclient program. We modify the swiftclient program to provide the user interface (CSSM-API) for CSSM.

In addition, the Swift Server Program provides the core storage service, which is implemented in the WSGI application. Considering the design principles of CSSM, we implement data dispersal, key generator and key manager in the WSGI application on Swift proxy node.

[10] discussed that Helpful correspondence is developing as a standout amongst the most encouraging procedures in remote systems by reason of giving spatial differing qualities pick up. The transfer hub (RN) assumes a key part in agreeable correspondences, and RN choice may generously influence the execution pick up in a system with helpful media get to control (MAC).

When user data needs to be downloaded, user initiates a download request containing the user password through the CSSM-API interface. The key generator on proxy node performs the following operations: 1) recover the container key box by using a keyword hierarchy derivation algorithm and $user_key$; 2) read specific container keys from the container key box; 3) decrypt and read specific object keys from the container key box; 4) perform decryption operations based on the object key, and return the needed data.

V. EXPERIMENTAL ANALYSIS AND EVALUATION

A. EXPERIMENTAL ENVIRONMENT

The CSSM prototype consists of five servers, one as the proxy service node and the other four as the storage service node. Each storage server holds two hard disks, one for the system and one for the data. The specific experimental environment is shown in Table 1.

B. SECURITY ANALYSIS

CSSM enhances the security function of the proxy layer, including object encryption and dispersion, key generation and management and so on. We created a container called "encon" for storing encrypted data, tested files called "ftxt" and "ukey" as our user password. The operation steps are as follows:

```

-# cat ftxt I wrote this vfile to do a
test. I want to read the file from the
storage device directly. Can I be
successful?.....
.....
-#swift -V3 post encon -u ukeys

```

No	0	1	2	3	4	5	6	7	8	9
Content	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000

```

-#swift -V3 upload encon ftxt -u ukey
-#swift -V3 download encon ftxt -u ukey

```

As shown in figure 4, ifile "text" has been divided into 10 blocks, and each block is stored in ciphertext form. In addition, the object key box is also stored in cipher text. As for the container key box, it is processed by the secret sharing algorithm and stored in the cloud in several "coding blocks". Therefore, in order to guarantee the security of user data, it is necessary to prove that the secret sharing algorithm can guarantee the security of these "encoded blocks". The secret sharing algorithm adopts the threshold value [m, n], that is, data D is encoded and converted into n blocks of data, and data D can be recovered at least through m blocks, while any data less than m blocks cannot obtain any part of the metadata information. The proof is given as follows.

1) DISTRIBUTION OF SECRET SHARES

The finite field GF(q) is used to select n different non-zero elements in the finite field (q is prime, q > n). Note that each element is denoted xi as xi (xi is public). The elements a1, a2, . . . , am-1 are generated randomly to form a polynomial $f(x) = a_0 + a_1x + \dots + a_{m-1}x^{m-1}$. For the original data D, let $D = a_0$ and calculate $f(x_i) (1 < i < n)$: $f(x) = a_0 + X^{mj} - 11$

a_j
 J
 mod q The calculated result $f(x_i)$ is the "encoded block" ($1 < i < n$).

2) KEY RECOVERY

The recovery process of the original data needs to know at least m blocks of data $f(x_i)$ in n blocks through calculating the following equations ($1 < i < m$):

$$f(x_i) = a_0 + a_1x_i + \dots + a_{m-1}x_i^{m-1}$$

$$\begin{aligned}
 &1 \\
 &f(x_2) = a_0 + a_1x_2 + \dots + a_{m-1}x_2^{m-1} \\
 &\dots \\
 &f(x_m) = a_0 + a_1x_m + \dots + a_{m-1}x_m^{m-1}
 \end{aligned}$$

These equations are converted to following matrix:

Since A is Vandermonde Matrix, A is invertible and the a unique solution could be found in above equations. In other words, we can find the a_0, a_1, \dots, a_{m-1} , so as to obtain the original data D. But if the number of blocks in $f(x_i)$ is less than m, there's an infinite number of solutions to (m-1) equations with m unknowns. Therefore, the original data could not be obtained. Hence, when the attacker cannot get the m block "encoded block", the secret sharing algorithm with the threshold value [m,n] can guarantee the security of the container key box. And because of data dispersion in the cloud, the attacker could hardly get my block "encoded block".

C. PERFORMANCE ANALYSIS AND EVALUATION

We analyzed and evaluated the performance of CSSM mainly from three aspects: time complexities, space complexities and performance results.

1) TIME COMPLEXITIES ANALYSIS

CSSM uses 128-bit AES encryption, so the time cost of encryption is proportional to the size of the encrypted file. And it encrypts a file of size N in O(N). The keys are stored as object key boxes, each of which is 16 bytes in size. The size of the object key box is proportional to the number of user files in the container. Compared with the size of the user file, the time cost of encryption and decryption of the object key box is very small and can be basically ignored. As for the index of keys, CSSM adopts keyword hierarchy derivation algorithm and user_key set by user. In this way, a p-layer full binary tree is generated. The number of leaf nodes of the tree is $n = 2^p - 1$, and the total number of nodes is $2^n - 1$. In the implementation, we choose $n = 16$, so the time cost is small and can be ignored.

2) SPACE COMPLEXITIES ANALYSIS

As result of adopting AES algorithm, the encrypted data is basically the same size as the original data. In terms of keys, Each key length is 16 bytes. The storage space of the object key is proportional to the number of user files, and the storage space of the container key is proportional to the number of containers. Relative to the size of user files, all storage overhead is not large.

3) PERFORMANCE RESULTS

In order to evaluate the performance of CSSM, we compare the time overhead with and without using CSS in upload and download operations based on the Swift system. In general, normal file sizes range from

32KB to 5GB. Considering the randomness of the time to complete each

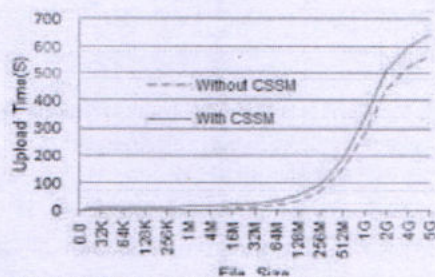


FIGURE 5 File upload time cost comparison.

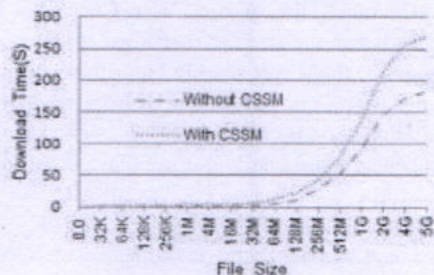


FIGURE 6 File download time cost comparison.

operation, we do 10 experiments on the same data file upload and download respectively, and the time consumed is average. As shown in figure 5 and figure 6, additional time overhead spent on upload and download operations are illustrated respectively. By analyzing the experimental results, we can draw the following conclusions.

4) THE IMPACT OF CSSM ON SYSTEM OVERHEAD

According to the experimental results, the time overhead of uploading and downloading files with CSSM increases as the file size increases. [8] discussed because of various appealing focal points, agreeable correspondences have been broadly viewed as one of the promising systems to enhance throughput and scope execution in remote interchanges.

The hand-off hub (RN) assumes a key part in helpful interchanges, and RN determination may considerably influence the execution pick up in a system with agreeable media get to control (MAC). When downloading a file, the system needs to locate the location of each cipher-text fragment, and then recover from the fragments, which is a serial operation.

5) THE FUNCTIONAL FEATURES OF CSSM

The experimental data show that the time cost of uploading and downloading files increases with the increase of file size, but the growth rate gradually slows down. For the time cost required by files of different sizes, CSSM has a better experimental effect for large files and its increased range is low. Therefore, the enhanced security features are more suitable for large files. The experimental results show that

CSSM can not only guarantee the confidentiality storage of data, so as to prevent the leakage of cloud data. And in terms of performance overhead, The increased time overhead is acceptable to the user.

IV. DISCUSSION

In this section we discuss several variants and extensions of CSSM which goes beyond the scope. From the perspective of improving storage security, a secure mechanism based on the proxy layer is proposed. In our design, the proxy layer can be integrated into the cloud storage system or it can work as a separate entity. For the sake of quick validation reason, we have used a single proxy server to represent the proxy layer in our implementation. In the experiment, the proxy server we used was equipped with a gigabit network card, 8-core CPU (model Xeon E5-2620 V3 2.4GHz or above), 32GB RAM, SAS-300GB hard disk, and 64-bit Ubuntu 14.04 LTS operating system. For the proxy server requirements, the general server can meet the requirements. In terms of availability, improvements can be made in the following areas. When some servers fail, the proposed mechanism can still run automatically without interference. For clusters, the main overhead comes from the cluster construction phase, such as installing service cluster software, adding common data storage devices, and so on. The cluster approach will increase the data synchronization and backup between multiple servers, which in turn improve the availability and efficiency of the cloud storage system. The proxy layer is designed to enhance the security of cloud storage, so it covers a number of data security technologies such as data encryption and dispersion. As for data replication to improve availability, it could be deployed in either proxy layer or cloud storage system. If a cloud storage service provider goes for data replication, the cloud system will not only bear data storage overhead, but also consume data replication, network communication overhead. However, for the purpose of not interfering with cloud storage systems, almost all data security technologies are implemented in the proxy layer. [4] proposed a secure hash message authentication code. A secure hash message authentication code to avoid certificate revocation list checking is proposed for vehicular ad hoc networks (VANETs). [6] discussed that the activity related status data will be communicated consistently and shared among drivers through VANETs keeping in mind the end goal to enhance driving security and solace. Along these lines, Vehicular specially appointed systems (VANETs) require safeguarding and secure information correspondences.

VII. CONCLUSION

For the issue of cloud data leakage caused by management negligence and malicious attack at the storage layer, we proposed CSSM, a cloud secure storage mechanism. CSSM adopted a combined approach of data dispersal and encryption 63750 VOLUME 9, 2021H. Song *et al.*: CSSM Based on Data Dispersion and Encryption technologies, which can improve the data security and prevent attackers from stealing user data. The experimental results show that CSSM can effectively prevent user data leakage at the cloud

storage layer. In terms of performance, the increased time overhead of CSSM is acceptable to users. This paper provides a feasible approach to solve the storage security problem, especially prevention from user data leakage at cloud storage layer. CSSM could also effectively protect cryptographic materials from storage perspective.

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PREDICTING RETINAL DISEASES USING EFFICIENT IMAGES PROCESSING AND CONVOLUTIONAL NEURAL NETWORK (CNN)

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ABSTRACT

Neural networks in image processing are becoming a more crucial and integral part of machine learning as computational technology and hardware systems are advanced. Deep learning is also getting attention from the medical sector as it is a prominent process for classifying diseases. There is a lot of research to predict retinal diseases using deep learning algorithms like Convolutional Neural Network (CNN) In any case, there are very few explores for anticipating illnesses like CNV which represents choroidal neo vascularization, DME, which represents Diabetic Macular Edema; and DRUSEN. In our exploration paper, the CNN (Convolutional Brain Networks) calculation marked the dataset of OCT retinal pictures into four sorts: CNV, DME, DRUSEN, and Natural Retina. We have also done several preprocessing on the images before passing these to the neural network. We have implemented different models for our algorithm where individual models have different hidden layers. We have carried out various models for our calculation where individual models have different secret layers. Toward the finish of our following research, we have viewed that as our algorithm CNN generates 93% accuracy.

Keywords: Retinal Disease, Deep Learning, Image Processing, Neural Network, Convolutional Neural Network.

1. INTRODUCTION

Drum Scanner is the first scanner which is developed for use with a computer. Since then the technology has advanced day by day, and lots of technology for scanning and loading pictures on a computer are available. With the availability of these function to find if the hidden layer neuron will roll the signal to the next layer or not.

technologies, researchers started to build and develop systems to analyze these images. The advancement of the image processing system is still going on in the present time, and it progressed from a ruled-formed method to a machine learning procedure. Even now, Machine learning methods take part in a prominent role. Experts mostly write the features in hand used in machine learning algorithms, which is one of the significant drawbacks of machine learning approaches. For image processing, the algorithm needs to be created, which will be able to extract features and complete calculations. This is where a deep learning method is applied in image processing. The advanced technology, medical researchers can take more precise images of x-ray and inner organs than before.

Deep learning algorithms are used in numerous branches of medical study that are related to retinal sickness prognosis, Cancer prognosis, abdominal and musculoskeletal prognosis. The deep learning technique is a machine learning approach in which various neural networks are implied for prognosis and categorization. Deep learning is used over massive imagery datasets for prediction and classification. Critical neural networks used in large imagery datasets are the ANN, CNN, RNN, and LSTM. Neurons are considered the modeling chunks of a neural network that looks like organic neurons in the interior of our brain. There are three distinct layers (input layer, hidden layer, and output layer). Input layer's each neuron extracts a sole attribute from the dataset and gives it to the hidden layer. Hidden layer's every neuron is attached to a former layer and preceding layer along with weights. When the hidden layer neuron gets the former layer's signal, each neuron is multiplied by the correlated weights. Then the multiplications of each neuron are added and then given to the activation

The weights of the neurons are assigned randomly at the beginning. Then during the training of the datasets, the value of the weight gets updated. In this way, neural

networks learn to differentiate one object from another. The number of hidden layers used in neural networks plays a vital role in classification and regression. Various hidden layers are used in a model, and the optimal result is selected. The back propagation technique is popular in neural networks for supervised learning, making deep learning more popular nowadays. This technique helps a machine learn distinct features from the datasets without the intervention of humans. Retinal disease is one of the common diseases in the present time. With the advancement of medical technology and computational science, many learning techniques are being invented for predicting and classifying disease accurately.

2. LITERATURE REVIEW

Several research papers include image datasets and deep learning algorithm techniques. In one research paper [15], the author examined RNFL (Retinal Nerve Fiber Layer) width and VF (Visual Field) and fetched some candidate attributes for the glaucoma prediction model. After that, the paper's author developed synthesized features and selected the most pleasing attributes for categorization (diagnosis) by implying feature evaluation. Then, the paper implemented machine learning approaches that are C5.0, Random Forest, SVM, and KNN. The dataset includes 100 cases of data for testing and 399 cases of data for training. Being a small dataset causes drawbacks as deep learning techniques need a vast dataset to predict precision. The research paper [16] implied CNN deep learning approach to perceive Glaucomatous Optic Neuropathy by observing color fundus pictures. The size of the dataset of that particular paper is 48,000 images. The paper's author labeled the data with the help of experts and then applied CNN deep learning to categorize the pictures. This paper was one of the inspirational papers for our research as we processed a much larger dataset and used convolutional neural networks (CNN) after processing. CNN is applied to perceive diabetic retinopathy by observing fundus images of the retina in another research paper [17]. The dataset size is 127125 images of the retina, which 54 licensed ophthalmologist's grade. Nevertheless, they focused on only one sickness and used the fundus picture dataset, unlike our research's OCT image datasets. Multiple classifications of retinal diseases are discussed in another note-worthy paper [18]. These diseases include AMRD, diabetic eye diseases, etc. To classify images into different image category the

author of the paper used deep CNN and SVM classifiers. In the end, the author discussed the difficulties of the classification for the likelihood of the disease. OCT images were used to categorize pictures into a distinct class of diseases in Ref. [19]. Here CNN is also implied, and the outcome is compared with the human ophthalmology experts categorizing these sicknesses. In another study [20], a deep learning technique was used to predict Age-related macular degeneration (AMD). The dataset size for this paper color fundus pictures of 120,656 pictures in which 13 categories were represented for prediction. The research paper's authors have tried various combinations of convolutional neural networks among different deep learning algorithms. Nonetheless, images are classified into only one sickness, and fundus pictures were used for this research's dataset. A convolutional neural network (CNN) was used in another research paper [21] to detect eye glaucoma eye disease on retinal fundus imaging. The dataset size of that paper was 1200 retinal images. In this research paper, an unsupervised convolutional neural network (CNN) was used to draw out the features from raw images. Then the author of the research paper applied the DBN technique to the extracted attributes by CNN to detect the optimal finest feature for the implementation in this research. And lastly, the softmax linear classifier was used to differentiate between two classes, glaucoma and not glaucoma. Like the previous paper, fundus images were used as datasets, and the images were classified into only one disease. Deep Learning was also used by the researchers [22] to assess cardiovascular risk factors from retinal fundus photographs. The research paper's authors have trained 284,335 patients on a dataset and validated their findings into two separate datasets. The size of the one separate dataset contains the data of 12,026 patients, and another separate dataset contains the data of 999 patients. Besides their excellent results, we think it would be better to use a larger dataset for more accurate validation findings. In a review paper [23] researchers discussed different deep learning approaches that can cause prognosis diabetic retinopathy in a person's retina. Other authors' papers discuss how deep learning algorithms are used to generate better prediction values. This paper is not that type of research paper where the authors launch a new model and attempt to attest their claim, but it can be helpful for further deep learning algorithm research. In Ref. [24] the authors applied deep learning approaches to predict diabetic retinopathy in the retina.

The dataset for this research is collected from 1612 diabetic patients, which contains 1796 retinal fundus pictures. Nevertheless, we think that dataset size is small-scaled as deep learning algorithms need a larger dataset for more accurate results. In another paper [25], deep learning was used on OCT images for Macular fluid's fully automated method for detecting and quantifying. The author's method based on a deep learning algorithm automatically detects IRC (Intra retinal cystoids) fluid and SRF (Sub retinal) fluid. The dataset size for this research paper is 1200 volumes of OCT images. We can see the discussion about the detection of diabetic retinopathy of different ethnicities of diabetic patients. The author used various deep learning algorithms for this detection and used a vast dataset of 494661 retinal images. They classified the image data into different ethnicities as people from **different corners of the world have different food habits**, and food habit is the primary concern on maintaining diabetes. This paper is different from other papers because it focuses on different ethnicities, which draws a different aspect. In Ref. [27] the researchers applied CNN and ANN in 84,494 image datasets to predict retinal diseases and compared each algorithm predicting accuracy. This paper is such an inspiration to us. However, we applied only convolutional neural networks (CNN) to the same dataset. Still, we have better predicting accuracy for different image processing approaches and other convolutional neural networks (CNN) algorithm implementation systems.

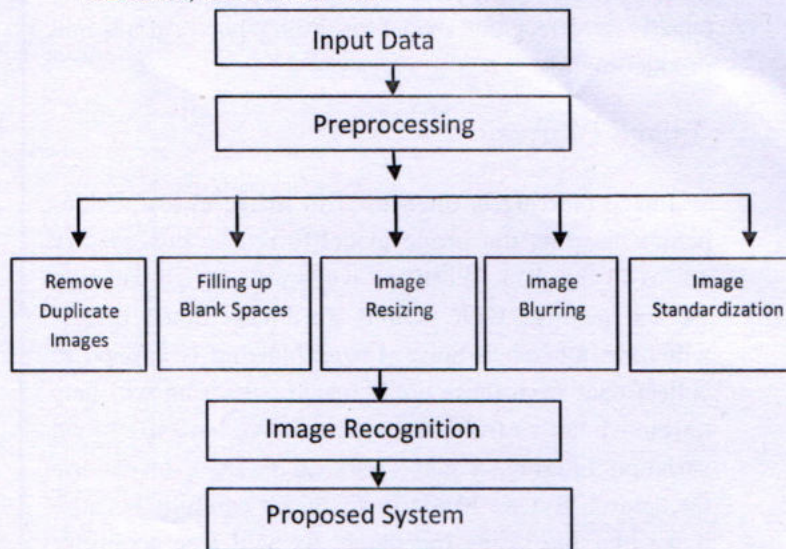
3. EXISTING SYSTEM

Before existing application it only predict the diseases but no accuracy in classification of images. many types of algorithm should be used. There is no particular algorithm used to classify the retinal diseases. So much of dataset are used ,so it leads to reduce the accuracy and it takes long time to executive the process and the curing of disease go to be delay.

4. PROPOSED SYSTEM

To classify the diseases, we have used a Convolutional Neural Network (CNN), an artificial neural network that is very popular for organizing dataset images. Our dataset contains a total of 84,484 images. These images are in Optical Coherence Tomography (OCT) form. We have divided our dataset

into three categories: 80% for training, 15% for validation, and 5% for test.



4.1 Input Data

First, we have imported our dataset into the model. In our dataset, images are organized into four different categories. Three represent a particular disease, and the remaining one category represents normal no-disease.

4.2 Preprocessing

Removing Duplicate Images

Our dataset had a total of 7676 identical images. We have removed those images from the dataset to make our prediction and algorithm learning unbiased. Repeating the same image may affect the learning of our algorithm.

Filling Up Blank Spaces

Some images had empty spaces by the border areas. We have filled up those empty spaces with the same background color, which happens to be black in our images. Filling up blank spaces of the images helps to make the images of our dataset consistent.

Image Resizing

Image resizing is an essential process in deep learning models. Models train faster if they are fed smaller images. Smaller images have more computational advantages compared to larger images. Also, many deep learning models require the image to be the same size. In our case, we have resized the images into 200x200 sizes.

Resizing them any smaller can lead us to information loss. On the other hand, larger images might also negatively affect our model regarding power drain and production time.

Image Blurring

Image blurring is often used in image classifications before inserting the image model to reduce unnecessary noises in the data. When we work with image datasets, we see pictures with various attributes. Some images will have too much noise. Image blurring is applied to collect data from these noisy images. Blurring will help to remove noises from those images. We have used total variation filtering, a noise removal process, to denoise the dataset. But we have to maintain it carefully because if we blur the image too much, we will lose necessary information from the images.

Image Standardization

Standardization is an important technique used as a preprocessing step. When it comes to pictures, the input data set features significant differences between their ranges. These differences in the ranges of elements can cause trouble for many machine learning models. We have used standardization techniques to scale the pixel values of the images.

Image Recognition

Architecture of the Proposed Model

Deep Learning is becoming the primary tool for problems that try to understand images, human voice, and robots. With our dataset, our main target is the implementation of CNN for recognizing images. The primary purpose of our proposed model is to have a proper grasp of CNN and customize the algorithm for recognizing images for the dataset. CNN uses filters to bring out the feature maps from 2D pictures.

It considers mapping image pixels with the neighborhood space instead of fully connected neuron layers. CNN has become an innovative and vastly acclaimed algorithm for processing images. It is also gaining attention in recognizing handwriting, object classifications, and computer vision. It is becoming a better option than others. When someone begins to gather ideas about deep learning and neural networks,

the Convolutional Neural Network (CNN) is one of the most used deep learning techniques.

The primary purpose of designing CNN is to find visual patterns straight from pictures with as low preprocessing as possible. Most CNNs try to apply convolutional layers to the input. By raising the feature map's quantity, CNN also downsamples the spatial dimensions called max pooling.

[2] discussed that The study of viruses and their genetics has been an opportunity as well as a challenge for the scientific community. The recent ongoing SARS-Cov2 (Severe Acute Respiratory Syndrome) pandemic proved the unpreparedness for these situations.

4. Explanation of the models

The first layer of each model gets the preprocessed image as the input of size 200*200. Each conv2D layer has filter size 3*3 with stride 1, padding='same', and activation function 'ReLU' (Rectified Linear Unit). We have used (2*2) max-pooling layers with a string of 2. The dropout rate is set to 0.2. Because our dataset is unbalanced, we have utilized class weight. This dictionary maps class indices to a weight value that may be used to urge the model to "pay more attention" to samples from an under-represented class.

5. Results and Discussion

Dataset Description

The dataset of our research paper [32] consisted of 84,495 numbers of OCT (Optical Coherence Tomography) pictures of the retina. Four categories separate these pictures. They are CNV, DME, DRUSEN, and normal retinal pictures.

The images of this dataset were taken from five institutes. The institutes are 1. Beijing Tongu Eye Center, Beijing. 2. The Shanghai First People's Hospital, Shanghai 3.MCOA, 4. CRRF, California, USA 5. Shiley Eye Institute, San Diego, USA

There are three disease categories and one normal category in five categories in the dataset. The disease categories are shortly discussed below:

CNV: CNV stands for choroidal neovascularization disease, which arises on the retina. This disease causes the massive growth of new vessels which carry blood in the choroid, a layer under the retina. Unlike normal vessels and occasionally red blood cells, new vessels let fluids from the blood.

DME: DME stands for Diabetic Macular Edema retinal disease, which transpires due to fluid leaking in the Macular's retina part. This disease generally arises in diabetic patients. It can damage blood vessels in the retina. This disease has to be treated within a certain time; otherwise, the eye can be damaged.

DRUSEN: the white or yellow-colored spots that transpire in the Bruch's membrane named retinal layer can be identified as DRUSEN. There can be several causes of this disease, and one of the common causes is gathering waste products from rods and cones. If this disease is not treated within a particular time, it can cause permanent blindness. Our research studied different layers to discover the optimal CNN algorithm model. Here, features of this particular algorithm were selected by the algorithm's built-in nature.

$$Accuracy = \frac{True\ Positives + True\ Negatives}{True\ Positives + True\ Negatives + False\ Positives + False\ Negatives}$$

$$Precision = \frac{True\ Positives}{True\ Positives + False\ Positives}$$

When we observe precisely, we can see that the five hidden layer model gives the highest accuracy (93.26%), sensitivity (93%), specificity (97%), and precision (93%), and the vgg16 model provides the lowest accuracy (90.02%) and sensitivity (90%), specificity (94%). [4] emphasized that Security is an important issue in current and next-generation networks. Blockchain will be an appropriate technology for securely sharing information in next-generation networks. Digital images are the prime medium attacked by cyber attackers.

3. Conclusion

In the forms of data analysis and data prediction, machine learning algorithms have surpassed all statistical models in the present time. But with the increasing amount of data, the limitations of the machine learning algorithms became clearer. That is the time the deep learning algorithm stepped up. Deep learning algorithms can select features independently and perform complex non-linear equations even though these algorithms are machine learning algorithms. For that reason, deep learning algorithms have taken up machine learning algorithms in various fields.

Convolutional Neural Networks (CNN) dominates in the image processing sector. The medical sector generates a massive quantity of image data, like ophthalmology. With this vast amount of imagery data, researchers used deep learning algorithms to predict diseases that might happen in our eyes. We inspired those research papers and applied Convolutional Neural Network (CNN) to separate three retinal diseases from normal vision. Nevertheless, in the future, we would like to develop the algorithm to get more accuracy and also would like to apply other deep learning algorithms to compare and observe whether it performs better than Convolutional Neural Network (CNN) or not.

Moreover, we can think of learning techniques that may be unsupervised in the future to see whether it surpasses convolution neural deep learning algorithms or not. Lastly, we would like to apply the same approach to other imagery datasets available for medical sectors and in other sectors where massive image datasets are used to classify and predict.

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BRAIN TUMOUR

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ABSTRACT

Technology and the rapid growth in the area of brain imaging technologies have forever made for a pivotal role in analyzing and focusing the new views of the brain anatomy and functions. The mechanism of image processing has a widespread usage in the area of medical science for improving the early detection and treatment phases. Deep Neural Network (DNN), till date have demonstrated a wonderful performance in classification and segmentation task. Carrying this idea into consideration, in this paper a technique for image compression using a Deep Wavelet Autoencoder (DWA), which blends the basic feature reduction property of autoencoder along with image decomposition property of wavelet transform is proposed. The combination of both has a tremendous effect on sinking the size of the feature set for enduring further classification task by using DNN. A brain image dataset was taken and the proposed DWA-DNN image classifier was considered. The performance criterion for the DWA-DNN classifier was compared with other existing classifiers like Autoencoder-DNN or DNN, and it was noted that the proposed method outshines the existing methods.

Keywords: Neural network (NN); Deep Neural Network (DNN); Autoencoder (AE); Image Classification.

1. INTRODUCTION

Automated classification and detection of tumors indifferent medical images is motivated by the necessity of high accuracy when dealing with a human life. Also, the computer assistance is demanded in medical institutions due to the fact that it could improve the results of humans in such a domain where the false negative cases must be at a very low rate. It has been proven that double reading of medical images could lead to better tumor detection. Butte cost implied in double reading is very high, that's why good software to assist humans in medical institutions is of great interest nowadays. Conventional methods of monitoring and diagnosing the diseases rely on detecting the presence of particular features by a human observer. Due to large number of patients in intensive care units and the need for continuous observation of such conditions, several techniques for automated diagnostic systems have been developed in recent years to attempt to solve this problem. Such techniques work by transforming the

magnetic resonance images by using some prior knowledge like pixel intensity and some anatomical features is proposed. Currently there are no methods widely accepted therefore automatic and reliable methods for tumor detection are of great need and interest. The application of PNN in the classification of data for MR images problems are not fully utilized. These included the clustering and classification techniques especially for MR images problems with huge scale of data and consuming times and energy if done manually. Thus, fully understanding the recognition, classification or clustering techniques is essential to the developments of Neural Network systems particularly in medicine problems.

Segmentation of brain tissues in gray matter, white matter and tumor on medical images is not only of high interest in serial treatment monitoring of "disease burden" in oncologic imaging, but also gaining popularity with the advance of image guided surgical approaches. Outlining the brain tumor contour is a major step in planning spatially localized radiotherapy (e.g., Cyber knife, iMRT) which is usually done manually on contrast enhanced T1-weighted magnetic resonance images (MRI) in current clinical practice. On T1 MR Images acquired after administration of a contrast agent (gadolinium), blood vessels and parts of the tumor, where the contrast can pass the blood-brain barrier are observed as hyper intense areas. There are various attempts for brain tumor segmentation in the literature which use a single modality, combine multi modalities and use priors obtained from population atlases.

2. PROPOSED METHOD

Figure 1 represents the architecture of our suggested model for Brain MRI image classification for disease detection based on Deep Wavelet Autoencoder (DWA) based Deep Neural Network. The images collected are mostly present in DICOM format, which is a medical file format for computer memory. These DICOM files first should be processed to extract images from it. After preprocessing of these images, all images are shown in the 2-D array format. Again, these 2D arrays are flattened to represent all images in a 2D dataset format. Since the amount of the images is very high, so they have been split into a number of tiny sub arrays for better performance. These image sub arrays are then processed through DWA to get the encoded images (Approximation and Detailed coefficients). In the final stage only encoded approximation images are further considered for training and testing of a predefined deep neural network

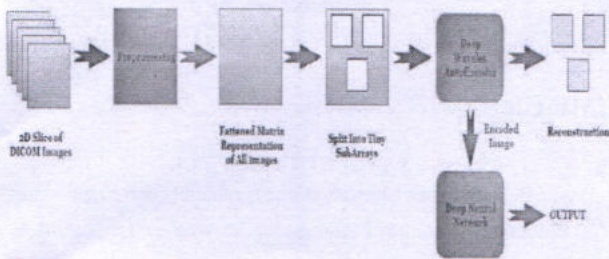


FIGURE 1. Proposed architecture of a DICOM image classifier for brain disease detection based on DWA-DNN model

3.METHODOLOGIES /TECHNIQUES USED

A.AUTOENCODER

Autoencoder [29-30] can be seen as optimization techniques that can be used to extract and learn principal components in case of large data distribution. It is mostly regarded as a deep learning technique as it possesses the power to make a deeper network, which can manage itself the network structure to conform to the desired environment. Generally it is used for image extraction, compression, de-noising, etc. In this research study, we have utilized this technique as an image compression technique which can be used as a feature selection technique. Autoencoder can be regarded as the best pre-processing technique for image classification using deep neural network (as depicted in figure 2).

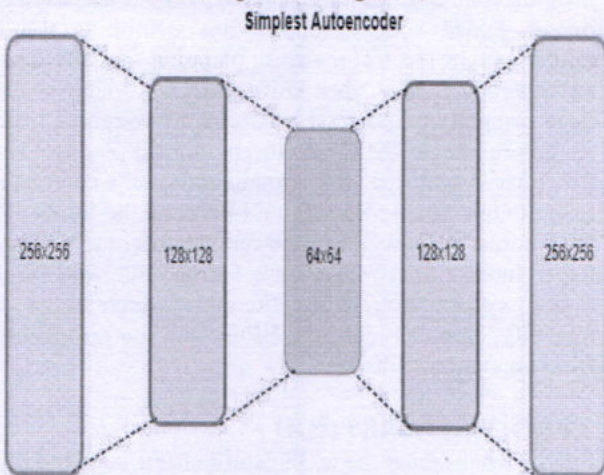


FIGURE 2: Simple Autoencoder model with 3 hidden layers for encoding and decoding of images

As the input size is very high, hence we have considered one extra intermediate hidden layer for encoding and for decoding as well (figure 3). The middle layer which actually contains the encoded image with a size of 64x64. Mathematically let X_i represents the input, H_i represents Hidden Layer (here I is 1 to 3) and Y_i represents the output.

Let the activation functions used

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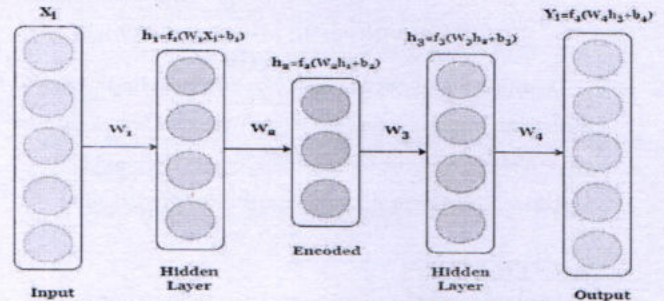


FIGURE 3. Autoencoder model with different layers, functions and parameters

B.REGULARIZED AUTOENCODER

1) SPARSE AUTOENCODER

Supervised learning has always garnered a huge admiration from all the quarters of AI as it is one the most powerful tool that exist. But irrespective of its accomplishment it is extremely circumscribed. Many algorithms till date do exist where the input characteristics are run manually for the purpose of reading. But there are domains where this manual intensive methodology will not scale well. Hence, it is highly needed that there should be some supervised learning method that should overcome the above problem. A vast number of algorithms exist in rich learning that utilizes a number of neural network techniques to discover and interpret the features for the purpose of sorting. The original and standard auto encoders are a bit hard to train as compared to any extended autoencoder versions. Sparse autoencoder [31] is competitive as compared to the standard auto encoder as they have a high number of hidden units as compared to the input units, but with an imposed restriction that only a few numbers of hidden units can be active at any point of time. Sparse encoder learning algorithm, usually automatically learn features from the unlabeled data.

As depicted in figure 2 (simple autoencoder), if we simply implement a sparsity constraint on the hidden units, then the autoencoder will uncover many interesting information from the data. This type of autoencoder having sparsity [32] factor guides a single layer network for the purpose of understanding and finding out a dictionary code that scales down the reconstruction error while posing a restriction of the number of code language for designing the same. Rather, the task of classification can be represented as a kind of specifying the algorithm to lessen the input fed to a single class that basically reduces the error at the time of prediction. Mathematically, the basic sparse autoencoder (shown in figure 4) consists of a single hidden layer, H , which is connected to the input vector, v with a weight matrix w . This normally is called as an encoding step.

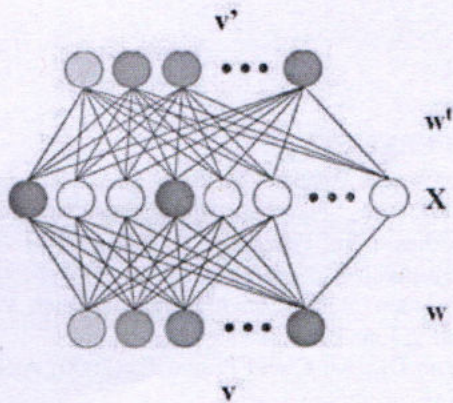


FIGURE 4. Sparse Autoencoder Network

2. DE-NOISING AUTOENCODER

The deep neural networks are quite nonlinear in nature and therefore, they are not worthy enough for major challenges. Hence, pre-training with the noisy data was highly required. This led to a process where noise was added artificially to each layer to provide better performance and rapid training (as shown in figure 5 below). An extension of the standard autoencoder is a denoising autoencoder [33] that was introduced as a base for deep network [17].

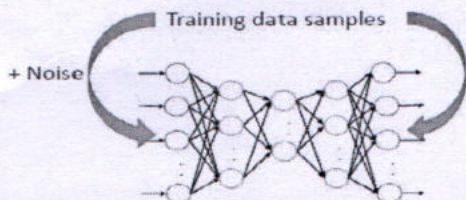


FIGURE 5. A schematic overview of denoising autoencoder

The idea underlying denoising autoencoder is quite straightforward and bare. [3] discussed that In surgical planning and cancer treatment, it is crucial to segment and measure a liver tumor's volume accurately. Because it would involve automation, standardisation, and the incorporation of complete volumetric information, accurate automatic liver tumor segmentation would substantially affect the processes for therapy planning and follow-up reporting. Based on the Hidden Markov random field, Automatic liver tumor detection in CT scans is possible using hidden Markov random fields (HMRF-EM). Another way is to, ruin the data by simply remove parts of the data. This would result in an autoencoder to predict the missing input. To provide an equilibrium between input and output, denoising autoencoders can also be stacked upon each other for the process of iterative learning.

C. DEEP WAVELET AUTOENCODER ss

Figure 6, represents a single layer of proposed DWA architecture. This architecture can be further extended to make the model deep. In this technique the encoded image generated from the original image is processed through a Discrete Wavelet Transform (DWT) [34] using Daubechies mother wavelet of order 2 to get approximate and detail coefficients by passing through low pass and high pass filters respectively. Out of these

coefficients only approximation coefficients are further considered for classification using a Deep Neural Network model

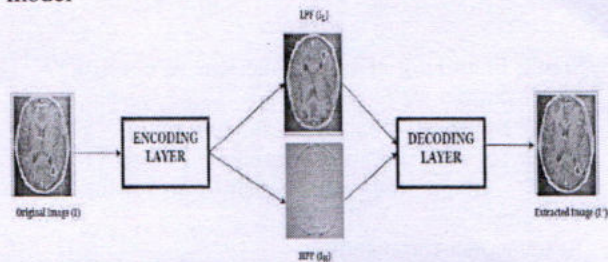


FIGURE 6. Proposed architecture of a single layer of Deep Wavelet Autoencoder

4. CLASSIFICATION TECHNIQUES USED

For the purpose of our study, some of the classifiers were used like ELM, RBFNN, MLPNN, PNN, and TDNN. Multilayer Perceptron Neural Network (MLPNN)[35] is a network having three layers that are input, hidden and output layers. It is the basic algorithm that is used for the purpose of error propagation and is also known as the layered network. The synaptic strength of the network here can be modified using the back propagation algorithm to get the desired output which also acts as an optimization technique. Few of the disadvantages of the above network include the propagation of error into the local minima which converges and hence, that may create possible issues in the field of real applications. The Radial Basis Function Neural Network (RBFNN) mostly works in two training phases, which is supervised as well as unsupervised phases. In the unsupervised phase, clustering algorithm is typically applied for deciding the center and the spread factor and the pseudo inverse weights are used that connects the end product of the net with the sensory fields. The performance is basically calculated using the mean squared error.

Another types of classifier is Extreme Learning Machine (ELM) [36] that is basically a single layer feed neural network. [1] discussed that Liver tumor division in restorative pictures has been generally considered as of late, of which the Level set models show an uncommon potential with the advantage of overall optima and functional effectiveness. The Gaussian mixture model (GMM) and Expected Maximization for liver tumor division are introduced. In the early liver division process Level set models are utilized.. Probabilistic Neural Network (PNN) on the other hand, is one of the famous classification technique for image analysis and it is quite efficient for any high dimensional data. Here, the Bayesian probability is used for backing the weights and the functions and the same is optimized using the gradient descent method. Time Delay Neural Network (TDNN) [37], the connection of hidden units plays a pivotal role. The units are connected to a quite fewer number of input units that represents a certain pattern and the hidden layer is connected to the output layer using a feed forward path. Here, the hidden units are the feature unit that makes out a certain features in the input irrespective of its position. Activation functions are usually different from this network.

5. ALGORITHMIC DESCRIPTION

Step1: Pre-processing of DICOM images to extract the specific image matrix only

Step2: Flattening of image matrices to construct image dataset.
 Step3: Splitting of dataset to sub arrays
 Step4: for each sub array continue the steps 5 to 9
 Step5: Input the image sub array to Deep Wavelet Autoencoder for encoding
 Step6: Pass the encoded image through low pass and high pass filter using discrete wavelet transform for decomposition.
 Step7: Apply inverse wavelet transform to combine and decode the images to get original image
 Step8: Run the Autoencoder for number of epochs to get optimized weight and bias values
 Step9: Extract approximation coefficients from the hidden layer, combine them and provide as input to a deep neural network for classification.
 Step10: Train the DNN with the inputs provided by step9 and test the network for different metrics measurement.

6.METHODOLOGY

The algorithm has two stages, first is pre-processing of given MRI image and after that segmentation and then perform morphological operations. Steps of algorithm are as following:-

- 1) Give MRI image of brain as input.
- 2) Convert it to gray scale image.
- 3) Apply high pass filter for noise removal.
- 4) Apply median filter to enhance the quality of image.
- 5) Compute threshold segmentation.
- 6) Compute watershed segmentation.
- 7) Compute morphological operation.
- 8) Finally output will be a tumour region. All above steps are explained here in detail.

7.RESULT & CONCLUSION

Interpretation of medical image dataset has always been a time consuming process and handling them is itself a challenge. In this paper, the solutions dealt made us to think in the perspective of DNN, AE and wavelet transformation. The proposed DWA-DNN classifier have achieved a great result in terms of accuracy, specificity, sensitivity and other performance measure when compared the existing classifiers like DNN, AE etc. The results of the proposed DWA-DNN technique shows that its accuracy and the statistical measure is far more competing than any other non-deep learning techniques. It would be far more interesting to explore the possibility of combining the DNN with many other variation of the autoencoder to see the effect or performance in the same brain MRI dataset

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Compressive Data Gathering Based on Even Clustering for Wireless Sensor Networks

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ABSTRACT :

Compressive data gathering (CDG) based on compressed sensing (CS) theory for wireless sensor networks (WSNs) greatly reduces the amount of data transmitted compared with the traditional acquisition method that each node forwards the collected data directly to the next node. CDG combined with sparse random projection can further reduce the amount of data and thus prolong the lifetime of the WSN. The method of randomly selecting projection nodes as cluster heads to collect the weighted sum of sensor nodes outperforms the non-CS (without using CS) and hybrid-CS (applying CS only to relay nodes that are overloaded) schemes in decreasing the communication cost and distributing the energy consumption loads. However, the random selection of projection nodes causes the overall energy consumption of the network to be unstable and unbalanced. In this paper, we propose two compressive data gathering methods of balanced projection nodes. For WSN with uniform distribution of nodes, an even clustering method based on spatial locations is proposed to distribute the projection nodes evenly and balance the network energy consumption. For WSN with unevenly distributed nodes, an even clustering method based on node density is proposed, taking into account the

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location and density of nodes together, balancing the network energy and prolonging the network lifetime.

KEY WORDS:

Cluster head, compressed sensing (CS), compressive data gathering (CDG), Even clustering, random projection, sensor node, wireless sensor networks (WSN).

INTRODUCTION:

The most immediate goal for wireless sensor networks (WSN) is to collect data. Because the data gathered by the sensor nodes in WSN has spatio-temporal correlation, it satisfies the condition that the signal is sparse or compressible in the application of compressed sensing (CS) theory. The sensor nodes have limited resources and the sink node has strong performance, which is suitable for the simple coding and complex decoding of compressed sensing theory. Therefore, the technology of WSN data collection based on compressed sensing has been gradually and extensively studied and developed.

Compressive data gathering (CDG) is based on the compressed sensing theory.

Each node multiplies the projection coefficient by the locally collected data and passes it to the next node. The next node also multiplies the collected data by the projection coefficient, then pluses the weighted data from the previous node, and transfers the weighted sum to the next node. In this way, each node calculates and transmits a weighted sum along the route. Eventually, the weighted sum of all nodes is transmitted to the sink node, thus the sink gets a measured value.

LITERATURE REVIEW:

A literature review is an account of what has been published on a topic by accredited scholars and researchers. Occasionally you will be asked to write one as a separate assignment, but more often it is part of the introduction to an essay, research report, or thesis.

In writing the literature review, your purpose is to convey to your reader what knowledge and ideas have been established on a topic, and what their strengths and weaknesses are. As a piece of writing, the literature review must be defined by a guiding concept (e.g., your research objective, the problem or issue you are discussing or your argumentative thesis). It is not just a descriptive list of the material available, or a set of summaries. We begin with a study of the overall properties of the network. We show that the density of the network, which measures the amount of interconnection per person, follows the same unexpected pattern in both networks: rapid growth, decline, and then slow but steady growth. We postulate based on the timing of the events that the pattern is due to the activities of early Adopters who create significant linkages in their exploration of the system, followed by a period of rapid growth in which new members join more quickly than friendships can be established, settling finally into a period of ongoing organic growth in

which both membership and linkage increases.

[1] J. Haupt, W. U. Bajwa, M. Rabbat, and R. Nowak, "Compressed sensing for networked data"

This article describes a very different approach to the decentralized compression of networked data. Considering a particularly salient aspect of this struggle that revolves around large-scale distributed sources of data and their storage, transmission, and retrieval. The task of transmitting information from one point to another is a common and well-understood exercise. But the problem of efficiently transmitting or sharing information from and among a vast number of distributed nodes remains a great challenge, primarily because we do not yet have well developed theories and tools for distributed signal processing, communications, and information theory in large-scale networked systems.

[2] J. Luo, L. Xiang, and C. Rosenberg, "Does compressed sensing improve the throughput of wireless sensor networks?"

Although compressed sensing (CS) has been envisioned as a useful technique to improve the performance of wireless sensor networks (WSNs), it is still not very clear how exactly it will be applied and how big the improvements will be. [2] proposed a secure hash message authentication code. A secure hash message authentication code to avoid certificate revocation list checking is proposed for vehicular ad hoc networks (VANETs). The group signature scheme is widely used in VANETs for secure communication, the existing systems based on group signature scheme provides verification delay in certificate revocation list checking. They illustrate two crucial insights: first, applying CS naively may not bring any improvement, and secondly, our hybrid-CS can achieve significant improvement in throughput.

[3] C. Luo, F. Wu, J. Sun, and C. W. Chen, "Efficient measurement generation and pervasive sparsity for compressive data gathering"

We proposed compressive data gathering (CDG) that leverages compressive sampling (CS) principle to efficiently reduce communication cost and prolong network lifetime for large scale monitoring sensor networks. The network capacity has been proven to increase proportionally to the sparsity of sensor readings. In this paper, we further address two key problems in the CDG framework. First, we investigate how to generate RIP (restricted isometry property) preserving measurements of sensor readings by taking multi-hop communication cost into account. Excitingly, we discover that a simple form of measurement matrix $[I R]$ has good RIP, and the data gathering scheme that realizes this measurement matrix can further reduce the communication cost of CDG for both chain-type and tree-type topology. Second, although the sparsity of sensor readings is pervasive, it might be rather complicated to fully exploit it. Owing to the inherent flexibility of CS principle, the proposed CDG framework is able to utilize various sparsity patterns despite of a simple and unified data gathering process. In particular, we present approaches for adapting CS decoder to utilize cross-domain sparsity (e.g. temporal-frequency and spatial-frequency). We carry out simulation experiments over both synthesized and real sensor data. The results confirm that CDG can preserve sensor data fidelity at a reduced communication cost.

EXISTING SYSTEM:

However, the random selection of projection nodes causes the overall energy consumption of the network to be unstable and unbalanced. In this project, we existing two compressive data gathering methods of balanced projection nodes. For WSN with uniform distribution of nodes, an even clustering method based on spatial locations is existing to distribute the projection nodes evenly and balance the network energy consumption. For WSN with unevenly distributed nodes, an even clustering method based on node density is existing, taking into account the location and density of nodes together, balancing the network energy and prolonging the network lifetime. The simulation results show that compared with the random projection node method and the random walk method, our proposed methods have better network connectivity and more significantly increased overall network lifetime.

DISADVANTAGES OF EXISTING SYSTEM:

The random selection of projection nodes causes the overall energy consumption

Network to be unstable and unbalanced.

Taking into account the location and density of nodes together, balancing the network.

PROPOSED SYSTEM:

- The proposed work describes an efficient communication paradigm has been adopted in the bottleneck zone by combining duty cycle and network coding.

- Studies carried out to estimate the upper bounds of the network lifetime by considering

- (i) duty cycle,
- (ii) network coding and
- (iii) combinations of duty cycle

and network coding. The sensor nodes in the bottleneck zone are divided into two groups: simple relay sensors and network coder sensors.

- The relay nodes simply forward the received data, whereas, the network coder nodes transmit using the proposed network coding based algorithm.

- Energy efficiency of the bottleneck zone increases because more volume of data will be transmitted to the Sink with the same number of transmissions. This in-turn improves the overall lifetime of the network.

ADVANTAGES OF PROPOSED SYSTEM:

- The network coding technique improves the capacity of an information network with better utilization of bandwidth and the reliability of the network.

- Energy savings are done at the node level through switching between active and sleep states.

- There is a reduction in energy consumption in the bottleneck zone with the proposed approach. This in turn will lead to increase in network lifetime.

IMPLEMENTATION:

Implementation is the stage of the project when the theoretical design is turned out into a working system. Thus it can be considered to be the most critical stage in achieving a successful new system and in giving the user, confidence that the new system will work and be effective.

The implementation stage involves careful planning, investigation of the existing system and its constraints on implementation, designing of methods to achieve changeover and evaluation of changeover methods.

MODULES:

1. Cluster Setup
2. Calculating the End-to-End Delay

3. Inter-Cluster Multi-Hop Routing Algorithm

4. Network coding

Module 1 :

The algorithm begins with the neighbor discovery phase, which is initiated by the sink by broadcasting an advertisement (ADV) message to all nodes at a certain power level. Each node computes its approximate distance to the sink (dtoSink) according to the received signal strength.

To address this situation, a trade-off for energy and delay (TED) is used to establish a balance between energy consumption and end-to-end delay by adjusting the value of the parameter α based on the remaining energy of the cluster head and the value of the parameter β based on distance from the cluster head to the sink. All cluster head candidates that receive a final cluster head announcement cancel their TED timers to become the member nodes for the current round. After the cluster setup procedure is finished, all cluster heads broadcast time division multiple access (TDMA) message to allocate time slots to their cluster members.

Module 2:

The link delay $D(i, j)$ is a measure of the delay a packet experiences when traversing a link from node i to node j . By definition, a link delay $D(i, j)$ includes the queuing delay dQ per node, the transmission delay dT , and the propagation delay dP . In other words:

$D(i, j) = (dQ + dT + dP)$ (5) where $dT = l/\psi$ and $dP = dij/\gamma$; l is the packet size (bits), ψ is the link bandwidth (bps), dij is the length of physical link from cluster head i to cluster head j , and γ is the propagation speed in the medium (m/s). The value of dQ can be calculated using rules related to queue theory. The nodal queue is considered to be of type $M/M/1$. In this type of queue, the input is of Poisson type, the output is an

exponential random variable, and the amount of service is 1.

[4] discussed that the activity related status data will be communicated consistently and shared among drivers through VANETs keeping in mind the end goal to enhance driving security and solace. Along these lines, Vehicular specially appointed systems (VANETs) require safeguarding and secure information correspondences.

Module 3:

Inter-Cluster Multi-Hop Routing Algorithm Our optimization problem is finding the lowest cost route (most energy efficient) from a Cluster head node x to the sink s such that the end-to-end delay along that route does not exceed a delay constraint Δ . The constrained minimization problem is: where R_k is the k th route, $R(x, s)$ is the set of routes from cluster head node x to the sink s for which the end-to-end delay is bounded by Δ , given by:

By considering the optimization problem above, we propose the algorithm shown in Algorithm 1 to find k -least cost routes that meet the end-to-end delay constraint. If so, R_k is chosen (SeR, lines 9 and 10), and if not, R_k will be removed and added to the No Sa (lines 7 and 13). Line 7 will remove least cost routes that do not satisfy the delay bound Δ .

Module 4:

Network coding is a technique which allows the intermediate nodes to encode data packets received from its neighboring nodes in a network. The encoding and decoding methods of linear network coding are described below. Encoding operation: A node, that wants to transmit encoded packets, chooses a sequence of coefficients $q = (q_1, q_2, \dots, q_n)$, called encoding vector, from $GF(2^s)$. A set of n packets $G_i (i= 1,$

$2, 3, 4, \dots, n)$ that are received at a node are linearly encoded into a single output packet.

The output encoded packet is given by the coded packets are transmitted with the n coefficients in the network. The encoding vector is used at the receiver to decode the encoded data packets. Decoding operation: A receiver node solves a set of linear equations to retrieve the original packets from the received coded packets. The encoding vector q is received by the receiver sensor nodes with the encoded data. Let, a set $(q_1, Y_1), \dots, (q_m, Y_m)$ has been received by a node. The symbols Y_j and q_j denote the information symbol and the coding vector for the j th received packet respectively. A node solves the following set of linear equations (2) with m equations and n unknowns for decoding operation.

[1] discussed because of various appealing focal points, agreeable correspondences have been broadly viewed as one of the promising systems to enhance throughput and scope execution in remote interchanges. The hand-off hub (RN) assumes a key part in helpful interchanges, and RN determination may considerably influence the execution pick up in a system with agreeable media get to control (MAC).

CONCLUSION :

LEACH seems to be a promising protocol, there are some areas for improvement that makes the protocol more attractive and widely applicable. In this project, an energy efficient clustering algorithm has been proposed for Wireless Sensor Network using fuzzy logic concept. By selecting suitable fuzzy descriptors one Super Cluster Head is selected among the cluster heads who is the representative for delivering the message to a mobile base station. The idea of sink mobility along with the fuzzy logic increases the network life time dramatically. It is expected that it

would be more useful in many practical applications like health care, agricultural field, disaster heat areas, military applications etc. Simulation result shows that the proposed protocol performs better than LEACH protocol in terms of first node dies, half nodes alive, last node dies, better stability and better network lifetime.

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SECURITY BASED ATM ROBBERY PREVENTION

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ABSTRACT

The objective of this Project is to develop an embedded system, which is used for ATM security applications. In this Project, if any disturbance takes place for the ATM machine that disturbance signal is sensed and send through microcontroller to GSM, so that the ATM door is automatically closed. Then microcontroller will send the message, by alerting the surrounding area using buzzer, at the same time total data will be uploaded in web page using GSM and puts alert message to concern person also.

In the same way, if any fire accident occurred the controller puts a message to concern person and uploads same data in web page using GSM. It also counts how many persons are entering into the ATM centre. This concept is not only a single ATM center. We can consider this ATM center as node1 (like node1, node2, node3..... Etc) are connected to web page through GSM module (ESP 8266). So that if there is any disturbance or any fire accident in any node we can get the area information through GSM to the web page along with buzzer.

Keywords: ATM, GSM, PIR Sensor, ARDUINO, Vibration Sensor, BLYNK platform.

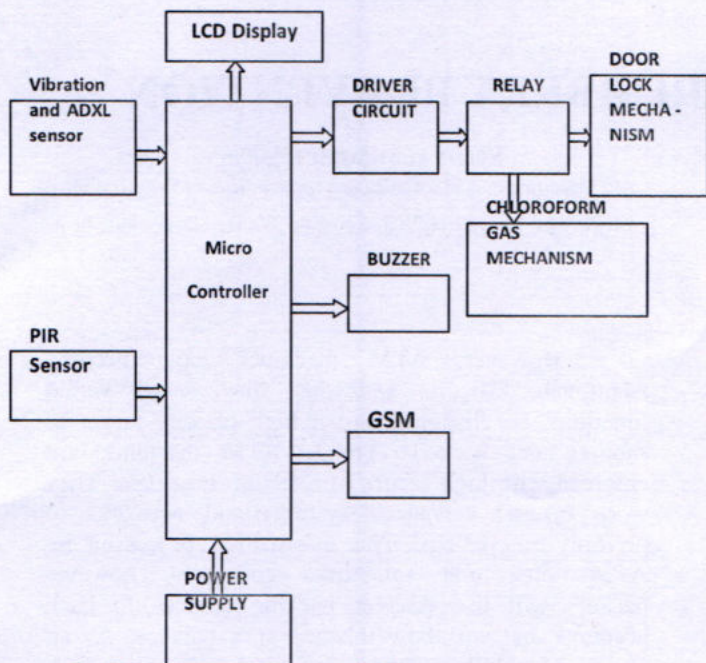
1. INTRODUCTION

The Internet of Things (GSM) is that the network of physical objects or "things" embedded with electronics, software, sensors, and network property that permit these objects to gather and exchange information. GSM permits objects to be detected and controlled remotely across existing network infrastructure, making opportunities for additional direct integration between the physical world and computer-based systems, and leading to improved efficiency, accuracy and economic profit. "Things," (ATMs) were 1st introduced in 1939. Nowadays, concerning three million units area unit put in worldwide. Because the variety of ATM units increase, the machines area unit susceptible to hacker attacks, fraud, robberies and security breaches. Within the past, the ATM machines main purpose was to deliver cash

However, ATM machines have become additional difficult, and that they serve varied functions, so changing into a high priority target to robbers and hackers. Trendy ATM machines are enforced with high security protection measures. They work beneath advanced systems and networks to perform transactions. The information processed by ATMs area unit sometimes encrypted, however hackers will use discreet hacking devices to hack accounts and withdraw the account's balance. As an alternate, unskilled robbers threaten bank patrons with a weapon to loot their withdrawn cash or account.

The Internet of Things (GSM) is that the network of physical objects or "things" embedded with electronics, software, sensors, and network property that permits these objects to gather and exchange information. GSM permits objects to be detected and controlled remotely across existing network infrastructure, making opportunities for additional direct integration between the physical world and computer-based systems, and leading to improved efficiency, accuracy and economic profit. "Things," (ATMs) were 1st introduced in 1939. Nowadays, concerning three million units area unit put in worldwide. Because the variety of ATM units increase, the machines area unit susceptible to hacker attacks, fraud, robberies and security breaches. Within the past, the ATM machines main purpose was to deliver cash of bank notes and to debit a corresponding checking account. [7] proposed a system about Efficient Sensor Network for Vehicle Security. Today vehicle theft rate is very high, greater challenges are coming from thieves thus tracking/ alarming systems are being deployed with an increasingly popularity .As per as security is concerned today most of the vehicles are running on the LPG so it is necessary to monitor any leakage or level of LPG in order to provide safety to passenger.

2. SYSTEM ARCHITECTURE



3. SOFTWARE DESCRIPTION

PIR sensor
 ARDUINO
 Vibration sensor
 ADXL

3.1 PIR Sensor

Passive infra-red sensor (PIR sensor) is an electronic sensor that calculate infra-red (IR) light emitting from objects in its field of view. They are most frequently used in PIR motion sensors. All objects with a temperature overhead absolute zero radiate thermal energy in the form of radiation. Generally this radiation isn't visible to human eye because it radiates at infrared wavelengths, but it can be detected by electronic devices planed for such a purpose. A PIR motion sensor is used to detect movement of people, animals, or other objects. They are often used in burglar alarms and automatically activated lightning devices. They are also called as "PID", for "Passive Infra-red Detector". The below fig 6.1 shows that PIR (Passive infra-red) sensor comprise of a pyro electric element along with the circuits to check the responsiveness and delay.

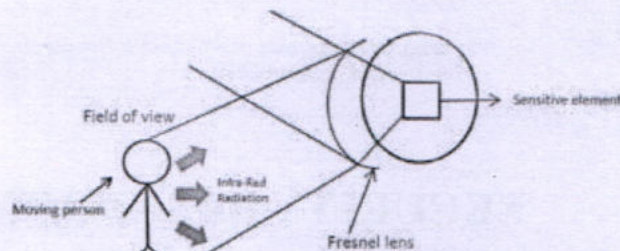


Fig III (a) Representation of PIR Sensor

PIR sensor sense the infrared radiation discharged or reflected from an object. The PIR sensors are used with Fresnel lenses to intensify and appearance their FOV (Field of View) Fresnel lenses are adequate energy collectors. In most cases an array of Fresnel lenses is used to split the FOV into various distinct fields to increase the sensitivity and efficiency of the sensor.

3.2 ARDUINO

ARDUINO is an open-source hardware and software company, project and user community that designs and manufactures single boar microcontrollers and microcontroller kits for building digital devices. Its products are licensed under the GNU Lesser General Public License(LGPL) or the GNU General Public License (GPL), permitting the manufacture of ARDUINO boards and software distribution by anyone. ARDUINO boards are available commercially in preassembled form or as do-it-yourself (DIY) kits.

ARDUINO board designs use a variety of microprocessors and controllers. The boards are equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards or breadboards (shields) and other circuits.

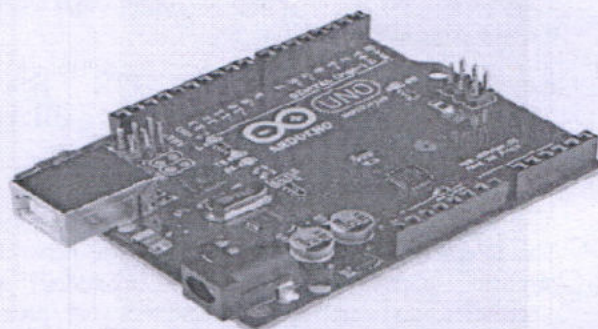


Fig III (b) ARDUINO

3.3 Vibration Sensors

Vibration sensors can be useful for monitoring the condition of rotating machinery, where overheating or excessive vibration could indicate excessive loading, inadequate lubrication, or bearing wear. Such sensors are also utilized in geophysical and applications requiring accelerometers. Piezoelectric

vibration sensors used for detecting vibration from various vibration sources are generally classified into two large types, resonant type and non resonant type.

3.4 ADXL

An accelerometer is a device that measure proper acceleration. The proper acceleration measured by an accelerometer is not necessarily the coordinate acceleration (rate of change of velocity). Instead, the accelerometer sees the acceleration associated with the phenomenon of weight experienced by any test mass at rest in the frame of reference of the accelerometer device. For example, an accelerometer at rest on the surface of the earth will measure an acceleration $g = 9.81 \text{ m/s}^2$ straight upwards, due to its weight. By contrast, accelerometers in free fall or at rest in outer space will measure zero. Another term for the type of acceleration that accelerometers can measure is g-force acceleration.

Working Principle:

An accelerometer Sensor is an electromechanical device that measures acceleration forces. These forces may be static or dynamic which is caused by moving or vibrating the accelerometer. By measuring the amount of static acceleration due to gravity, you can find out the angle the device is tilted at with respect to the earth. By sensing the amount of dynamic acceleration, you can analyze the way the device is moving.

There are different types of accelerometers:

- Piezo electric accelerometer
- Piezo resistive accelerometer
- Strain gage accelerometer

4. HARDWARE DESCRIPTION

- Arduino IDE
- Blynk GSM Platform

4.1 Arduino IDE

ARDUINO IDE is an open source software that is mainly used for writing and compiling the code into the ARDUINO Module. It is an official ARDUINO software, making code compilation too easy that even a common person with no prior technical knowledge can get their feet wet with the learning process. It is easily available for operating systems like MAC, Windows and Linux which runs on the Java Platform that comes with inbuilt functions and commands that play a vital role for debugging, editing and compiling the code in the environment.

A range of ARDUINO modules available including ARDUINO Uno, ARDUINO Mega, ARDUINO Leonardo, ARDUINO Micro and many

more. Each of them contains a microcontroller on the board that is actually programmed and accepts the information in the form of code. The main code, also known as a sketch, created on the IDE platform will ultimately generate a Hex File which is then transferred and uploaded in the controller on the board. [6] discussed about Intelligent Sensor Network for Vehicle Maintenance System. Modern automobiles are no longer mere mechanical devices; they are pervasively monitored through various sensor networks & using integrated circuits and microprocessor based design and control techniques while this transformation has driven major advancements in efficiency and safety.

4.2 BLYNK GSM PLATFORM

BLYNK is a Platform with IOS and Android apps to control ARDUINO, Raspberry Pi and the likes over the Internet. It's a digital dashboard where you can build a graphic interface for our project by simply dragging and dropping widgets. [4] discussed about Positioning Of a Vehicle in a Combined Indoor-Outdoor Scenario, The development in technology has given us all sophistications but equal amounts of threats too. This has brought us an urge to bring a complete security system that monitors an object continuously.

There are three major components in the platform:

BLYNK App - allows to you create amazing interfaces for your projects using various widgets we provide.

BLYNK Server - responsible for all the communications between the smart phone and hardware. You can use our BLYNK Cloud or run your private BLYNK server locally. Its open- source, could easily handle thousands of devices and can even be launched on a Raspberry Pi.

BLYNK Libraries - for all the popular hardware platforms - enable communication with the server and process all the incoming and out coming commands.

Now imagine, every time you press a Button in the BLYNK app, the message travels to the BLYNK Cloud, where it magically finds its way to your hardware. It works the same in the opposite direction and everything happens in a BLYNK of an eye.

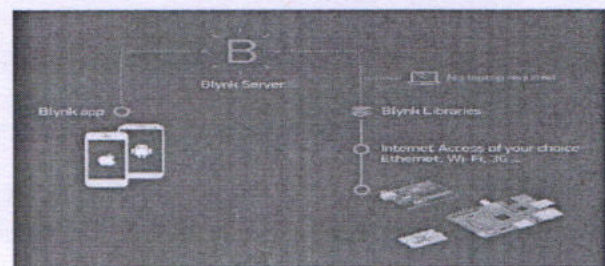


Fig IV (a) BLYNK Cloud Architecture

5. IMPLEMENTATION RESULT

The Implementation of Advanced ATM theft avoidance System is brought into world with the perception of ATM wrong doing occurring far and wide. This paper manages the counteractive action of ATM wrongdoing. At whatever point burglary happens, MEMS module is present to detect crime happening at ATM machine. Proposed framework is done by microcontroller based installed framework designed for constant information gathered utilizing a MEMS module. When the theft happens this, designed system automatically alerts alarm such as buzzer, dc motor control gate, GSM sends SMS to authorized person and the status is displayed in LCD to monitor. Simultaneously this framework additionally manages the wellbeing of the client by cautioning the encompassing individuals and close-by police headquarters at whatever point the client is in risky circumstance.

6. CONCLUSION

Based on the results obtained, the objective of implementing ATM security system using ARDUINO and vibration sensor has been achieved. This project is used to provide security to ATM. Whenever a person tries to distract the ATM, the sensor which senses the vibrations & send a signal to the microcontroller. Once the controller receives signal, it locks the door of ATM room by sending signal to the dc motor and sprinkler sprinkles the chloroform to make the thief unconscious. At the same time, the buzzer also gets activated. Simultaneously, the controller will send a message to an authorized person through GSM modem and the door is made to open only after entering the password.

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Alive Human Detector in Affected Areas Using Radar PIR Sensor

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ABSTRACT

In this modern era, technological development lead the creation of sky scraper buildings and dwellings which increase risks of losing life due to natural and manmade disasters. Many people died by trapping under debris as their presence cannot detect by the rescue team. Sometimes, it is impossible to reach in certain points of the disasters in such calamity hit zones. The situation is worst for developing country like Bangladesh because of low quality design and construction. The principal purpose of this embedded application is to design a remote controlled robot that can hit upon stay humans and transmit the vicinity information wirelessly. It conflict fields and places in which war or disaster has occurred. Detection is also required in risky sectors like boilers, reactors where in most effective legal man or women can input. The stay body sensor in this venture is a special sort of sensor called PIR sensor. Any alive frame with a temperature above absolute temperature emits radiations. This can be invisible to the regular eye. It senses those rays to come across the live human and will inform to the microcontroller.

Keywords: *Microcontroller, PIR Sensor, LCD Display, GSM*

1. INTRODUCTION

Disasters like earthquakes, tsunami, bomb explosion and floods often cause loss of precious human lives.

During such emergency situations, and especially in urban disasters, in order to prevent loss of life and property, various essential services like policemen, fire fighters and medical assistance etc, are deployed. Rescue operations are performed mostly by human and trained dogs, often in very dangerous and risky conditions. Hence, to make the rescue operation more safe and effective, mobile robots have been proposed which detect alive human beings and wirelessly communicate with the rescue team. This work aims to develop an economical robot, which works using AVR MCU, PIR sensor etc. It can be used in areas where rescue is needed. The robot senses the human body temperature using PIR sensor and alarm/indicator indicates the signal when it detects alive body and the message is sent through sms using GSM technology to enable rescue operation. Some loss their lives because of not being treated at time. According to the field of Urban Search and Rescue (USAR), the probability of saving a victim is high within the first 48 hours of the rescue operation, after that, the probability becomes nearly zero. Generally, Rescue People cannot enter into some parts / places of the war field or in the earth quake affected areas. All of these tasks are performed mostly by human and trained dogs, often in very dangerous and risky

situations. To avoid such losses, a robotic system can perform well for providing alert (detection) of human being. This work aims to develop an economical robot, which works using AVR MCU, PIR sensor etc.

2. LITRATURE SURVEY

A unique passive Infrared sensor is used in our design that receives infrared rays that are emitted from humans. When a human body emits infrared radiation of micron wavelength it will be received and manipulated by the PIR (Passive infrared sensor). Once a human target is located the system has to give an alert which may help to identify and localize the victim location as soon as possible. The major part of circuit design is the „Human detection module“ which will be used for carrying out the search activity. The implementation of Microwave life detection system to locate human subjects under earthquake rubble or behind barrier was based on microwave beam of low frequency i.e. 450 MHz so that the communication between human subjects and earthquake rubble or construction barrier was less. In implemented system to detect victims with image taken by an IR (Infrared camera) in an intelligent way, the detection of an object in an image is so complicated so they used neural network method for recognition of the body of human in taken image.

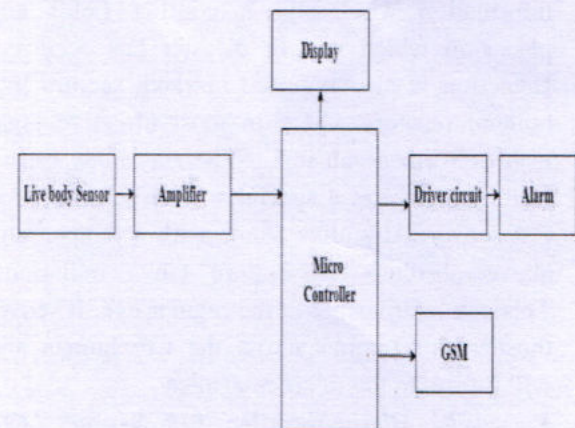
3. EXISTING SYSTEM

Which existing for detecting stay human beings in destructed environments using an self-sustaining. The Machine uses an ultrasonic sensor so that it will come across the existence of dwelling humans and a low-cost digital camera as a way to acquire a video of the scene as wished. Having detected a sign of a residing human, the ultrasonic sensor Triggers the camera to show stay scene. The video is then displayed at the screen. This method requires a rather small wide variety of records to be acquired and processed at some stage in the

rescue operation. This Manner, the real-time value of processing and facts transmission is considerably decreased. This device has the capability to obtain excessive performance in detecting alive humans in devastated environments rather fast and value successfully.

4. PROPOSED SYSTEM

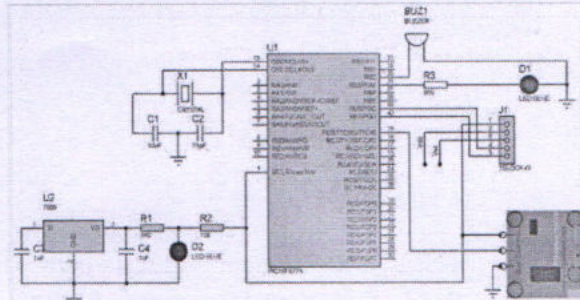
The system has live body sensor and amplifier to detect human presence. The live body sensor is the special type of sensor. This sensor has two Elements. Naturally the passive infrared radiation is the one type of rays, which are always emitting from the live human bodies. These rays will be received by the sensor elements. If there is a variation between the outputs of these elements due to movement in the live body, the difference between the outputs will be amplified by differentiation amplifier. Then the signal is fed to another amplifier unit in order to amplify the voltage level. The amplifier unit is constructed by the operational amplifier. Then the amplified signal is given to micro controller.



4.1 BLOCK DIAGRAM

Here the micro controller is the flash type reprogrammable microcontroller in which we have already programmed. When human bodies in the destroyed building due bomb blast or earth quack, the sensor senses the radiation signal from the human bodies the

microcontroller received the signal from the amplifier and activates the driver circuit for alarm. The driver circuit is constructed with transistor, which acts as switch to turn ON and turn OFF alarm. Now the alarm makes the sound for live bodies" indication.



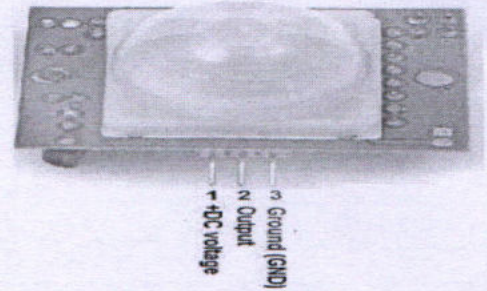
4.2 CIRCUIT DIAGRAM

The major heart of this project is microcontroller; a microcontroller (sometimes abbreviated C or MCU) is a small computer on a single integrated circuit containing a processor core, memory, and programmable input/output peripherals etc. However, compare to others, microcontroller is fast and very easy to program. Crystal Oscillator. A crystal oscillator is an electronic oscillator circuit that uses the mechanical resonance of a vibrating crystal of piezoelectric material to create an electrical signal with a very precise frequency. This frequency is commonly used to keep track of time, to provide a stable clock signal for microcontrollers. The most common type of piezoelectric resonator used is the quartz crystal, so oscillator circuits incorporating them became known as crystal oscillators. Reset Function - Reset is used for putting the microcontroller into a known condition. That practically means that microcontroller can behave rather inaccurately under certain undesirable conditions.

5. PIR SENSOR

The Term PIR is the short form of the Passive Infrared. The term "passive" indicates that the sensor does not actively take part in the process, which means, it does not emit the referred IR signals itself, rather passively detects

the infrared radiations coming from the human body in the surrounding area. The PIR sensor range is up to 10m.



5.1 PIR SENSOR

The detected radiations are converted into an electrical charge, which is proportional to the detected level of the radiation. Then this charge is further improved by a built in FET and fed to the output pin of the device which becomes applicable to an external circuit for further triggering and amplification of the alarm stages.

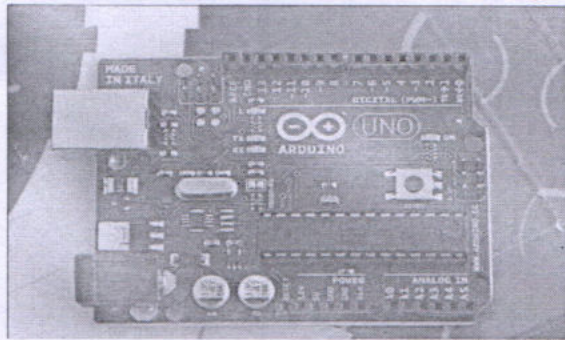
5.2 PIN CONFIGURATION

The Passive infrared sensors consist of three pins as indicated in the diagram.1. Pin1 corresponds to the drain terminal of the device, which should be connected to the positive supply 5V DC. 2. Pin2 corresponds to the source terminal of the device, which should be connected to the ground terminal via a 100K or 47K resistor. The Pin2 is the output pin of the sensor, and the detected IR signal is carried forward to an amplifier from the pin 2 of the sensor.3. Pin3 of the sensor is connected to the ground.

6. ARDUINO MICROCONTROLLER

The Arduino microcontroller is an easy to use yet powerful single board computer that has gained considerable traction in the hobby and professional market. The Arduino is open-source, which means hardware is reasonably priced and development software is free. This guide is for students in ME 2011, or students anywhere who are confronting the Arduino for the first time. For advanced Arduino users,

prowl the web; there are lots of resources. The Arduino project was started in Italy to develop low cost hardware for interaction design.

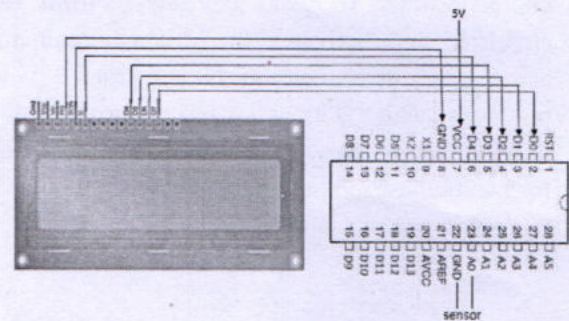


6.1 ARDUINO MICROCONTROLLER

An overview is on the Wikipedia entry for Arduino. The Arduino hardware comes in several flavors. In the United States, Sparkfun (www.sparkfun.com) is a good source for Arduino hardware. [2] proposed a novel method for secure transportation of railway systems has been proposed in this project. In existing methods, most of the methods are manual resulting in a lot of human errors. This project proposes a system which can be controlled automatically without any outside help. This project has a model concerning two train sections and a gate section..

7. LCD DISPLAY

LCD (liquid crystal display) is the technology used for displays in notebook and other smaller computers. Like light-emitting diode (LED) and gas-plasma technologies, LCDs allow displays to be much thinner than cathode ray tube (CRT) technology. Liquid crystal displays (LCDs) are a commonly used to display data in devices such as calculators, microwave ovens, and many other electronic devices. [4] emphasized that people who are visually impaired have a hard time navigating their surroundings, recognizing objects, and avoiding hazards on their own since they do not know what is going on in their immediate surroundings. We have devised a new method of delivering assistance to people who are blind in their quest to improve their vision.



7.1 LCD DISPLAY

8. GSM MODULE

GSM/GPRS Modem-RS232 is built with Dual Band GSM/GPRS engine- SIM900A, works on frequencies 900/ 1800 MHz The Modem is coming with RS232 interface, which allows you connect PC as well as microcontroller with RS232Chip (MAX232). The baud rate is configurable from 9600-115200 through AT command. The GSM/GPRS Modem is having internal TCP/IP stack to enable you to connect with internet via GPRS. It is suitable for SMS, Voice as well as DATA transfer application in M2M interface. The onboard Regulated Power supply allows you to connect wide range unregulated power supply. Using this modem, you can make audio calls, SMS, Read SMS; attend the incoming calls and internet act through simple AT commands. This GSM Modem can accept any GSM network operator SIM card and act just like a mobile phone with its own unique phone number. Advantage of using this modem will be that you can use its RS232 port to communicate and develop embedded applications. Applications like SMS Control, data transfer, remote control and logging can be developed easily. [7] emphasized that Security is an important issue in current and next-generation networks. Blockchain will be an appropriate technology for securely sharing information in next-generation networks. Digital images are the prime medium attacked by cyber attackers. In this paper, a blockchain based security framework is proposed for sharing digital images in a multi user environment.

7. CONCLUSION

The Arduino monitors PIR sensor and the program is written and uploaded to Arduino.

Whenever a human detection occurs within the range of PIR sensor, the LED switches on and buzzer rings which can be seen by the team. If the PIR sensor generates false alerts, this will also be monitored by the Arduino and considered by the operation team. The team will move the robot in the vicinity, stop it and carry on a human search. The system is able to detect the human beings in calamity-affected zones effectively. The robot is able to navigate at all possible locations in the disaster-affected field. It detects living humans from the unreachable point. It also detects the human behind the obstacle. With the help of PIR sensor systems, it is able to avoid collisions which enhance the working capability in extreme conditions. The system is helpful in reducing the risk of life of a rescuer and it also eliminates the physical presence of rescuers at the affected site. The system gives positive results as soon as it detects a living human in its working range. The system gives better and reliable results. Since the system needs lots of power supply instead of using batteries it can have solar power source. High pixel camera can be used for more clearly and proper streaming.

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A NOVEL APPROACH FOR A PORTABLE WIRELESS AUTOMATIC CALLING BELL FOR DEAF AND DUMB PEOPLE

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ABSTRACT

This present research paper proposes every problem human race has ever faced, technology has given its answer. Technology has now evolved in each and every aspect of human world, from electric cars to smart washing machine and what not. Our motivation for this research is to assist deaf and dumb persons in effectively responding to non-speech critical noises so that they can live a normal life. This project a user module is designed which will notify the user whenever the doorbell is do not want to pressed. The notification will be send through a wireless module which covers a good amount of range. One module will be hooked at the doorbell while other will be connected to the user module (a wearable device) with some vibrating motor for the indication purpose. The LCD screen will display the text for notification purpose. These modules are controlled by Arduino control Unit. Without knocking on the door or using the door bell, the message is instantly send to the deaf and dumb people automatically. We've connected some vibrators to their bodies in the shape of wrist band. So the LCD sensor analyses the person standing outside the door. As a result, the wireless RF frequency indicates vibration. As a result, he can feel the presence of the person at the door.

Keywords: RF frequency Transmitter, RF frequency Receiver, LCD sensor.

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1. INTRODUCTION

According to World Health Organization figures, over 300 million people are deaf, 1 million are dumb, and many more suffer from severe physical disabilities. With the advancements in science and technology, human life and comfort have reached new heights in a short period of time. Various advanced technologies have arisen in recent decades that have made our lives so much easier and more pleasant that we no longer need to move our bodies to complete tasks. However, we have always placed a premium on the average man, and we have neglected a segment of our society known as the Physically Disabled, who are often denied access to scientific and technological developments. This is because science has not provided them with the level of comfort that they require to feel like they are a member of this evolved civilization and that they, too, have the right to walk alongside the greatest. Communication, which is a vital component of human life, is extremely difficult for Deaf or Dumb people.

This study will focus on this fact and attempt to establish a new wireless calling bell system that is specifically built for the Deaf and can assist him in communicating easily with the outside world with other normal people or people of their own kind.

The major goal of this study is to close a communication gap by developing basic technology that allows a deaf person to sense the presence of someone at the door.

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We have shown a prototype that will assist a deaf person in recognising the presence of a person at the door. [2] discussed about an eye blinking sensor. Nowadays heart attack patients are increasing day by day."Though it is tough to save the heart attack patients, we can increase the statistics of saving the life of patients & the life of others whom they are responsible for. The main design of this project is to track the heart attack of patients who are suffering from any attacks during driving and send them a medical need & thereby to stop the vehicle to ensure that the persons along them are safe from accident.

The prototype is based on the concept of Wearable Technology, which requires the user to wear the device on their wrist as a wrist band, and the sensor will scan and deliver vibrations to anyone standing outside the door. The vibration might be felt on his or her hand.

2. PROPOSED METHOD

In this paper we have designed a automatic calling bell for deaf and dumb. Generally we have the normal calling bell but we never thought of how to call a physically handicapped (a deaf person). Here we have made a wireless automatic calling bell which is very useful for a deaf person. When somebody stands outer the door the calling bell is automatically on, the calling bell then sends the signal to the receiver unit which in turn activates the vibrator so a deaf can feel the vibration and know that somebody is calling/knocking at the door. It uses RF (Radio frequency) technology (434 MHz).

The micro controller now displays the associated message on the LCD screen. It also sounds a buzzer along with message as soon as it receives motion signal from the sensor. The patient motion recorder device consists of an RF transmitter in order to transfer the data signal. An RF receiver on the other side receives the data and then decodes it before passing it to the micro controller for processing the input and responding to it. The situation would have been different if the person inside would have some portable/wearable device on which the notification would have been popped up whenever the doorbell would have been pressed, thus helping deaf people reach the door whenever the door is knocked. Here the transmitter contains an Arduino module connected with a doorbell along with wireless module, while the receiver's module contains Arduino, LCD display, vibrating motor/flashing LED and wireless module.

Here the process is divided into two segments. The region above "Medium/Channel" is transmitter's region and the region below it is receiver's region. One Arduino unit will be attached at the doorbell. The Arduino connected over there will continuously monitor whether the doorbell is pressed or not, if Yes, then send the signal "open the doorbell" via wireless module.

3. WORKING PRINCIPLE

In this project we have designed a calling bell for deaf and dumb. Generally we have the normal calling bell but we never thought of how to call a physically handicapped (a deaf person). Here we have made a wireless calling bell which is very useful for a deaf person. When somebody stands outside the door the bell is automatically on, the calling bell then sends the signal to the receiver unit which in turn activates the vibrator so a deaf can feel the vibration and know that somebody is calling/ knocking at the door. It uses RF (Radio frequency) technology (434 MHz). When someone stands outside the door the bell is automatically on, the signal from the calling bell is sent to the encoder IC which is then fed to the Transmitter Module for the wireless transmission through Transmitting antenna at the same time the signal is also sent to the relay driver which operates the Calling Bell. The Receiving antenna receives the signal from the Transmitting antenna which is received by the receiver module then the signal is fed to the Decoder for decoding so that it can effectively operate the Vibrator attached in the wrist band unit. The Calling Bell switch is connected to a 5V DC. HT12E is the Encoder IC capable of encoding information which consists of N address bits and 12- N data bits. Each address or data input can be set to either 1 or 0.

The programmed addresses or data are transmitted together with the header bits via an infrared transmission medium or RF upon receipt of a trigger signal. After the data being received by the receiving antenna the data is then given to the decoder IC HT12D through the Receiver Module. Then the decoded data is fed to the Vibrator for vibration and the same data is also fed to the led for visualization. Hence the deaf person can sense the vibration as well as he can also visualize the effect by the LED. We propose a system which mainly consists of a transmitter and a receiver section. In the transmitter section (at the patient side), a four axis accelerometer will be placed on the any movable part of the patient. This accelerometer is capable of measuring the static acceleration due to gravity and thus finding the angle at which the device is tilted with respect to the earth. Whenever patient needs any help he tilts the accelerometer in different directions. This acts as an input to the accelerometer while output of it is in volts that is connected to the controller board which acts as the processing unit. The output of the accelerometer depends on the tilt angles and is read by the controller. The controller maps the input voltages between 0 and 5 volts into integer values between 0 and 1023 as analog data from the range of 0-1023. The switch S1 is the calling bell switch which is connected to the 5v DC supply. When anyone presses the switch, the 5v DC is fed to the 10th pin i.e. AD8 of HT12E all other pins (AD9-AD11) are grounded as they are of no need. When 5V is fed LED1 glows and at the same time it also triggers the relay so the calling bell also beeps. The data being fed to the encoder encodes the data and the encoded data is given out through the 17th pin. DOUT pin of HT12E. The encoded data is given to the Transmitter Module (434 MHz) which modulates (ASK Modulation) the data and send the same through the transmitting antenna. The receiving antenna receives the modulated signal then it fed the signal to the RX Module which is then fed to the HT12D for decoding the signal back to 4bit. As there no addresses to be received so all the pins (A0-A7) are grounded. The encoded data is reflected in the D0 pin which triggers the BC547 as a result the vibrator vibrates. A capacitor is connected across the vibrator because when the calling bell is pressed it will keep on vibrating for some time to help the deaf respond respectively.

4. BLOCK DIAGRAM

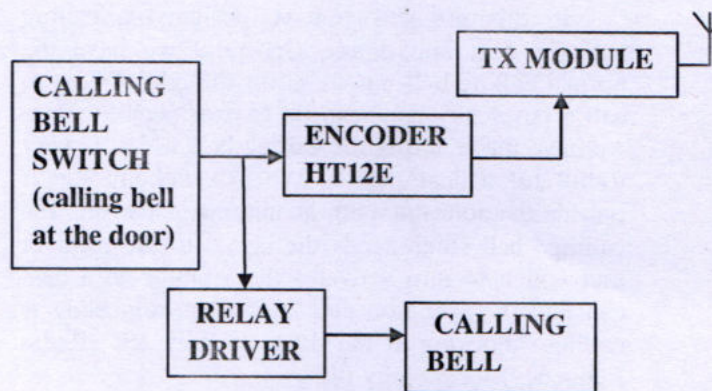


Fig.4.1 Transmitter Section

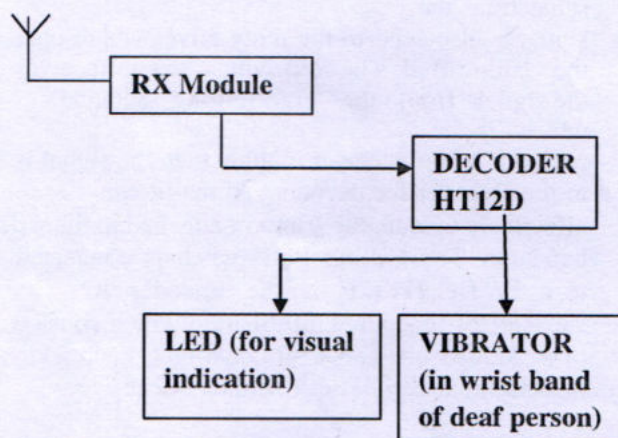


Fig.4.2 Receiver Section

5. CIRCUIT DIAGRAM

The Step down 12V AC is fed to the bridge rectifier. The rectifier converts AC to DC and it gives the DC voltage to the 2Voltage Regulators (7812 and 7805). IC1-7812 is used to provide the power supply to the relay (here 12V SPDT relay is used). IC2-7805 is used to provide the power supply to the rest of the components. LED1 is used for the indication purpose that the system is powered ON.

A. Transmitter Section Circuit

The switch S1 is the calling bell switch which is connected to the 5v DC supply.

[4] discussed about Nanorobots Control Activation For Stenosed Coronary Occlusion, this paper presents the study of nanorobots control activation for stenosed coronary occlusion, with the practical use of chemical and thermal gradients for biomedical problems. The recent developments on nanotechnology new materials allied with electronics device miniaturization may enable nanorobots for the next few years. [6] emphasized that people who are visually impaired have a hard time navigating their surroundings, recognizing objects, and avoiding hazards on their own since they do not know what is going on in their immediate surroundings. We have devised a new method of delivering assistance to people who are blind in their quest to improve their vision.

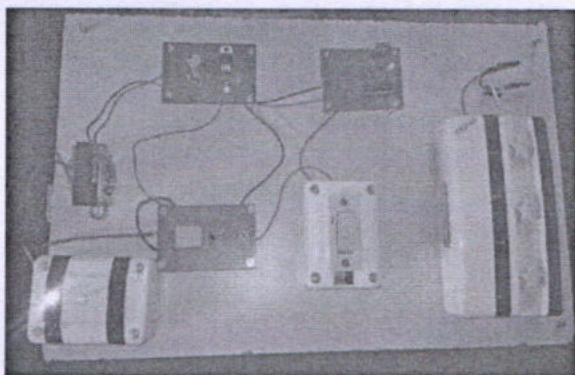
B. Receiver Section Circuit

The receiving antenna receives the modulated signal then it fed the signal to the RX Module which is then fed to the HT12D for decoding the signal back to 4bit.

As there is no address to be received so all the pins (A0-A7) are grounded. The encoded data is reflected in the D0 pin which triggers the BC547 an as a result the vibrator vibrates. A capacitor is connected across the vibrator because when the calling bell is pressed it will keep on vibrating for some time to help the deaf respond effectively.

Here 7805 IC is used for the vibrator in order to provide the constant 5v DC to the vibrator. We can also use a rechargeable battery.

6. EXPERIMENTAL SETUP



We have tested the prototype and also tested it with a deaf person. In future we shall expand the prototype for the 2 way communication.

7. CONCLUSION

As it can be seen in the figure that when the human being stands outside the door the calling bell is automatically on . Then immediately the message was displayed on the screen with motor vibrating and flashing led. The doorbell notification for deaf people is a practical solution has been experimentally proven to work satisfactorily. The handshaking between Arduino with various sensors has been done successfully. Thus the wearable device for deaf people was successfully designed, implemented and tested.

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Disease Prediction Based on Retinal Images using Deep Neural Networks

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ABSTRACT

Image processing and analysis methods are increasing importance in all fields of medical science because it is helpful to learn visual signs on Retinal vessels, There are several maladies in humanlike vascular diseases like diabetes, and hypertension. Blood vessels in the retina reflect the changes in the blood vessels of other parts of body like heart, brain, kidney etc. Veins of retina are partitioned into two kinds they are supply arteries and veins. For finding of different illnesses, it is more essential to initially recognize the vessels into arteries and veins. it is more important to first distinguish the vessels into arteries & veins. The largest arteries & veins are measured using CRAE & CRVE which is correlated with stroke & heart disease. Thus, wrong identification of vessels leads to wrong diagnosis of the diseases. However, automation of retinal segmentation that is difficult as a result of that the retinal pictures are noisy, distinction low, and therefore the vessel breadth often varies from very large to very tiny Hence pre processing steps are introduced to vessel segmentation using median filter algorithm. In this paper, our focus is calculation of Arteriolar-to-Venular diameter ratio (AVR) for the diagnosis of various diseases.

Keywords: CRAE, CRVE, artery, median filter, neural network, AVR.

1. INTRODUCTION

Currently the diseases associated with the eye are redoubled and lots of individuals suffered to visual impairment. Image process is that the area, that analysis the image and which involves within the vessel extraction, classification, and segmentation. By recognizing the vessel patterns within the retina of the human eye that were to research the vessels of the retinal image. Within the maladies like retinopathy

principally leads to the result of the overall vision defect of the eye.

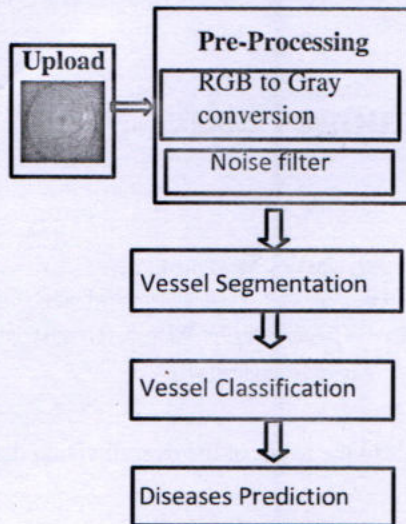
A design concept to medicine and biology for health care purpose is the Bio Medical Engineering (BME) Application The field seeks to close the gap between engineering and medicine field. Retinal images of the humans play the most important role in the detection and diagnosis of many human eye diseases for ophthalmologist. Some disease such as diabetic retinopathy and vascular degeneration and glaucoma are very dangerous diseases that they can lead to blindness of the human eye if they are not detected in early time correctly. Therefore, the detection of the human retinal images is very necessary and among them the detection of the blood vessels is most important. The alterations about the human eye blood vessels such as length, width and the branching patterns are very helpful to grade disease severity or automatically diagnose the diseases Arteriolar-to-venular diameter ratio can be comprised of two elements they are Central Retinal Arteriolar Equivalent (CRAE) and Central Retinal Venular Equivalent (CRVE).

These values which are beneficial in finding the disease such like hypertension and other vascular diseases. These kinds of diseases even change the vessel branching patterns, so that there is need to overcome the problems which occur due to the bifurcation, cut of vessel etc. however manual detection of blood vessels is much more difficult since the blood vessels in a retinal image are complex and with low contrast.

Also, there are number of retinal images to detect a disease. As a result, reliable and automatic methods for extracting and measuring the vessels in retinal images are needed. The main goal of this paper is estimation of the average diameter ratio of arteries with respect to veins which is the strong parameter in the diagnosis of the various vascular diseases.

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2.SYSTEM ARCHITECTURE



3. MODULES

- Image acquisition
- Pre processing
- Vessel Segmentation
- Vessel Classification
- Disease diagnosis

3.1 Image Acquisition

Retinal image is the microscopic image of human eye. User can upload the retinal images. Image can be any size and any resolution. Based on retinal images, predict the diseases using blood vessels.

3.2 Pre processing

Convert RGB image into gray scale image.

Gray-scale image = $(0.3 * R) + (0.59 * G) + (0.11 * B)$.

Using median filter algorithm to eliminate the noises in images. Such noise reduction is a typical pre-processing step to improve the results of later processing.

3.3 Segmentation of Blood Vessels

From this module, we implement neural network mechanism of image processing. At first vessel values are tracked and pointed the vessel features. Based on feature values, Back propagation algorithm is used.

3.4 Classification of Blood Vessels

Track the vessels and calculate the width of each blood vessel. Based on width values, categorize artery and vein vessels. And differentiate the vessels such as red represent as artery and blue represent as vein.

3.5 Disease Diagnosis

Calculate CRAE and CRVE measurements. Based on these above measurements, predict various diseases such as hyper tension, stroke, and blood pressure and so on.

4. MEDIAN FILTER

A grayscale is used in retinal image for determining the value of each pixel of a single image, in simple; it carries the information about intensity. In retinal imaging, it's known as "black-white" which is composed of exclusive shades of gray varying from black at weakest intensity to white at the strongest. Grayscale images(b) have many shades of gray in between.

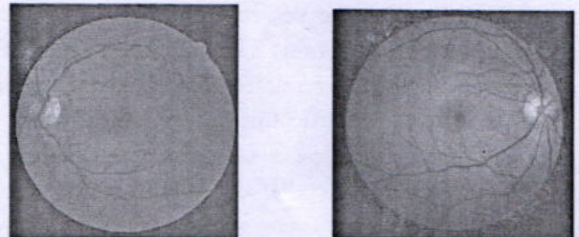


Fig IV(a) Fig IV(b)

In medical imaging, it is used for some kind of noise reduction on retinal image(b). It provides enhanced image. This type of noise reduction is typical a pre processing step. In median filter, majority of the computational effort and time is taken for calculating

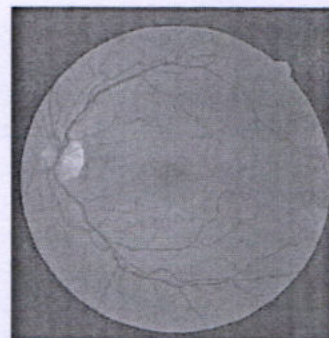


Fig IV(C)

median of each window. Since the filter must process every entry of the vessels and for large vessels such as

images the median calculation efficiency is a critical factor to determine the speed of the algorithm and its run time capacity. Since in a given list of numbers only the middle value is required.

Median filtering is a nonlinear method used to remove noise from images. It is widely used as it is very effective removing noise while preserving edges. It is particularly effective at removing „salt and pepper“ type noise. The median filter works by moving through the image pixel by pixel replacing each value with the median value of neighboring pixels.

5. TECHNIQUES AND ALGORITHMS:

The segmented vessels are classified into arteries and veins. Correct classification of vessels is vital, because heart diseases affect arteries and veins differently. The alterations in veins and arteries cannot be analyzed without distinguishing them. Segmented vessels are classified by the supervised method Support Vector Machine. After extraction of blood vessels, feature vector is formed based on properties of artery and veins. The features get extracted on the basis of centerline extracted image and a label is assigned to each centerline, indicating the artery and vein pixel. Based on these labeling phase, the final goal is now to assign one of the labels with the artery class (A), and the other with vein class (V). In order to allow the final classification between A/V classes along with vessel intensity information the structural information and are also used. This can be done using SVM classification.

The trained classifier is used for assigning the A/V classes to each one of the sub graph labels. First, each centerline pixel is classified into A or V classes, then for each label $(C_{ij}, j = 1, 2)$ in sub graph i , the probability of its being an artery is calculated based on the number of associated centerline pixels classified by LDA to be an artery or a vein. The probability of label C_{ij} to be an artery is $P_a(C_{ij}) = n_{aC_{ij}} / (n_{aC_{ij}} + n_{vC_{ij}})$ Where $n_{aC_{ij}}$ is the number of centerline pixels of a label classified as an artery and $n_{vC_{ij}}$ is the number of centerline pixels classified as a vein. For each pair of labels in each sub graph, the label with higher artery probability will be assigned as an artery class, and the other as a vein class. Finally, to prevent a wrong classification as a result of a wrong graph analysis, we calculate the probability of being an artery or a vein for each link individually.

6. NEURAL NETWORKS

It is a system of hardware and software patterned after the operation of neurons in the human brain, it is also called artificial neural network. Image processing techniques use vessel segmentation method which is used to generate vascular tree in clinical imaging. It is widely demonstrated in ophthalmology. It enables external inspection of the condition and structure of blood vessels. The detection of arteries in ophthalmology is a basic procedure for the diagnosis of retinal pathologies, which are commonly seen and indicated in patients with diabetes and hypertension. Vision loss is an accurate identification for prevention of further deterioration. Pathologic progression is characterized by abnormal vascular arrangement in the eye. Segmentation of vascular tree forms the first step towards construction of an algorithmic basis for pathological detection. A DNN approach has been constructed of pixels for given image. It is a natural approach, for which heterogeneity in the roles of processing layer in the network required for recognizing different geometrical and spatial features of vessels. Neural networks (also referred to as connectionist systems) are a computational approach, which is based on a large collection of neural units. Each neural unit is connected with many others, and links can be enforcing or inhibitory in their effect on the activation state of connected neural units.

Neural networks (also referred to as connectionist systems) are divided into three layers

1. Input layer is defined as the various input such as image, in which vessel width are given.
2. Hidden layer is responsible for actual processing.
3. Output layer includes the processing of code in hidden layer we get a desired output.

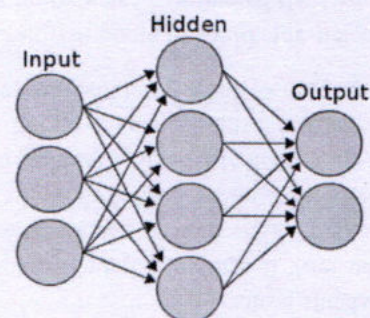


Fig V(a)

Retinal arteriole to venular ratio	Adjusted RR (95% CI) *	
	Women	Men
1st quintile (range: 0.57-0.78)	2.2 (1.0-4.6)	1.1 (0.7-1.8)
2nd quintile (range: 0.59-0.82)	2.3 (1.1-4.8)	1.0 (0.6-1.7)
3rd quintile (range: 0.83-0.86)	1.6 (0.8-3.4)	1.2 (0.7-1.9)
4th quintile (range: 0.87-0.91)	1.3 (0.6-2.8)	1.2 (0.7-2.1)
5th quintile (range: 0.91-1.22)	1.0	1.0

7. DISEASE PREDICTION

Recognizable proof the sicknesses exploitation AVR quantitative connection upheld CRAE and CRVE estimations. Vessel movement CRAE, CRVE discovered correlative with the dangers elements of cardiovascular ailments and are sure genuine numbers. The significant general determinant for littler CRAE is higher pulse though more extensive CRVE is important in view of everyday cigarette smoking, higher circulatory strain or cardiovascular sickness, fundamental irritation infection (SID) and avoirdupois. A more up to date think about found that the strong circuitous connection between neural works and retinal parameters (CRAE and CRVE) in a very accomplice of eighty the sound individuals, that recommends a run of the mill determinant in pre-clinical organ damage. [5] discussed that Liver tumor division in restorative pictures has been generally considered as of late, of which the Level set models show an uncommon potential with the advantage of overall optima and functional effectiveness. The Gaussian mixture model (GMM) and Expected Maximization for liver tumor division are introduced. [8] discussed about diabetic retinopathy from retinal pictures utilizing cooperation and information on state of the art sign dealing with and picture preparing. The Pre-Processing stage remedies the lopsided lighting in fundus pictures and furthermore kills the fight in the picture. [10] discussed about detection of leukaemia using a small picture handling method that distinguishes between red blood cells and young white cells. Visual examination of minuscule photos by looking at alterations such as surface, calculation, shading, and measurable research of photographs is now the only recognisable proof of blood trouble.

This is in help of prior examinations looking at the relationship between retinal vascular signs and episode cardiovascular sickness giving verification To retinal picture were utilized for trademark impacts of ailments like cardiovascular maladies therefore that a decline in CRAE is in this manner a predecessor to clinical beginning of cardiovascular infection and occurs before entirely unexpected indications of organ damage Beside the value of CRAE inside the recognizing and foreseeing HTN (hypertension), it conjointly demonstrates decent potential in various pathologies together with stroke and polygenic issue.

TABLE IV(a)Retinal Arteriolar Narrowing and 3-Year Risk of Coronary Heart Disease

8. BACK PROPAGATION

It is a common method of training a neural network in which the initial system output is compared to the desired output, and the system is adjusted until the difference between the two is minimized. Back propagation neural networks employ one of the most popular neural network learning algorithms, the Back-propagation algorithm. It has been used successfully for wide variety of applications, such as image pattern and medical diagnosis. Back propagation is a common method of training artificial neural networks and used in conjunction with an optimization method such as gradient descent. [2] discussed that In surgical planning and cancer treatment, it is crucial to segment and measure a liver tumor's volume accurately. Because it would involve automation, standardisation, and the incorporation of complete volumetric information, accurate automatic liver tumor segmentation would substantially affect the processes for therapy planning and follow-up reporting.

9.CONCLUSION

Retinal vascular structure measurements provide good diagnostic capabilities for the risk of cardiovascular disease. The wrong identification of vessels will lead to incorrect diagnosis. In the existing system Graph Tracer Algorithm is used to segment vessels. Graph tracer algorithm is not a perfect approach because there are bifurcations & cut-off of vessels. The proposed algorithm will focus on the use of a new gray image as input obtained from IR sensor scanner with the three RGB components. The median filter algorithm overcomes the drawbacks of graph tracer algorithm. The proposed work will be extended to detect the age of the patient with the CRAE& CRVE measures using optic disk.

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ADVANCED SKIN DISEASE DIAGNOSIS USING IMAGE PROCESSING

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ABSTRACT:

Malignant melanoma is the deadliest form of skin cancer. Dermoscopy is a noninvasive high-resolution imaging technique that assists physicians for more accurate diagnoses of skin cancers. Melanoma is a fast-growing aggressive type of skin cancer. Due to this feature, malignant melanoma remains one of the fastest growing cancers worldwide. After it metastasizes from its origin into other tissues, the response rate to treatment declines as low as 5%, and its 10-year survival rate is only about 10%. After it metastasizes, there is no surgical rem detection of malignant melanoma is critically important. Among many types of skin cancers, melanoma has the highest false negative ratio. Therefore, this thesis proposes three methods for early detection of malignant melanoma. More specifically, this thesis introduces a novel approach of texture-based abrupt cutoff quantification method. In current clinical practice, abrupt cutoff evaluation is subjective and error-prone. In our method, we introduce a novel approach to objectively and quantitatively measure abrupt cutoff. To achieve this, we quantitatively analyzed the texture features of a region within the skin lesion boundary using level set propagation (LSP) method. Then, we built feature vectors of homogeneity, standard deviation of pixel values, and mean of the pixel values of the region of interest between the contracted border and the original border of a skin lesion. These vectors were then classified using neural networks (NN) and support vector machines (SVM) classifiers.

Keyword:

Deep Learning, Transfer Learning, Malignant, Melanoma,

INTRODUCTION:

The occurrence of malignant melanoma, which is the deadliest form of skin cancers, has been elevated in the last decade. Between 2009 and 2010, the mortality rate due to melanoma increased by 3% in the USA. Skin cancer occurrence has become more common not only in the USA but also in different countries with Caucasian people majority such as the UK and Canada with 10,000 diagnoses and annual mortality of 1,250 people. Early diagnosis of the melanoma has been spotlighted due to the persistent elevation of the number of incidents, the high medical cost, and increased death rate.

Dermoscopy, which is one of the noninvasive skin imaging techniques, has become a key method in the diagnosis of melanoma. Dermoscopy is the method that magnifies the region of interest (ROI) optically and takes digital pictures of the ROI. Misdiagnosis or under diagnosis of melanoma is the main reason for skin cancer-related fatalities. The cause of these errors is usually due to the complexity of the subsurface structures and the subjectivity of visual interpretations.

Expert clinicians look for the presence of exclusive visual features to diagnose skin lesions correctly in almost all of the clinical dermoscopy methods. These features are evaluated for irregularities and malignancy. However, in the case of an inexperienced dermatologist, diagnosis of melanoma can be very challenging.

The problems addressed in this thesis are; how to eliminate the subjectivity on visual interpretation of dermoscopy images for border irregularity/abruptness; how to improve the performance of feature extraction algorithms by providing more accurate skin lesion segmentation; and how to reduce the number of false-negative diagnosis.

Images used in this thesis are obtained from the International Skin Imaging Collaborations Archive.

OVERVIEW OF MACHINE LEARNING:

Machine learning (ML) is an area that aims to construct new algorithms to make predictions based on given data. ML generates general models using training data so that these models can detect the presence or the absence of a pattern in test (new) data. Patterns can be a low-level or a high-level.

Biological neural network is an important part of the human brain. It is a highly complex system and has an ability to process different tasks simultaneously. Neural network (NN) is a classifier that simulates the human brain and neurons. Instead of neurons, "perceptron" is used as a basic unit of NN. NN architecture consists of the different layers.

The back-propagation algorithm can be divided into two phases: propagation and weight update. In the first phase of this algorithm, an input vector is propagated forward through the neural network, and the output value is generated.

DEEP LEARNING AND TRANSFER LEARNING:

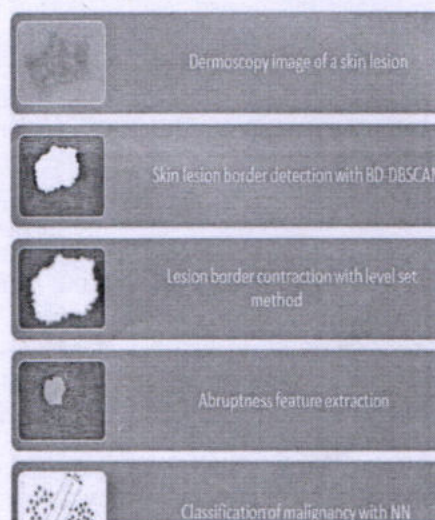
Deep learning, also known as Deep Structured Learning, is a subdivision of ML supported by mass of algorithms. Deep learning can extract useful features directly from images, text and sound in supervised and/or unsupervised manners which makes it different than standard machine learning techniques. In fact, feature extraction with this approach is considered as a part of the learning process. Transfer learning is a ML technique where a model that is trained on one task is repurposed on another related task.

Abruptness of pigment patterns at the periphery of a skin lesion is one of the most important dermoscopic features for detection of malignancy. In the current clinical setting, abrupt cutoff of a skin lesion is determined by an examination performed by a dermatologist.

This region was bounded by an interior border line of the lesion boundary which is

determined using level set propagation (LSP) method. This method provides a fast border contraction without a need for extensive boolean operations. Then, we built feature vectors of homogeneity, standard deviation of pixel values, and mean of the pixel values of the region between the contracted border and the original border.

The data set for this part of the thesis was obtained from ISIC 2016: Skin Lesion Analysis Toward Melanoma Detection [59], which has 900 dermoscopic images with 727 benign and 173 malignant lesions, and Edra Interactive Atlas of Dermoscopy [60], which has 73 benign and 27 malignant lesions.



[3] discussed that in surgical planning and cancer treatment, it is crucial to segment and measure a liver tumor's volume accurately. Because it would involve automation, standardisation, and the incorporation of complete volumetric information, accurate automatic liver tumor segmentation would substantially affect the processes for therapy planning and follow-up reporting. Based on the Hidden Markov random field, Automatic liver tumor detection in CT scans is possible using hidden Markov random fields (HMRF-EM).

Then, we considered the offset of a continuous function of whole lesion border

using constant velocity level sets and contracted the lesion border using these

levelsets.

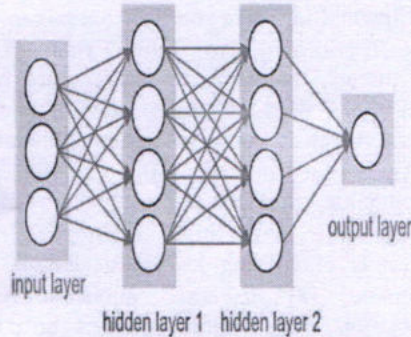


Figure: Fully-connected multi-hidden layer NN architecture.

We empirically determined the iteration numbers as 600, 750, and 1000 without constraining a stoppage criterion. Then, we added the learning rate of 0.0001 to exit the iteration between two consecutive epochs. We ran both NN methods and SVM on the same set of image data however different feature vectors based on the different feature extraction methods used

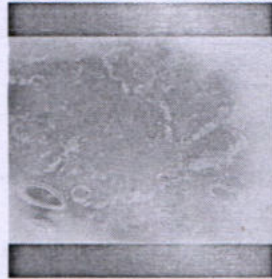
Feature Extraction-Classification	Precision	Recall	Sensitivity	F1-Score
LSP-Multilayer Perceptron NN	0.82	0.81	0.75	0.8
DS-Multilayer Perceptron NN	0.77	0.76	0.56	0.74
LSP-SVM	0.69	0.64	0.66	0.66
DS-SVM	0.62	0.61	0.61	0.61
LSP-Fully-connected multilayer NN	0.86	0.87	0.78	0.87
DS-Fully-connected multi-hidden layer NN	0.76	0.75	0.61	0.75

	NN	Parameters	SVM
Learning rate	0.001	Kernel function	Polynomial
Number of iterations	1000	Polynomial order	3
Number of runs	20	Kernel scale	Auto
Number of hidden layers	1	Box constraint	Inf
Number of hidden layer node	4	Standardize	True
Number of hidden layers (If multilayer NN is used)	4	Outlier fraction	0.05

As lower homogeneity indicates sharp cutoffs, suggesting melanoma, we carried out our experiments on two dermoscopy image datasets, which consisted of 800 benign and 200 malignant melanoma cases. By using texture homogeneity at the periphery of a lesion border determined by LSP, as a classification results, we obtained 87% f1-score and 78% specificity; that we obtained better results than in the previous study. We also compared the performances of two different NN classifiers and support vector machine classifier.

We start segmentation process by first finding the super pixels. Super pixels are one of the most popular images over-segmentation algorithms. Among many super pixel algorithms, the choice of super pixel algorithm in this thesis is Simple

[5] discussed that Liver tumor division in restorative pictures has been generally considered as of late, of which the Level set models show an uncommon potential with the advantage of overall optima and functional effectiveness.

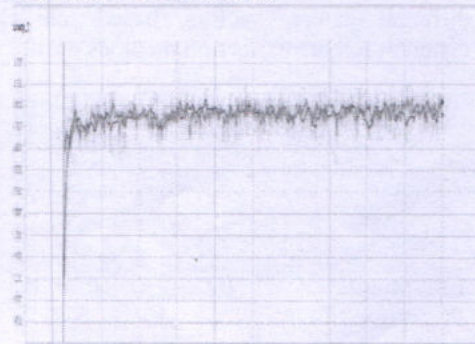


After the resizing step, we randomly split images into training and testing subsets. 2,086 malignant and 2,086 benign images were in training set, and 200 malignant and 200 benign images were on testing sets. Notice that now the data is balanced.

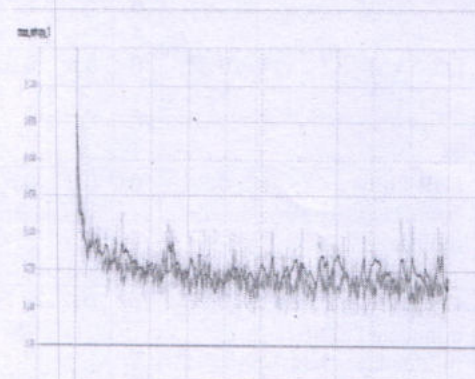
CLASSIFICATION RESULT:

Class Number	Recall	Precision	F1-Score	Support
(Benign)-0	0.97	0.92	0.94	200
(Malignant)-1	0.92	0.97	0.95	200
Average / Total	0.95	0.94	0.94	400

The classification results of experiment four were the best overall in all categories. Similar to the first two experiments, malignant class' f1-score was again higher than the benign class. Training and validation iteration results are illustrated in. This plot indicates that results are reproducible, and the algorithm is robust and reliable with high confidence for accurately classifying lesions as benign or Malignant. [8] discussed about diabetic retinopathy from retinal pictures utilizing cooperation and information on state of the art sign dealing with and picture preparing. The Pre-Processing stage remedies the lopsided lighting in fundus pictures and furthermore kills the fight in the picture. Although the Disease Classifier step was used to identify arising wounds and other data, the Division stage divides the image into two distinct classes.



These results also indicate that there is no over fitting or under fitting on the transfer learning model. Also, we examined the cross-entropy loss (log loss) which measures the performance of a classification model whose output is a probability value between 0 and 1.



With this motivation, we studied skin cancer malignancy detection to classify skin lesions and identify malignant cases. Finally, we were able to classify skin lesions with 94% average f1-score. Also, the malignant class skin classification f1-score (95%) was higher than benign class f1-score.

CONCLUSION:

Skin cancer is increasing and affects many people every day. This cancer can be treated successfully if it is detected in early stages. Early diagnosis and treatment will lead to an increased survival chance and reduced mortality rates. However, current clinical techniques used for the diagnosis of malignant melanoma are prone to human error due to the subjectivity and novice physicians.

This thesis proposed creative and effective methods to eliminate the subjectivity in visual interpretation of dermoscopy images and decrease the number of false-negative/false-positive diagnoses by introducing a new method for measuring abrupt cutoff and increasing the performance of feature extraction algorithms.

Abruptness of pigments on the skin is one of the most important dermoscopic features for detection of malignancy. In the current clinical setting, abruptness is determined by an examination performed by a dermatologist. This process is subjective, non-quantitative, and error-prone. We presented an improved computational model to quantitatively measure abruptness of a skin lesion by quantitatively analyzing the texture features of a region within the lesion boundary. These vectors were then classified using neural networks (NN) and SVM classifiers.

Diagnosis of malignant melanoma is the real reason of fatality due to skin cancer. Even though there are imaging and diagnosis techniques used commonly for melanoma like dermoscopy, automatic recognition is still challenging due to the difficulty of segmenting accurate lesion areas, similarity between melanoma and non-melanoma lesions and the variation of skin conditions.

Besides these problems, medical images are not easy to find while protecting the anonymity of the patients. The sum up, the objectives of this thesis were to eliminate the subjectivity on visual interpretations of dermoscopy images for abrupt cutoff and to reduce the number of false-negative/false-positive diagnosis of malignancy classifications.

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RFID BASED(THEFT) VEHICLE TRACKING SYSTEM

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ABSTRACT:

The paper aims at using RFID (Radio Frequency ID) for developing tracking systems for vehicles. The paper addresses three major problems: traffic signal timings, congestions on roads and theft of vehicles. A novel solution for each problem is presented here. The traffic signalling is made dynamic based on regressions over data archives, containing a detailed set of traffic quotient and time. This technique incorporates a simple, unique way to calculate traffic quotient based on the physical dimensions of the road and nature of traffic on the road. The theft of car is detected using track logs of vehicle. Analysis of congestion forms a key attribute for traffic signalling system and is used for suggesting faster routes to vehicle drivers and balancing the traffic across various routes. The RTSV requires installing RFID

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tags on all vehicles and RFID readers on various junctions of city for tracking.

The objective of this project is to monitor and track the vehicles in the road side and also theft vehicle using RFID technology. This project is very useful to track the stolen vehicle so we can easily monitor and find out the vehicle with RFID technology and with help of PC. Radio-frequency identification (RFID) is a technology that uses communication through radio waves to exchange data between a reader and an electronic tag attached to an object, for the purpose of identification and tracking. It is possible in the near future, RFID technology will continue to proliferate in our daily lives the way that bar code technology did over the forty years leading up to the turn of the 21st

century bringing unobtrusive but remarkable changes when it was new.

KEYWORDS:

Internet of Things, Radio frequency Identification, Microcontroller, Tracking System.

1.INTRODUCTION:

The unending cycle of technology innovation brings satisfaction and impart an exquisite outcome to the people. As technology evolved, everyone has been open in living with several state of the art control systems. Examples of which is the security at home, mobility and remote supervision applications. Security, nowadays, is the most important for us people that is why the search for a safe and sound living still remain around the need of everyone. Aside from home, schools are also in the main lists when it talks about safety especially public schools because of the number of vehicles moving into and out of the school premises.

Today, transportation has the important role in our society. However, as we notice, human population is growing bigger along with vehicles are also growing in number. Monitoring today is becoming a big challenge for everyone in securing their own properties. In many areas that vehicle

passes, there are problems encountered when it comes to security. A lot of vehicles that enters and exits in one place to another is one of the realistic circumstances. It has been raised that there is difficulty of managing the entrance and exits of the vehicles manually. Manual monitoring makes the assigned guard difficult to monitor every vehicle that is entering the area from time to time as well as maintaining the records of vehicles are a complicated task. The plate number is only recorded information for the vehicle entering and exiting the gate. The primary aim of this study is to design and establish a vehicle monitoring system that is RFID-Based.

1.1 The Impact of Security Technologies to Transportation

With the growing and continuous improving state of technology today, it was not surprising that everyone deals with technologies most especially in securing their life and properties. It rapidly changed the economy, the society, and the way people live, work, and interact with each other. Transportations become the most technology's integrated part throughout the industry, especially in investing security technologies historically and over the years had passed, great improvements in the transportation systems are being made and

created with the help of numerous advances in science and technology [1]. The researchers concluded that having changes in transportation technologies have impact in the society as well.

1.2 Security Technologies Used in Vehicles

RFID is a technology that gathers and captures data about an object without the need of touching or seeing the data carrier. This is done through the application of inductive coupling or electromagnetic waves. This is also an emerging technology that uses wireless radio in order to identify objects from a distance without requiring a line of sight or even substantial contact [3]. With the use of Servo motors, barrier gates are well known in terms of securing road gates. Servo motors are best known for their rapid acceleration and deceleration capability, made possible by delivering high-peak torque in conjunction with a high torque-to-inertia ratio. Arduino is a tool and an open-source platform for making systems usually applied for controlling another system. It is a physical computing platform that is based on a simple microcontroller board and has a development environment for writing software for the board. Arduino projects can be stand-alone, network based or and can communicate with software

running on other computer systems such as LabVIEW, Matlab and may others. Communication processes between human and devices were also renewed through the use of GSM modem. SMS notification, unlike its common purpose, is also used in warning and monitoring security systems.

2. LITERATURE SURVEY:

A RFID-based monitoring system was design for vehicles in Brunei Darussalam primarily to track the speed of vehicles. The RFID kit is associated with Raspberry-pi board and Central Control Unit (CCU) to establish connection with a remote administration server [5]. There is also a Vehicle Monitoring System that uses RFID which generates and maintain daily reports of vehicles under monitor. Through this RFID vehicle monitoring system, information can be collected automatically for efficient and safe vehicle management. Automatic vehicle identification increases the security and hence, can prevent loss of vehicles.

Additionally, a similar system was established in Malaysia to track the school children in school vehicles. The design used the Global Positioning System (GPS) as a ways of tracking the school vehicle. A passive RFID technology was integrated for

recording the presence of the children in the vehicle. Parents will know the location of the vehicle while their children are on board. Hence, this paper concerns most on the safety on their children with the RFID and GPS technology [7].

An implementation on Vehicle theft alarm and tracking the location using GPS and RFID was also established. The System consists of a microcontroller circuit board, keypad, alarm system and a display board with the combination of RFID and GSM. The key used by the automobile is an RFID card that is convenient, contactless and secure [8].

Vehicle Security System Using Zigbee is designed and implemented to check and secure the car based on combination of Zigbee system, Peripheral Interface Controller (PIC) 16F877A microcontroller, vibration sensor (body), temperature sensor and micro switch (engine), alarm, buzzer, fan and magnetic sensor (door). Users can monitor the status of car remotely using the Liquid Crystal Display (LCD) display which is attached to the controller. The authors concluded that this system is successfully tested for its performance [9].

The system about embedded Vehicle Monitoring system based on Web

Technology used level sensor, pressure sensor, tilt sensor, gas sensor, and alcohol detector. These sensors are applied for Liquid Level, State of Vehicle, Pollution by Vehicle, alcoholic taste of driver and so on are being checked. These sensors provide the information to the Arduino (ATMEGA 328P-P0). Web Technology is used to check the information needed. The author concluded that this project can be improved by using a camera and by integrating a mobile based application to get the information from the vehicle in real time [10].

3. EXISTING SYSTEM:

3.1 Existing Monitoring System for Vehicles

There are vehicle monitoring system are now available and sold in the market. A system was presented to monitor the location of the vehicle along with its parameters, like speed, compartment temperature, fuel consumption, from a centralized location for research and development purposes. This system can also store data for further analysis and records keeping but it uses internet-of-things technology..

3.2 Differences with existing system

With the emerging of transportation technologies today, a lot of changes have been made. Most of the literature and studies focused on the automation of vehicle identification, monitoring of vehicle using camera, and tracking using RFID and GSM. Hence, the researchers designed and implemented technologies and systems that are applicable to Automatic Vehicle Identification (AVI), Intelligent Transportation System (ITS), and Internet of Things (IOT) which bring great improvements in solving transportation security problems. The literatures and studies are also different in terms of structure, in areas of study and with the other purposes. The literatures presents the idea of using RFID technology.

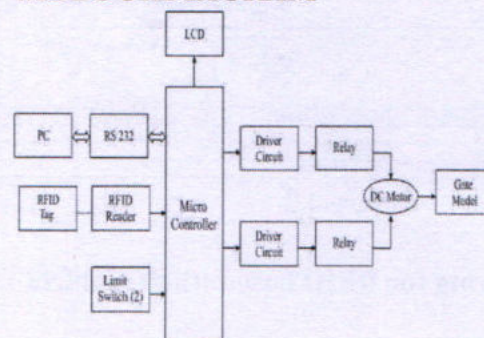
It collects, records, maintains, and saves data detected from the vehicles running in road, passing through road gates, monitoring vehicle status, and entering/leaving an area using RFID Tags as well as gathering and sending Tag ID information into a base station in which the researchers would want to incorporate and adapt in this paper. [2] emphasized that people who are visually impaired have a hard time navigating their surroundings, recognizing objects, and avoiding hazards on

their own since they do not know what is going on in their immediate surroundings.

These provides brief detailed references on the functionality of each device, mainly the microcontroller used. Thereby, the proponents adapted the combination of RFID and GSM as well as the camera and incorporate a barrier gate system using servo motor in order to secure the implementation scope of the study. [4] emphasized that Security is an important issue in current and next-generation networks. Blockchain will be an appropriate technology for securely sharing information in next-generation networks. Digital images are the prime medium attacked by cyber attackers. [6] discussed about Positioning Of a Vehicle in a Combined Indoor-Outdoor Scenario, The development in technology has given us all sophistications but equal amounts of threats too. This has brought us an urge to bring a complete security system that monitors an object continuously

4. PROPOSED SYSTEM:

4.1 BLOCKDIAGRAM



4.2 WORKING PRINCIPLE

Radio-frequency identification (RFID) is an automatic identification method, relying on storing and remotely retrieving data using devices called RFID tags or transponders. An RFID tag is an object that can be applied to or incorporated into a product, animal, or person for the purpose of identification using radio waves. Some tags can be read from several meters away and beyond the line of sight of the reader.

RFID is the special type wireless card which has inbuilt the embedded chip along with loop antenna. The inbuilt embedded chip represents the 12 digit card number. RFID reader is the circuit which generates 125KHZ magnetic signal. This magnetic signal is transmitted by the loop antenna connected along with this circuit which is used to read the RFID card number.

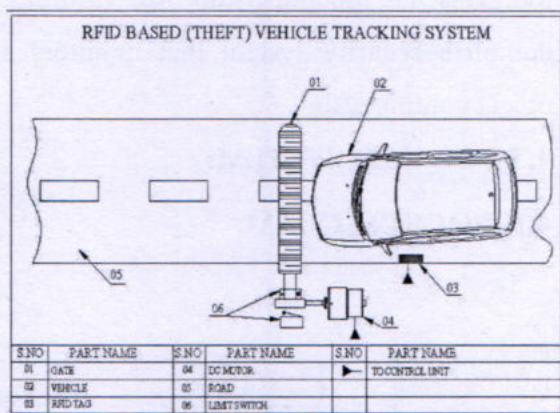


Figure 4.2

Drawing for RFID based (theft) vehicle

4.2.1 Tracking system

In this project we attach the RFID card to each vehicle and RFID reader is placed in the road side checking place. Whenever the vehicles come near the gate, the readers sense the RFID card and send the card number to the control unit. Here the control unit is the flash type reprogrammable microcontroller in which we have already programmed according to our objective. Then the control unit transmits card numbers to PC. Here the PC is interfaced with control unit through RS232 communication. In PC the corresponding vehicle number and information is stored. The PC will compare the received vehicle number and corresponding vehicle number stored in PC if this both number match's the PC will give signal to control unit as "ALLOWED" then the control unit activate the relay to open the gate. Suppose vehicle number in PC and received number do not match the PC will give signal to control unit as "NOT ALLOWED" then the control unit activate relay driver circuit to close the gate. Here the PC will maintain the database in MS access. The database we can control by visual basic 6.0.

5. CONCLUSION:

Based from the result of the study, it was concluded that the developed RFID-Based Vehicle Monitoring was successfully tested and demonstrated. Incorporating highlights of all the equipment parts utilized have been produced in it. Each module has been consistent out and it is carefully placed, which causative to the best working of the unit. Secondly, with the use of highly advanced IC's and with the assistance of developing innovation, the project has been successfully implemented. In this paper RFID tag is used for authentication purpose. RFID reader reads the tag values and this values are given to the Raspberry pi processor. We can enter the theft vehicle's RFID Tag details using any browser which is in turn given as input to the arduino. Further, the developed RFID-Based Vehicle Monitoring is tested and it is working properly as to its purpose. It was also perceived to be functional, usable, and reliable.

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TEMPERATURE CONTROLLED BODYSUIT FOR ARMY PERSON

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ABSTRACT

Nowadays the world has uncertain and insecurity situation that means the war is cultivated in any time. At the same time the soldiers to join in army is very less. In this critical occasion we have to protect our soldier's lives. To increase the soldier's lives we have created a solution based on embedded systems using IOT. In this project we provide the special advanced techno suit for the army soldiers. For avoiding this problem, we found this 'suit. This suite is multi purposed suit. It is providing the location of soldier and injuries of the soldiers though IOT data base. IOT is a technology used for security purpose and they are used to safeguard the connected devices and networks in them, it also involves interconnecting computing devices by internet. It reduces the body temperature will goes to high and vice versa goes low increase the temperature it will helps to maintain the body health of the soldiers. It helps the soldiers to maintain his body conditions in a sustainable manner.

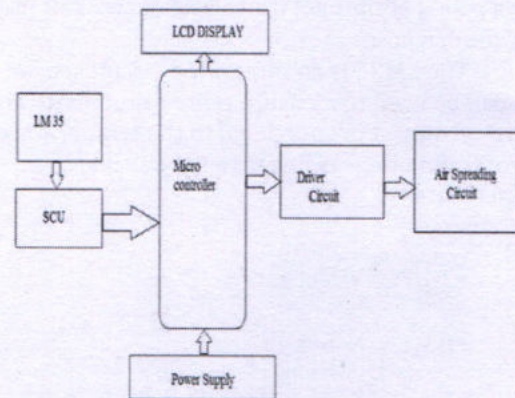
Keywords: Multipurpose suit, Maintain body condition, Peltier Plate.

1. INTRODUCTION

Indian soldiers are the most important resource of our country. They play a very important role to protect the country and the peoples living in the country. Army, Air Force, Navy and Marines all comes under the term soldiers they are always ready to take and hold their duties in extreme weather conditions. The Armed Forces personnel are issued with two types of extreme climate protective clothing. The first version is issued to troops deployed in areas where temperatures do not fall below -20°C and are not perpetually snowbound. This ensemble consists of woollen inner underpants, woollen shirt, serge pants, woollen jersey, and anorak style parka with hood, woollen socks, snow boots, mittens and impermeable gloves. The specially designed EJackets will give better production to the soldiers working in extreme weather conditions. This E-Jacket will operate in twomodes:

inside the uniform which helps the soldiers to bear any kind of external environment and he can efficiently work without heat stress or cold stress. The heat-protective clothing can provide a protection for their safety from the external climatic conditions. The proposed system is adaptable jacket based on climate conditions using ARM microcontroller, by which the people/user can easily control the temperature of the jacket. The Peltier plate temperature automatically adjusts according to the condition of the relay circuit. The user wears a climate adaptable jacket as a dress, it observe the temperature status in the LCD, which is placed in this jacket.

2.SYSTEM ARCHITECTURE



3. WORKING PRINCIPLE

We are going to control the temperature at the region of army persons, in this 6-volt battery is used throughout the circuit as power supply. The temperature sensor and pulse sensor are connected to the microcontroller (ATMEGA 328P). Here we are using LCD display for displaying value of temperature sensor and pulse sensor. The LED also displaying value of Peltier plate. Thermoelectric cooler operates according to the Peltier effect. The effect creates a temperature difference by transferring heat between two electric junctions. The relay is simple switches which are operated both electrically and mechanically. The buzzer used to indicate the dangerous sound at

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risk time of the soldiers. The IOT module (Node MCU) is connected to the microcontroller. It is used to share and track location of the soldiers. The Peltier plates work on the principle of Peltier effect. The Peltier effect is defined as creating a temperature difference by applying a voltage between two electrodes connected to a semiconductor material. This phenomenon is very much useful when it is necessary to transfer heat from one medium to another on a small scale.

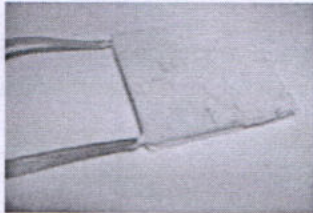


Fig III (a)

4. TEMPERATURE MONITORING SYSTEM

Temperature is the most important symptoms that can get reflected in the health conditions of body. Temperature enhances malignancy and body infections. Only constant temperature is computed over a period of time not than a spot of check. It may copy the diagnosis.

The LM35 is an integrated circuit sensor that can be used to measure temperature with an electrical output proportional to the temperature. The output voltage is linear to the Celsius temperature.

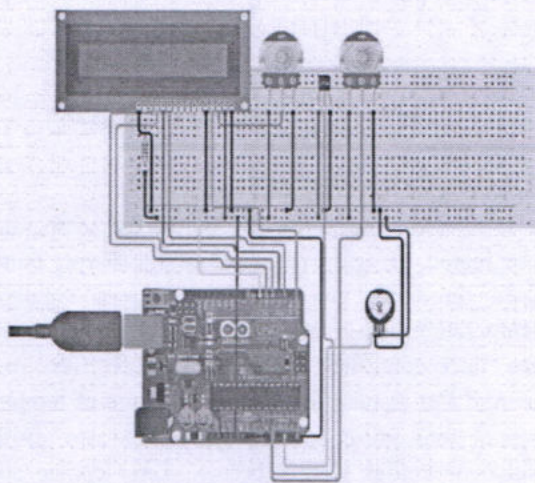


Fig IV (a)

5. PELTIER PLATE

The Peltier plates work on the principle of Peltier effect. The Peltier effect is defined as creating a temperature difference by applying a voltage between two electrodes connected to a semiconductor material. [1] proposed a novel method for secure transportation of railway systems has been proposed in this project. In existing methods, most of the methods are manual resulting in a lot of human errors. [3] emphasized that people who are visually impaired have a hard time navigating their surroundings, recognizing objects, and avoiding hazards on their own since they do not know what is going on in their immediate surroundings. [4] brought out present disclosure which provides a system for monitoring and controlling farming using drone technology comprising a drone system for monitoring the farm and transmitting information and a ground control system for controlling the drone system and receiving the information.

6. HARDWARE DESCRIPTION

POWER SUPPLY UNIT

In most of our electronic products or projects we need a power supply for converting mains AC voltage to a regulated DC voltage. For making a power supply designing of each and every component is essential. Here we using the regulated 5V Power Supply.

ARDUINO UNO

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the

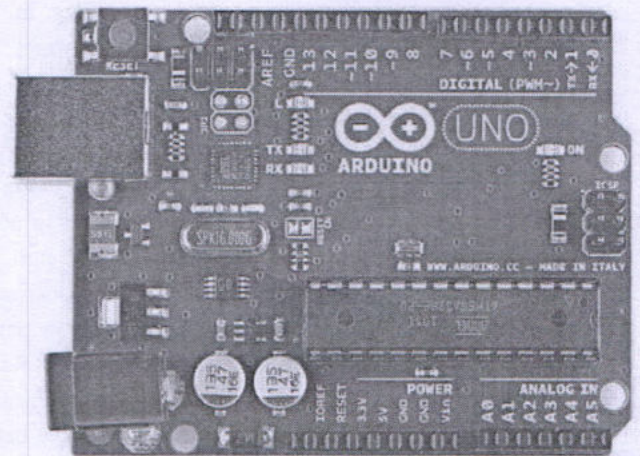


Fig VI (a)

microcontroller on the board.

DRIVER CIRCUIT

A relay is an electrically operated switch. Many relays use an electromagnet to operate a switching mechanism mechanically, but other operating principles are also used. Relays are used where it is necessary to control a circuit by a low-power signal (with complete electrical isolation between control and controlled circuits), or where several circuits must be controlled by one signal

7. CONCLUSION

The project "Temperature controlled bodysuit for army person" is successfully implemented. This system is smaller, less weight and having low power consumption, so it is very efficient. It helps the soldiers to work even in extreme climatic conditions. For the future expansion, this uniform can easily power by a small portable solar panel and is friendly too. The use of solar panel gives continuous power output. We can also include rain drop sensors, humidity sensors for working purposes. These jackets can be wearable in all weather conditions. We can utilize this jacket to shield us from over-heating & cooling. We can also place heart beat sensor in the jacket.

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PREVENTING DISTRIBUTED DENIAL-OF-SERVICE FLOODING ATTACKS WITH DYNAMIC PATH IDENTIFIERS

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Abstract: Nowadays, here are increasing interests with Path Identifiers (PIDs) as intermediary domain path items. Though, in previous used path identifier are still fixed, and the path identifiers used in previous methods are static, it is actually easy for Hackers to attack data and provide a Distributed Denial of Service overflowing attack. Here we are offering one of the implementation with the design and calculation of Distributed Path Identifiers to solve above given problem. One of the method that uses PID Path identifiers inter domain path have a connection between two domains are it Keeps privacy and turns energetically. We define in depth how to discuss about PIDs interaction domains, how to keep Communications issued when the PIDs changes. We build 42 nodes Prototype is included in six domains to ensure the possibility of D-PID And simulate and evaluate its effectiveness Costs s exchanged among neighboring fields and inter-domain routing items.

Keywords: Distributed Denial-Of Service(DDoS) Attack, Inter-Domain router, Path Identifier (PIDs).

Protocol names: MANET, AODV, DSR, DSDV, NS2, NAM, UDP, TCP, Trace graph.

I. INTRODUCTION

Most of the research work done with Distributed Denial of service (DDoS) attack to solve the internet security problems. However, this attacker is very problematic on the internet. In recent years, there are increasing interests in using path identifiers (PIDs) as inter-domain routing objects. However, the PIDs used in existing approaches are static, To address this issue, in this project, we present the design, implementation, and evaluation of D-PID, a framework that uses PIDs negotiated between neighboring domains as inter-domain routing objects. A botnet network is a big of compromised machines (bots) are managed by one entity. By sending orders on bots via the entity command and control channel an entity can expose a synchronized attack, like DDoS attack. we propose a novel group testing (GT)-based approach deployed on back-end servers, which not only offers a theoretical method to obtain short detection delay and low false positive/negative rate, but also provides an underlying framework against general network attacks. vacation spot is aware of while the give up consumer dispatched best the software to request to end user away After identification of the path, give up person collects a packet content at the vacation spot via encapsulating inside the packet header of PIDs and Packaged-based ground on the router network.

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II. THE D-PID IMPLEMENTATION

To solve the limitation in previous works in this approach, we offer design, dynamic PID processing and diagnosis (D-PID) mechanisms. In D-PID, two nearby domains sometimes update the PID between them and install a new Path identifier in the data plane for packaging forwarding. And also, if the attacker attempts get it new PID and DDoS Flooding attack are going to assault, not handiest significantly boom the assault fee (Second V-A1), however, moreover make it smooth to locate the attacker (Second V-A2) one, how and the way often it needs to be Regarded nearby regulations of autonomy the PID modifications System. In addition, a new PIDs inter-domain way remains kept a mystery through two neighbors routing domain names. Thus, the basic idea of D-PID is to change the PID of Inter-domain paths. Specifically, for a given (virtual way) attached to the two neighboring domains A and B, it is assigned a PII and an updated update T-PID.

2.1. Common Types of DDoS Attacks

Types;

- (i) Volume-based attacks
- (ii) Protocol layer attacks
- (iii) Application-layer attack
- (iv) Zero day attack

2.2. EFFECTS OF ATTACKS

- (i) Economic loss to the victim since users will be unable to utilize services during the attack.
- (ii) Negative impact on the company's future: the target would appear to have security flaws, causing customers.
- (iii) If user information has been breached or the target failed to satisfy service-level agreements.

2.3. PID ARCHITECTURE

To solve the limitation in previous works in this approach, we offer design, dynamic PID processing and diagnosis (D-PID) mechanisms.

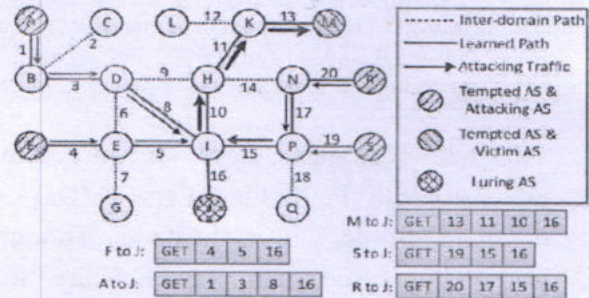


Fig: 2.a) Dynamic Pathway Identifier

III. BACKGROUNDWORK

In the preceding paintings, handiest the DDoS moderation of the assaults is shipped, however the finding is placed very near to the target. Unlike FireCol, all literature discussed solutions do not exploit proficient use of association due to the difficulties of safety there are many perspectives against the DDoS flood attacks. Other than that, the proposed method pursuits to reduce the DDoS assault According to assets on sending silent messages; they take into account that they will co-operate with the flooding.

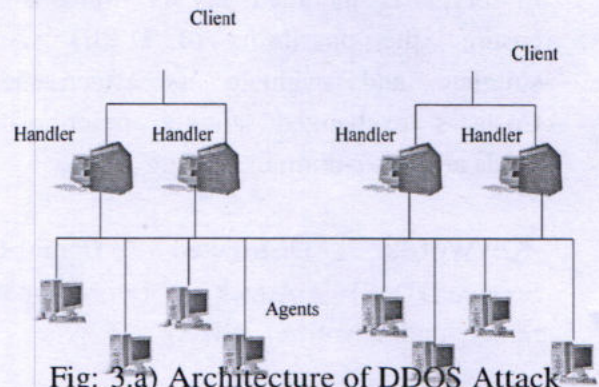


Fig: 3.a) Architecture of DDoS Attack

3.1 ALGORITHM

```

1: if (bi ^ IPSid ≠ null )then
2: if IPS_id == MyID then
3:   bi = false;
4: return
5: else
6: ratei □ □ +Fi
7: if then
8: bi=false
9. raise DDOS alert;
10. return
11. else
12: next IPS.checkRule
(IPS_id,i,ratei,capi )
13: end if
14: end if
15: else
16:   bi=true;
17: next IPS.checkRule ( MyID, i,0,capi )
18. end if

```

Table.1 Effect of α on a five-virtual-rings topology

High Entropy	0.605	0.719	0.805	0.910
TPR	0.906	0.845	0.785	0.820
False positives	10.40	9.50	6.850	9.820

[2] proposed a secure hash message authentication code. A secure hash message authentication code to avoid certificate revocation list checking is proposed for vehicular ad hoc networks (VANETs). [4] discussed that the activity related status data will be communicated consistently and shared among drivers through VANETs keeping in mind the end goal to enhance driving security and solace. Along these lines, Vehicular specially appointed systems (VANETs) require safeguarding and secure information correspondences. In the case analyzed, the wrong is multiplied by 1.5.

IV. IMPLEMENTATION

Implementation is the stage of the project when the theoretical design is turned out into a working system. Thus it can be considered to be the most critical stage in achieving a successful new system and in giving the user, confidence that the new system will work and be effective. The implementation stage involves careful planning, investigation of the existing system and its constraints on implementation, designing of Methods to achieve changeover and evaluation of changeover methods.

4.1. System Architecture

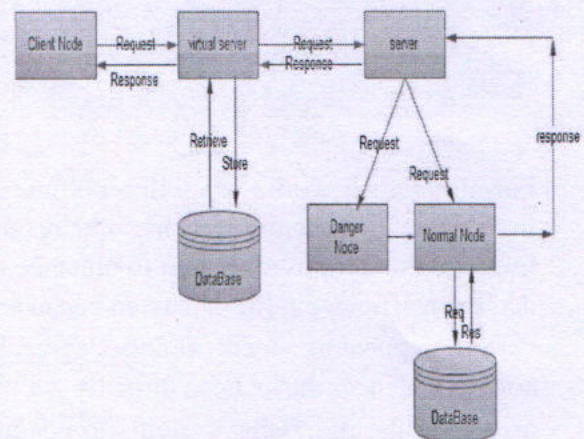


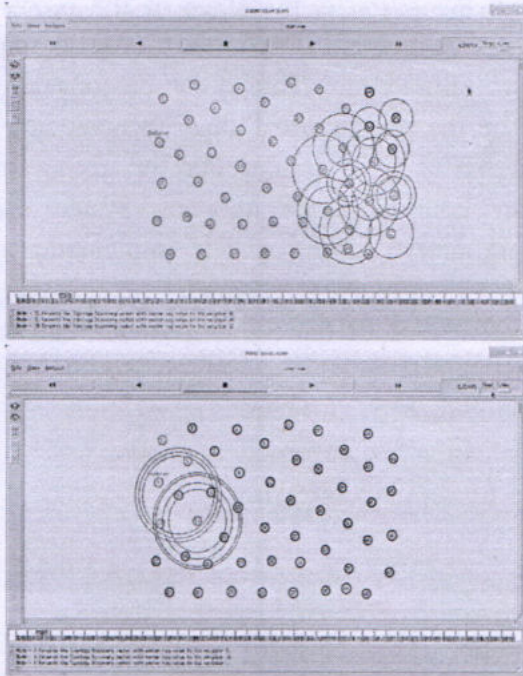
Fig:4.a) Intrusion Detection System

4.2. MODULES

- Login Process Denial of Services.
- Group attacker modules.
- Group testing modules.
- Victim/Detection modules.

we first extend classic GT model with size constraints for practice purposes, then redistribute the client service requests to multiple virtual servers embedded within each back-end server machine, according to specific testing matrices.

V.RESULT



For the future work, we will continue to investigate the potentials of this scheme and improve this proposed system to enhance the detection efficiency. [6] discussed because of various appealing focal points, agreeable correspondences have been broadly viewed as one of the promising systems to enhance throughput and scope execution in remote interchanges.

ADVANTAGES

- Every request or all the requests to the server are parallel checked for DDOS by using GT.
- Due to this server performance is not affected and reduces the workload of Server.

This work lies in the detection algorithms proposed and theoretical complexity analysis. We also provide preliminary new Scheme.

VI.CONCLUSION

A novel technique for detecting application DDOS attack by means of a new constraint-based group testing model. Motivated by classic GT methods, three detection algorithms were proposed and a system based on these algorithms was introduced. Theoretical analysis and preliminary simulation results demonstrated the outstanding performance of this system in terms of low detection latency and false positive/negative rate. We have defined the design Details of Path Identifiers and 42 node model useful to it forcheck its possibilities and belongings. We have offered Digital outcomes from prototype running experiences. The results show thatnegotiations have been spent at this time

PID is very small to distrib te. And more D-PID is active in avoid attacks of DDoS. The overhead of maintaining the state transfer among virtual serv rs can be further decreased by more sophisticated techniques. Based on this framework, we propose a twomode detection mechanism and modern cracking algorithm using some dynamic thresholds to efficiently identify the attackers We also provide preliminary simulation results regarding the efficiency and practicability of this new Scheme.

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RFID BASED AUTOMATION FOR AUDITORIUM

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ABSTRACT

automation system with a RFID reader by using RF (Radio Frequency) technology. Nowadays, auditorium are gradually shifting from normal switches to centralized control system, involving a RFID reader. This technology is not only easy to use but also helps to prevent missuses of energy. RFID reader The main object of this project is to develop an auditorium is small and very light weight, which will work from a decent distance. It helps elderly people to RFID reader control from anywhere up to 75 feet. This RFID reader is also very productive for commercial uses in Industrial and medical systems. RFID reader controlled home automation system provides a simpler solution with RF technology. In order to achieve this, a RF reader is interfaced to the microcontroller which sends ON/OFF commands to the receiver where loads are connected. By operating the specified RFID card on the RFID reader, the loads can be turned ON/OFF card through wireless technology. Arduino IDE software has been used to compile some programs related to the microcontroller ATmega328.. Benefit of using this technology is there will not be any range limitation compared to Radio Frequency technology.

INTRODUCTION

Human life. People often forget to turn the lights off when they leave a room and they never enjoy walking into a dark room looking for a light switch, that's just human nature.

The RFID based lighting control system living Today we are in 21st century where automation is playing an important role in provides means to eliminate this problem without the use of cumbersome and irritating motion detectors. The RFID

nodes operate at 13.56 MHz and provide a range of 1-3 feet depending on the location of the reader and attenuation in the respected environment.

EXISTING SYSTEM

Auditorium automation is the use of one or more computers to control basic home functions and features automatically and sometimes remotely. The existing home automation system relies on proprietary connection mechanisms for automating home appliances. The problem with this approach is that the same automation system cannot be extended to accommodate a growing variety of home appliances. [1] proposed a novel method for secure transportation of railway systems has been proposed in this project. In existing methods, most of the methods are manual resulting in a lot of human errors. This project proposes a system which can be controlled automatically without any outside help. This project has a model concerning two train sections and a gate section.

244

PROPOSED SYSTEM

The purpose of this project to build a RFID Automated Home control System using RFID technology

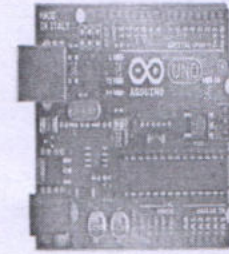
Dr.R.PUNIDHA,M.E.,Ph.D.,
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ENGINEERING FOR WOMEN,

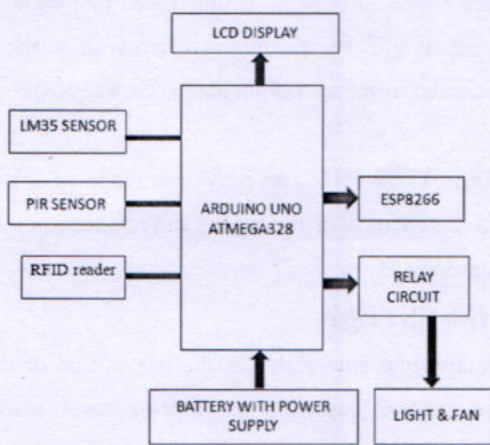
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which provides a secure and peace environment to the people. RFID system uses Radio frequency electromagnetic fields to transfer data from a RFID tag to identify and track the object. Our system will apply Radio Frequency technology which consists of RFID Tags, RF Readers with antennas, Arduino, transmitter- receiver, and added networking properties to identify and track object. RFID reader reads the tag ID received by the user and reports the tag ID to system. System verifies RFID tag with its unique identification and performs the expected task. All communication and controls in this system pass through the microcontroller. Security being the main intent of the project, the most important application of this system is any domestic security.



BLOCK DIAGRAM



HARDWARE DESCRIPTION

- Arduino UNO ATmega328
- RFID card
- RFID reader
- LCD Display
- Relay Circuit
- Battery with power supply

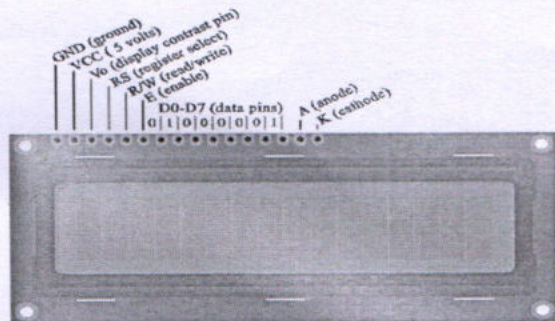
ARDUINO UNO ATMEGA328

Arduino is an open-source electronics platform based on easy-to-use hardware and software. The Arduino Uno is one kind of microcontroller board based on ATmega328.

[3] discussed about Nanorobots Control Activation For Stenosed Coronary Occlusion, this paper presents the study of nanorobots control activation for stenosed coronary occlusion, with the practical use of chemical and thermal gradients for biomedical problems. The recent developments on nanotechnology new materials allied with electronics device miniaturization may enable nanorobots for the next few years. [4] discussed about a project, in this project an automatic meter reading system is designed using GSM Technology. The embedded micro controller is interfaced with the GSM Module. This setup is fitted in home. The energy meter is attached to the micro controller. This controller reads the data from the meter output and transfers that data to GSM Module through the serial port.

LCD DISPLAY (16x2)

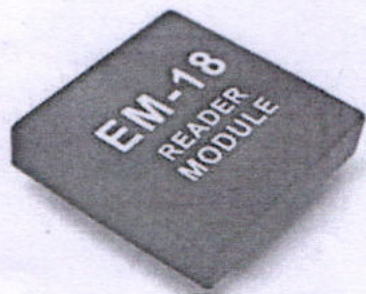
LCD display is a LCD type of flat panel display which uses liquid crystal in its primary form of operation.



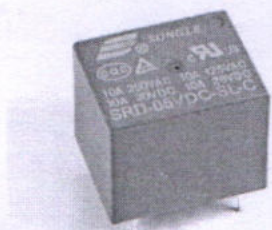
RFID reader module

A Radio-Frequency Identification system uses tags, or labels attached to the objects to be identified.

Two-way radio transmitter-receivers called interrogators or readers send a signal to the tag and read its response.



RELAY:



A relay is an electrically operated switch. Many relays use an electromagnet to operate a switching mechanism mechanically, but other operating principles are also used.

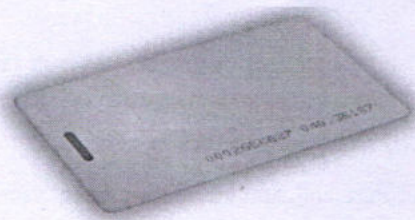
Relays are used where it is necessary to control a circuit by a low-power signal or, where several circuits must be controlled by one signal.

RFID CARD

An RFID credit card is equipped with radio frequency identification technology.

This allows your credit card to communicate with a payment terminal using a radio frequency instead of a magnetic strip.

RFID technology allows you to simply tap or wave your credit card near a card reader or ATM.



ADVANTAGE

- ❖ It avoids interference from other wireless devices.
- ❖ It has range better than Infrared communication.
- ❖ It has lower power consumption.
- ❖ The Bluetooth is used for voice and data transfer and Bluetooth devices are available at very cheap cost.
- ❖ The technology is adopted in many products such as head set, in car system, printer, web cam, GPS system, keyboard and mouse.

APPLICATION

- ❖ IOT project
- ❖ Access point portable
- ❖ Wireless data logging
- ❖ Smart home automation
- ❖ Portable electronics

CONCLUSION

The objective to build a RFID automated home control system was successfully working for use cases. This project proves that how RFID technology is significant for the object tracking system, environmental and accessibility system and security system. People can control and secure their houses very easily using RFID technology. In the end, this RFID system offers many convenient applications to the customer, leaving them with peace of mind when they are not able to manually control appliances and other devices

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SINGLE MOTOR OPERATED WHEELCHAIR FOR PHYSICALLY CHALLENGED

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Abstract: A joystick manage wheelchair may be very use complete for the handicaps. They cannot move anywhere like a everyday man or woman. For this reason they always rely on the other human beings. However the joystick manipulate wheelchair can eliminated this trouble and help them to transport anywhere. The motion of wheelchair may be control manually by means of the joystick. In maximum of computerized wheelchair use two motor. Each automobiles offer course to the wheelchair. This paper describes a machine in which handiest single motor are used. The total embedment of wheelchair, speed controller, equipment arrangement and a BLDC motor.

Introduction

The aim of this project is to use the wheelchair to move forward, backward, left and right. The general design of this project is the independence of the severely disabled person. This mechatronic toy stick is used for a number of functions such as speed control, gear control and vehicle control. This paper explains how a single-engine wheelchair can be used to control a wheelchair without any problem for the patient.

1. Working Principle

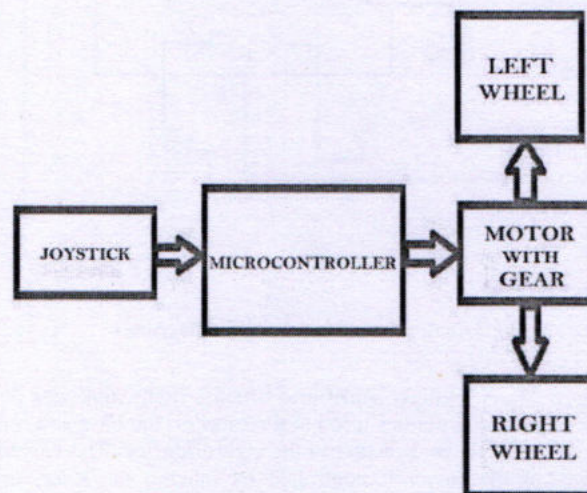
Initially the joy stick is rotated in the center. The joystick until stored in the center of the engine will stop. For this wheelchair use one BLDC engine with a power output of 500W. The motor is mounted inside the rear wheel. In a BLDC car the rotor has permanent magnets and the stator has an electronic control circuit, which uses sensors to operate it efficiently. Brushless motors improve high torque. When stopped, it decreases along the line as the speed increases. A battery is required for this 48V wheelchair. Four batteries connected to each series have a 12V and 26Ah rechargeable battery. Batteries are found inside the seats. Then use a 48V / 300-500 Watt speed controller. The speed control system consists of resistors, capacitors, MOSFET. These control the power supply and provide the desired value of the BLDC motor.

When you increase the rotation of the toy stick then change the magnetic flux and change the current on the BLDC motor with the help of a speed controller. The throttle position sensor was used to control the speed of the car. The TPS unit provides the throttle position voltage associated with a large BLDC motor. CU provides the required bias in TPS and TPS results. Ultimately the control gear depends on changing the gears position and compliance with the rear wheel. The mechatronic play stick changes position left or right and changes location settings in gear.

2. Block Diagram

The command is executed using a play stick and the command is sent to a microcontroller where the ATMega328p controller will issue a command. After performing, the controller sends a command to the gear control of a single BLDC motor. The BLDC motor is therefore rotated according to the command of the joy rod.

Fig.1: Block diagram of joystick control wheelchair



Analog Joystick

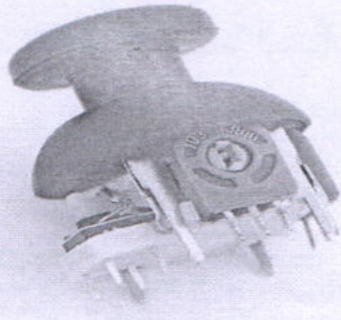


Fig.2 Analog Joystick

A joystick is known as proportional control. This is the most commonly used type of control. The joystick moves the powered wheelchair in the direction that the user points it in. Typically, the further the joystick is pushed, the faster the power wheelchair will go.

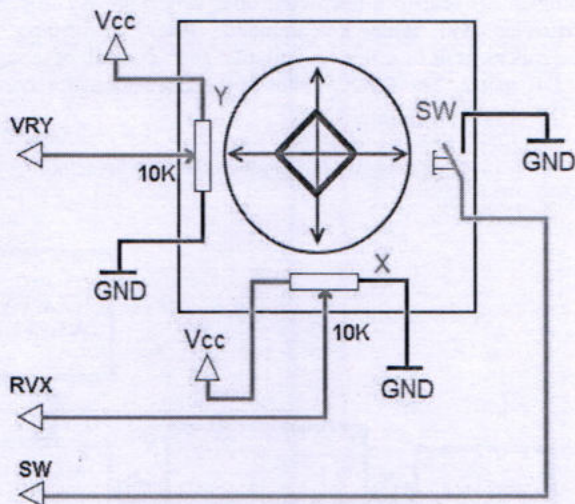
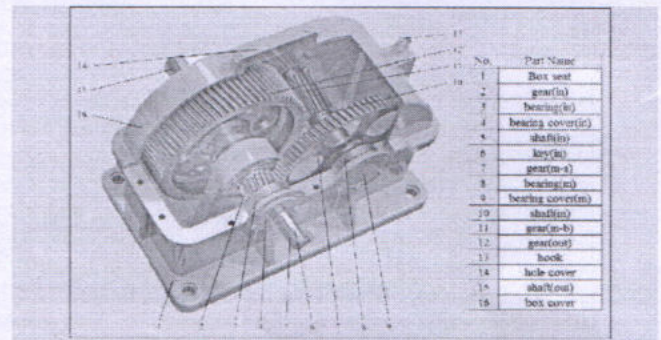


Fig.3 Analog Joystick schematic diagram

A joystick, sometimes called a flight stick, is a device that incorporates a rod that rotates on the base and reports an angle or direction to the control device. The movement of the cursor is controlled by moving the lever on the manual joystick. Input device widely used in game programs and sometimes, in explicit programs.

Gear System

The control gear depends on changing gear position and compliance with the rear wheel. The mechatronic play stick changes the position to the left or right and changes the geographical position of the gear according to the mechatronic play stick. Hand gears or wheelchairs are places for armrests and drive rear wheels. As a result, the wheels can be made smaller than normal. Hand gear does not make the wheelchair wider or wider, so the drive should be used in the home.



It consists of a free gear, connected to a rotating shaft in the center of the bearing. [2] proposed a novel method for secure transportation of railway systems has been proposed in this project. In existing methods, most of the methods are manual resulting in a lot of human errors. This project proposes a system which can be controlled automatically without any outside help. This project has a model concerning two train sections and a gate section. Its top or slotted for fixed with free gear and one small rod is connected to the movement gear of choice with the help of a mechatronic joystick wire.

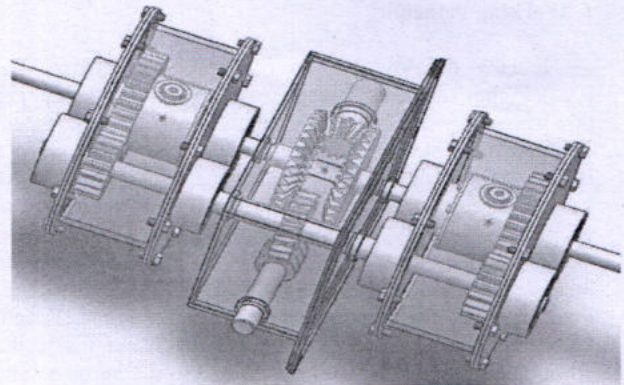


Fig.4 Gear System

3. Discussion

All electric wheelchairs can be controlled by a proposed work frame. One thing that should be required is the gear system. A limited play stick will suffice for this frame work but a strong field will be required.

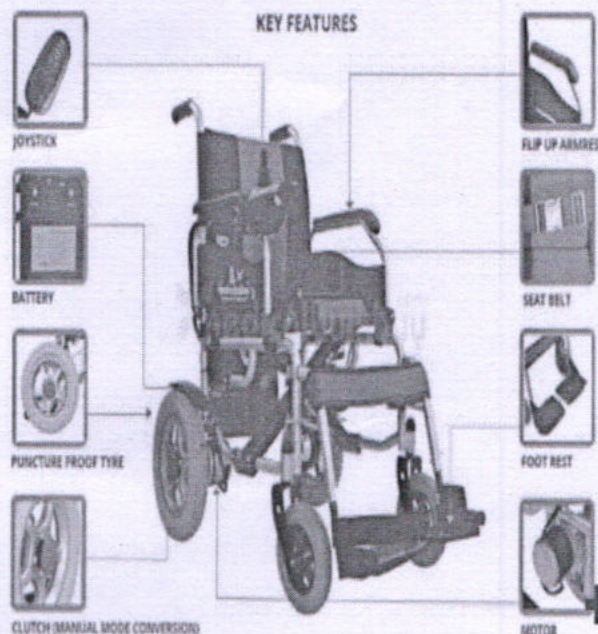
4. Conclusion

This wheelchair is designed for people with physical disabilities who are unable to walk, so they can easily carry it with their hands using Joystick. The first test of driving a single-engine wheelchair using a gear system showed good control and ease of use. A wheelchair with several guides and flexible speed control makes it easy and understandable for a mechatronic toy stick with minimal effort on the patient. [4] emphasized that people who are visually impaired have a hard time navigating their surroundings, recognizing objects, and avoiding hazards on their own since they do not know what is going on in their immediate surroundings. . [6] proposed a system, this fully automatic vehicle is equipped by micro controller, motor driving mechanism and battery. The power stored in the battery is used to drive the DC motor that causes the movement to AGV. The speed of rotation of DC motor i.e., velocity of AGV is controlled by the microprocessor controller. This is an era of automation where it is broadly defined as replacement of manual effort by mechanical power in all degrees of automation. The operation remains an essential part of the system although with changing demands on physical input as the degree of mechanization is increased.

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Model Figure





ARDUINO SPEED CONTROL OF DC MOTOR

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ABSTRACT

This work presents a simple speed control application for a DC motor in laboratory use. The purpose of this application is to maintain the desired speed on a generator operating on the same axis to the motor. Two small laboratory DC machines of 1kw and 300W nominal power have been used for testing the controller. Close loop control has been applied by using appropriate speed encoder. The controller functions as a DC chopper and PWM signal is produced by an Arduino UNO controller. The nominal input voltage was 200Volt, so igt switching devices were used. There are over voltage and over current protections and, moreover, a mode without speed metering is available (open loop control scheme). A detailed analysis is provided on the equipment and the techniques that have been used for the control of the power electronic device. The scope of this work was to plan and test the controller, in terms of energy efficiency and economical operation. This study presents the critical results of the tests focusing on the best operational point and discusses the related conclusions. The controller's operation was efficient in both low and high speeds that were tested.

INTRODUCTION

DC motors have many applications in many fields of industrial, commercial and other activities, such as robotics, automobiles, servomechanisms etc. The electric drive systems used in many industrial applications require higher

performance, reliability, variable speed due to their ease of controllability. The speed control of a DC motor is crucial in applications where precision and protection are essential. The purpose of a motor speed controller is to take a signal representing the required speed and to drive a motor at that speed. Microcontrollers can provide easy control of a DC motor. A microcontroller-based speed control system consists of an electronic component and a microcontroller. There are many applications of DC motor drives that use power electronics to control the voltage and consequently the speed or position of the motor. For large motors it is highly economical to use power electronics, in order to minimize the power loss and the size of the motor.

EXISTING SYSTEM

Vikhe, Punjabi, and Kadu (2014) reported how DC motor can be controlled by using a PID controller in Lab VIEW. The speed of the DC motor is set by creating a Graphic User Interface (GUI) for PID Controller in Lab VIEW. Lab VIEW in turn pass this speed to the DC motor using a PWM pins on the Arduino Uno board. DC motor move with the speed set by the user in Lab VIEW. The speed of the DC motor is sensed by using the tachometer. From tachometer, the output is sent back to the PID Controller in Lab VIEW via Arduino board. PID Controller compares the actual speed of the DC motor with the set speed. If its speed is not same, PID Controller will try to minimize the error and bring the motor to

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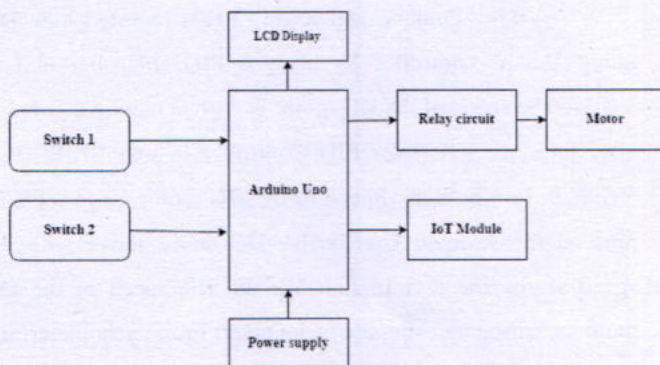
the set point value.

PROPOSED SYSTEM

Arduino can be used to Develop Stand-Alone Interaction Objective or can be connected to software on computer. The open-source IDE can downloaded for free.

The Arduino Mega is a microcontroller board based on the Atmega2560. Example: (Flash, Processing, MAXMSP). Power supply Motor speed control of DC motor is nothing new. A simplest method to control the rotation speed of a DC motor is to control its driving voltage. The higher the voltage is the higher speed the motor tries to reach. In many applications simple voltage regulation would cause lots of power lesson control circuit, so a pulse width modulation method (PWM) is used in many DC motor controlling applications. In the basic Pulse Width Modulation (PWM) method, the operating power to the motors is turned on and off to modulate the current to the motor. The ratio of "on" time to "off" time is what determines the speed of the motor. [2] discussed about E-plane and H-plane patterns which forms the basis of Microwave Engineering principles. [4] discussed about principles of Semiconductors which forms the basis of Electronic Devices and Components. [6] presented a brief outline on Electronic Devices and Circuits which forms the basis of the Clampers and Diodes.

BLOCK DIAGRAM



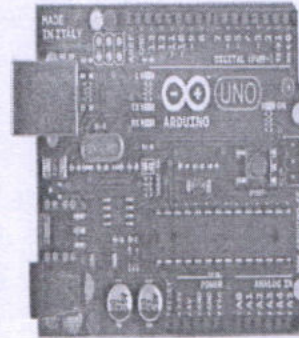
HARDWARE DESCRIPTION

- Transformer
- Arduino Board

- H-Bridge
- Regulator
- Motor
- Motor Drive

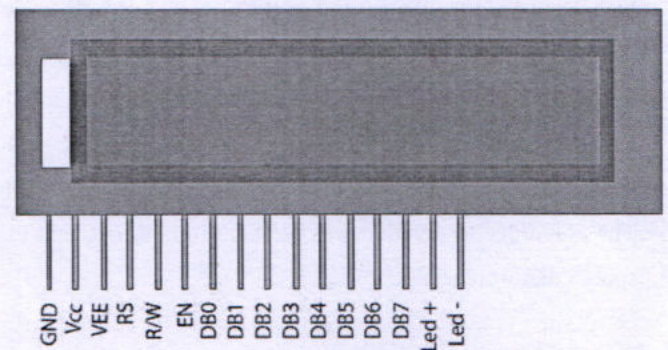
ARDUINO UNO

The Arduino microcontroller is an easy to use yet powerful single board computer that has gained considerable traction in the hobby and professional market. The Arduino is open-source, which means hardware is reasonably priced and development software is free. This guide is for students in ME 2011, or students anywhere who are confronting the Arduino for the first time. For advanced Arduino users, prowl the web; there are lots of resources.



LCD DISPLAY (16x2)

LCD display is a LCD type of plat panel display which uses liquid crystal in its primary from of operation.



RELAY:



A relay is an electrically operated switch. Many relays use an electromagnet to operate a switching mechanism mechanically, but other operating principles are also used.

Relays are used where it is necessary to control a circuit by a low-power signal or, where several circuits must be controlled by one signal.

ADVANTAGE

- It requires no human supervision.
- It causes no harm to the animals or humans.
- It is a highly flexible system.
- It is also highly economical.
- It is an effective, accurate and adaptive system. IX
- It is used to protect the farm.
- It is used in orchard/fruit garden.
- It is used for vegetable garden

APPLICATION

- Weighing machines
- Traffic light count
- Parking lot counter
- Embedded Systems
- Home Automation
- Medical instrument

CONCLUSION

The research is about controlling DC Motor using arduino. The research was done by simulation and hardware implementation. In the simulation and hardware implementation result, the integral state feedback gave a good performance while reaching the set point. From the tracking control result with different set points, integral state feedback presented similar performance: the augmented system performed with fast rising time and settling time with small overshoot. Compared with the existing methods, the integral state feedback had a better system response in tracking control at some set points

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Voice Based Hot/Cold Water Dispenser System Using Arduino

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ABSTRACT:

BACKGROUND AND OBJECTIVE; This

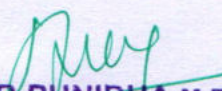
system is fully based on voice sensor, which uses Arduino circuit, this water dispenser system also uses IR sensor, voice sensor, mic, jars for storing water, pipes and motor. In this project the voice is detected by the voice sensor, then the sensor sends the respective information to the microcontroller, to understand whether the water required by the person should be hot or cold.

METHODOLOGY: The microcontroller processes the information to the IR sensor to determine where the glass is placed below the pipe or not. The system uses IR sensors to detect the presence of water glass and then /the IR sensor sends the signal to the micro controller about the presence of the glass, accordingly the motor starts and the water flows through the pipes from the particular jar (hot/cold). If the glass is not placed, the water does not come.

KEYWORDS: Microcontroller, Bluetooth Module, IR sensor, Voice sensor.

1. INTRODUCTION

Voice Based Hot- Cold Water Dispenser System using Arduino is the project which will be very useful for old-age people and disabled people, basically for one's who cannot perform basic activities efficiently. It is this idea which corresponds to the new area of automation and technology. The main of this automation system is to make like easier. Mobile devices are very common among everyone due to its user - friendly interface and portability features. In this project we aim to control electrical home appliances by android and voice commands using Bluetooth . 24


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1. IMPLEMENTATION

WATER DISPENSER SYSTEM

In this research paper, we are using voice commands to get cold or hot waters. By using Bluetooth we can give our commands. Based on that we will get water. IR sensors are placed to check the glass presence. This system is fully based on voice command, which uses Arduino Uno board, this water dispenser system also uses IR sensor, jar for storing water, pipes and motor. In this project the voice is detected by the Bluetooth Module, then the sensor sends the respective information to the microcontroller.

The water required by the person should be hot or cold. The micro controller processes the information to the IR sensor to determine where the glass is placed below the pipe or not. The system uses IR sensor is to detect the presence of water glass, according the motor starts and the water flows through the pipes from the particular (hot/ cold). If the glass is not placed, the sensor sends respective signal to the motor, which does not cause the water to flow through the pipe until the glass is placed. This system can be used at home, offices etc. to get hot or cold water by just giving voice command. performed like here all are is displayed.

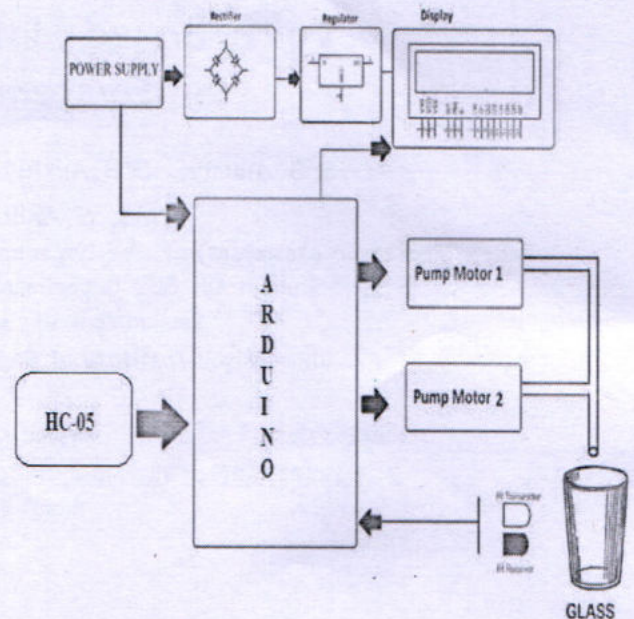


Fig2.1 Block diagram of proposed system

LCD DISPLAY:

The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD. The data is the ASCII value of the character to be displayed on the LCD. To about internal structure of a LCD.

DC GEAR MOTOR:

Geared DC motors can be defined as an extension of DC motor which already had its Insight details [here](#). A geared DC Motor has a gear assembly attached to the motor. The speed of motor is counted in terms of rotations of the shaft per minute and is termed as RPM. The gear

assembly helps in increasing the torque and reducing the speed. Using the correct combination of gears in a gear motor, its speed can be reduced to any desirable figure. This concept where gears reduce the speed of the vehicle but increase its torque is known as gear reduction. [3] proposed a novel method for secure transportation of railway systems has been proposed in this project. In existing methods, most of the methods are manual resulting in a lot of human errors. This project proposes a system which can be controlled automatically without any outside help. [5] discussed that the activity related status data will be communicated consistently and shared among drivers through VANETs keeping in mind the end goal to enhance driving security and solace.

1. CONCLUSION:

This work is easy in Operation and cost maintenance is low. Hence this project is mostly designed to get the hot or cold water by giving through our own voice command. This is mainly very useful for old age people and in Hospitals and one's who cannot perform basic activities efficiently.

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