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Editorial

It takes immense pleasure in launching this issue of the Journal of the Computer Engineering Department, PCE. The journal is a forum for the students and faculty of the department to showcase their work in various imminent fields related to computer engineering and its applications.

This issue has 09 papers comprising the outcome of research work done by the students and the faculty of the computer department, exploring the various domains such as Augmented reality, Machine Learning, Internet of Things, Natural Language Processing, Security, Mobile and Web technologies, E-Commerce and others.

I hope that this issue of PCE JCE will be helpful for the future aspiring computer engineers and the research students. I thank the editorial team for their efforts put in for the launching of this issue.

Dr. Sharvari Govilkar

Editor-in –Chief

Abnormality Classification And Detection in Musculoskeletal Radiographs

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Abstract*—Bone fracture is created by stresses higher than the bone can bear. It leads to bone discontinuity. Healing of fracture takes time. Timely diagnostic and effective detection of bone fracture is essential to minimize the complications. The conventional radiography is the most common means of bone fracture evaluation in clinical practice. In this paper image processing techniques are used to detect bone fracture. The MURA standard dataset is used as a ground truth in the experiment to train and detect abnormalities on elbow, forearm, hand, humerus, shoulder, finger and wrist studies. The detection of abnormalities on various bones of different body parts's radiographs. The experimental results are compared radiologist's results available in the MURA standard dataset to analyze the performance.

Keywords—Bone fracture, Abnormalities, Canny Edge Detection, Sobel Edge Detection, Prewitt Edge Detection, Convolutional Neural Network, ResNet, DenseNet, Image Augmentation,Flask.

1. Introduction

Bones are the rigid organs in the human body which protects important organs such as heart, lungs, brain and any other internal organs. The human body has 206 bones. The largest bones are femur bones, and the smallest bones are auditory ossicles. Fracture of a bone is a common problem in human beings. It can occur due to accidents or any other case in which pressure is applied on the bones. There are different types of bone fracture that occur: oblique, compound, comminuted, spiral, greenstick and transverse.

2. Literature Survey

The detection of bone fracture is done manually. Which means the doctor or the radiologist just looks at the x-ray image and prepares the results accordingly. Mahmoud Al-Ayyoub et al. [1] proposed the idea of an efficient system for quick as well as accurate diagnosis of hand bone fractures based on the data gained from the x- ray images. Input is taken which is many labelled x-rays images. These x- rays are of hand bones. The set contains both normal bone as well as fractured bone images. At first these images are enhanced using filtering algorithms so as to remove the noise from the image. Then these images are processed further for edge detection using some set of methods. Tools like Wavelet and Curvelet transforms are used for converting each image into a set of features. Based on the extracted images, classification algorithms are built. At the end the performance and accuracy of the images are evaluated. The results come out to be 91.8%. Pierre Sermanet et al. [2] proposed a way to show that training a convolutional network to classify, locate and detect objects in images, can boost the classification accuracy, detection and localization accuracy of all tasks. A single ConvNet is proposed as a new integrated approach for object detection, recognition and localization. Also, introduction of a novel method for localization and detection. Many localization predictions are combined so that detection can be performed without training on background samples. This method avoids more consumption of time and lets the network focus more on positive classes for higher accuracy S. Febrianto Kurniawan et al. [3] proposed a system that detects bone fracture using Canny Edge Detection Algorithm. This system uses the OpenCV library combined with the Canny Edge Detection algorithm to detect the bone fracture. This method is an optimal edge detection algorithm on determining the end of a line with a threshold that can be changed and less error rate. Nancy Johari et al.[4] discussed to find out the accuracy of a bone fracture detection using the Canny Edge Detection Algorithm. This framework will provide more accuracy with less effort and time. While using the Sobel operator the parameter sigma is kept at 4.75 which helps to enhance the efficiency of the system. It also helps to diagnose the hairline fracture more effectively. Using this value, edges can be treated in such a way that all the distortions and joints are visible that increases the success rate of the system. Pranav Rajpurkar et al. [5] proposed a system which could be able to detect abnormalities in bones by analysing the x-ray images of bones.

The system is able to highlight the area of fracture that occurred in the bone. The result comes out to be accurate and could provide more details on the fracture. In order to get the results, 169 layers Convolutional Neural Network model is used. Before training the model, image processing techniques are used. They are mainly the edge detection algorithms so as to detect the edge of the bones from the given radiographs. Mariam M Saii et al. [6] devised a novel method for fracture detection and classification. The basic stages include pre-processing of bone image and structured operations to obtain the ROI region which is manipulated by a post processing stage to remove non-fracture pixels. The approach extracts three features from bone image. Mainly transverse, cracks and divergence features in order to define the fracture type or integrity of bone image. 92% true detection rate was achieved for general bone fractures, 93.33% true detection rate for finger bone fractures and 93.33% true rejection rate. Wint Wah Myint et al. [7] proposed an idea to detect fracture or non-fracture and classify the type of fracture of the leg bone Tibia in x-ray image. The system is developed with three steps mainly Pre-processing, Feature Extraction and Classification. A sharpening technique is used in pre-processing known as Unsharp Masking (USM). This technique enhances the image and highlights the edges in the image. The sharpened image is processed further for feature extraction by using Harris Corner detection algorithm to extract corner feature points. Two approaches are used for detection and classification of fractures. Simple Decision Tree is used for detection of fracture and K-Nearest Neighbour (KNN) is used for classification of fracture types. Dennis Banga et al. [8] developed the ensemble200 model. The current model by Pranav et al.[5] which is 169 layer DenseNet on the abnormality detection task, lacks in performance. As the overall performance was lower than the results of the radiologists. The ensemble200 model scored 0.66 Cohen Kappa which is lower than the DenseNet model but the model performance with the F1 score is more as compared to the DenseNet model. The Cohen Kappa score variability with the different studies is lower. The best Cohen Kappa score on the upper extremity studies is 0.7408 for wrist and the lowest is 0.5844 for hand. Whereas the ensemble200 outperformed DenseNet model on the finger studies with a Cohen Kappa score of 0.653 showing reduced performance variability on the model performance

Summary of Related Work

The overview of different works is given in Table 1.

Table 1. Overview of literature survey

Literature	**Advantages**	**Disadvantages**
Mahmoud Al-Ayyoub et al. September 2013 [1]	Accuracy is 91.8%.	Low quality images equal less accuracy
Pierre Sermanet et al. February 2014 [2]	No training on background samples and less time consumption	No use of back-propping through the whole network
S. Febrianto Kurniawan et al. June 2014 [3]	Tested with real data and implemented successfully.	Needs to be improvised and reduce response time
Nancy Johari et al. January 2018 [4]	More accurate results with less effort and time	Value of edge detection not perfect so as the edges shown
Pranav Rajpurkar et al. May 2018 [5]	Accurate results similar to that of radiologists	Bad alignments and imperfect orientation of images
Mariam M Saii et al. August 2018 [6]	Experimented on 155 bone images with 93% accuracy.	Less quality of image results in less accuracy
Wint Wah Myint et al. October 2018 [7]	Accurate and reliable results as well as performance	Less accuracy resulted due to less quality
Dennis Banga et al. August 2019 [8]	High performance on finger studies as compared to DenseNet model	Less performance on wrist and hand studies as compared to DenseNet model

3. Proposed Work

The X-Ray images are obtained from a dataset known as MURA. Stanford University has a huge amount of X-Ray images . These are bone X-Ray images for many people. The bones are of forearms, humerus, femur, wrist, etc. These X-Ray images are first converted to black and white. The black and white images may contain noise in them. So firstly, the noises in images are removed. Then we apply an Edge Detection Algorithm for obtaining the edges of the images. When we have the edges of the bone then it could be easy to find the abnormal region of the bone. When we get the abnormal region, we get the accuracy as high. Accuracy tends to be low as sometimes it could not find the abnormality. Here we use the Convolutional Neural Network (CNN) for classifying the images between abnormal and normal sets of output. Due to edged image input the model finds it easy to classify the images. After this process we proceed towards DenseNet and ResNet. These methods have been adopted in order to detect the abnormality of the bone which means the fractures occurred in bones. The input is given which is an X-ray image. The system converts the normal image into a negative image using Image Augmentation. After which the system could detect and highlight the abnormal region of the bone on the image. Once detected the system tends to calculate the percent of abnormality found on the bone. These are computer generated results which provides more accuracy rather than the doctor manually looks up and predicts the fracture. The final procedure is shaping the system in an interface using Flask which is a python web framework. The design UI is kept simple so that any user could use it easily.

3.1 System Architecture

Figure 1. shows the system architecture for classification of normal and abnormal conditions of the bones in the images.

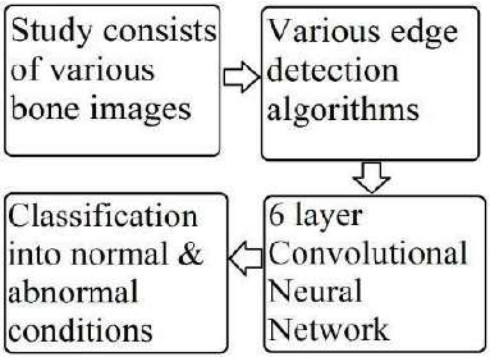

Figure 1. Proposed System Architecture

A. Input Block Description: The first block consists of the input which we have to give to the system. The input consists of various bone x-ray images. In which some images may contain normal or abnormal conditions of bones. MURA dataset provides more than 14,000 images. The images are of high quality. Then these images are processed further.

B. Edge Detection Algorithms: The second part is to detect the edges of the bones. Canny, Sobel and Prewitt are the edge detection algorithms used in our system. Each provides different accuracy levels in detecting the edges. We use the edges so that our model is able to classify easily between the normal and the abnormal conditions of the bone. Different methods for extracting edges provide different accuracy results. The algorithm containing higher accuracy will be feasible to use.

C. 6 Layer Convolutional Neural Network: The input to this model is the edge detected images. Convolutional networks (ConvNets) are inherently efficient when we apply in a sliding fashion as they naturally share computations common to overlapping regions. While applying a network to larger images at test time, we simply apply each convolution over the extent of full image. This extends the output of each layer which covers the new size of image, therefore producing a map of output class predictions, with one spatial location for each "window" (field of view) of input.

D. Output Block Description: At the end we get the final output in which the images are classified into normal and abnormal conditions. Referring to these images we could get an idea of which is a normal image, which means the bone shown in the image is free of fracture and the other one the abnormal image image, which means the bone shown in the image contains a fracture. Figure 2 shows the architecture of the Convolutional Neural network.

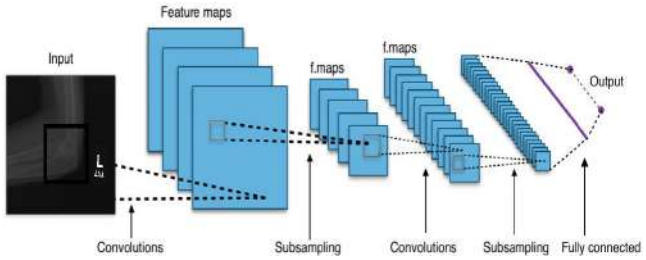

Figure 2. Convolutional Neural Network

Image Augmentation: In order to achieve good performance, deep networks require a high amount of training data. To boost the performance of deep networks, image augmentation is required. Multiple processing is carried onto the training images. In our case we need image augmentation for converting the normal image to a negative image. Due to which highlighting the abnormality becomes easy.

ResNet and DenseNet: Another architecture we come across is DenseNet and ResNet. Residual Neural Network is a kind of Artificial Neural Network. This network is capable of training hundreds or even thousands of layers and still achieve compelling performance. The base block of ResNet is a residual block. When we proceed further through the large number of layers, the computation becomes more complex. Every layer tries to learn some underlying mapping of the desired function and instead of having these blocks, we try and fit a residual mapping. We can get an idea of ResNet by looking at Figure 4 which is an architecture of ResNet 101. In the case of DenseNet, the network proposes concatenating the outputs from the previous layers instead of using the summation. Here the reuse of the residuals are high, which creates a deep supervision because every layer receives more supervision from the previous layer and thus loss function will react accordingly and due to this methodology, it makes DenseNet a more powerful network. In our project we use these networks for training of multiple images and get the abnormalities of the bones in the end. We get a percentage value on how much abnormality of the bone is detected. Figure 3 shows the architecture of DenseNet 121.

Flask Python: At the end of all the procedures we shape them for user interaction. We have used Flask as GUI in our system. It is a web framework which is developed using python.

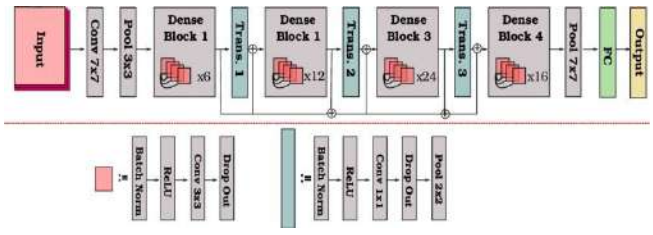

Figure 3. DenseNet 121 Architecture

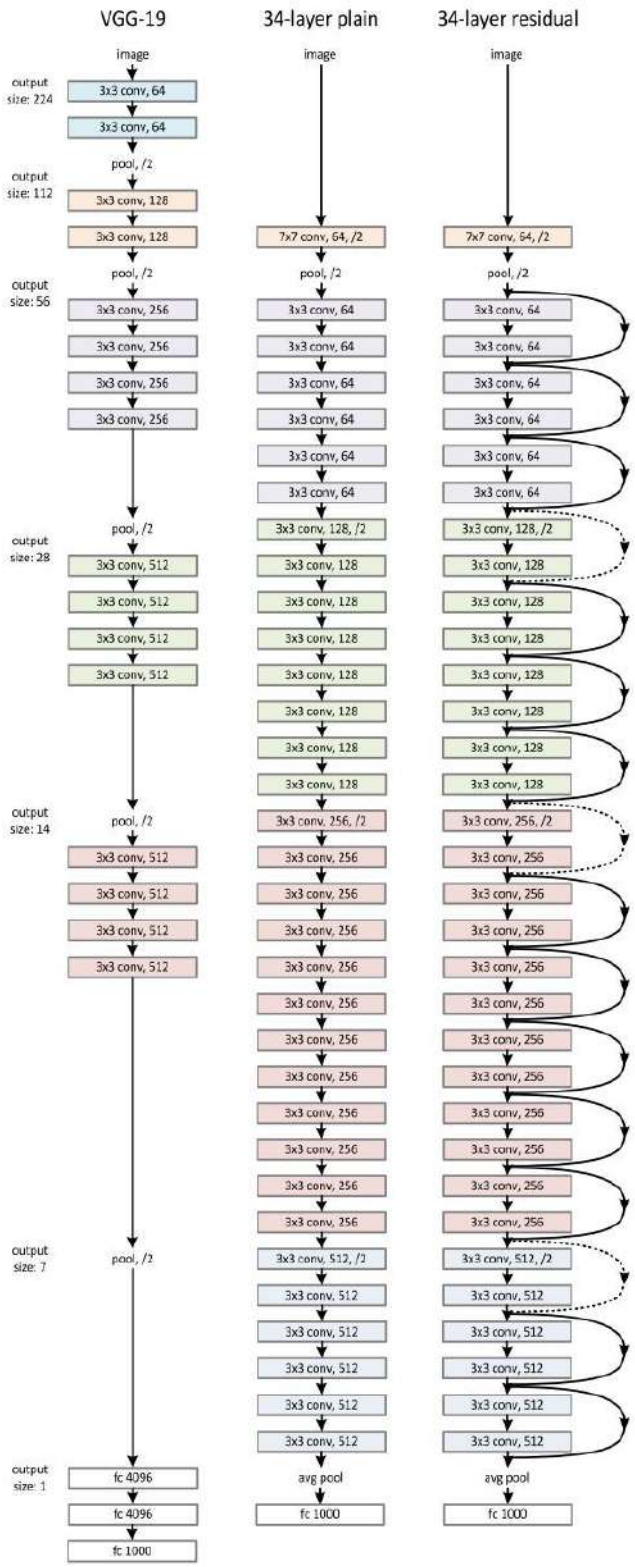

Figure 4. ResNet 101 architecture

Dataset and Parameters

A dataset of x-rays consisting of a total of 40,561 multi-view radiographic images. Around 14,863 studies from 12,173 patients. with each belonging to one of seven standard radiographic study types: elbow, finger, forearm, hand, humerus, shoulder, and wrist. The MURA abnormality detection task is a binary classification task, where the input is an upper extremity radiograph study where each study contains one or more images and the expected output is a binary label either 0 or 1 indicating whether the study is normal or abnormal, respectively. [5]

Table 2. Dataset used for project [5]

Study	Train		Validation		Total
	Normal	Abnormal	Normal	Abnormal	
Elbow	1094	660	92	66	1912
Finger	1280	655	92	83	2110
Hand	1497	521	101	66	2185
Humerus	321	271	68	67	727
Forearm	590	287	69	64	1010
Shoulder	1364	1457	99	95	3015
Wrist	2134	1326	140	97	3697
Total No. of Studies	8280	5177	661	538	14656

Table 2 shows the total number of images in the dataset by MURA. These images are collected from Stanford University. These are x-rays of various bones of various patients. Containing both normal bone as well as the fractured bone x-ray images.

4. Results

At the very first we look for the results of classification of the images. The images are processed which means edge detected and then sent for training for classification. The classification of the images are done through the Convolutional Neural Network. At the end we get some set of results. The network provides the training results from which we get the Accuracy and Loss for classifying the images in normal and abnormal conditions.

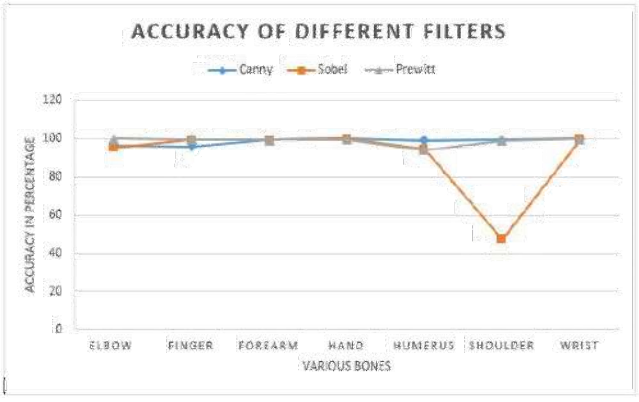

Figure 5. Graph showing accuracy in percentage of various bones

As we can see in Figure 5 the accuracy which we get for 3 different filters for the various bones when trained in Convolutional Neural Network. This accuracy is dependent on how clean the images are. If the images are not of high quality, the accuracy tends to be very low automatically. The graph in Figure 6 shows the loss of classification by the Convolutional Neural Network.

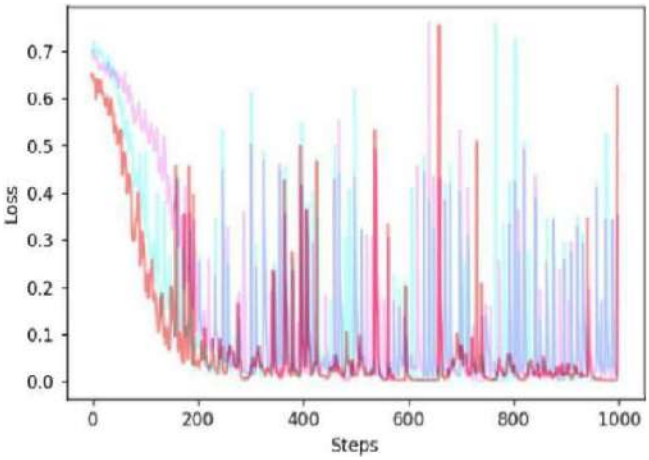

Figure 6. Loss graph with Canny, Sobel and Prewitt filter represented by color Red, Magenta and Cyan respectively.

Now let us look for the results of ResNet 101 and DenseNet 121 which is used for detecting the abnormalities in the bone. All the various bone images are given as input and sent for training through ResNet 101 and DenseNet 121. As we can see in Table 3 the results obtained from both the networks.

Table 3. Results of trained model

Model	Single View Accuracy	Multi View Accuracy	Single View Kappa	Multi View Kappa
ResNet	81.1	83.1	0.619	0.653
ResNet (w test aug)	81.9	84.1	0.637	0.675
DenseNet	83.2	84.4	0.663	0.682
DenseNet (w test aug)	82.5	84.8	0.649	0.692

We have around 36800 train images. All the images are classified in normal and abnormal classes. We can see in Figure 7 how much images we get in normal class and abnormal class respectively.

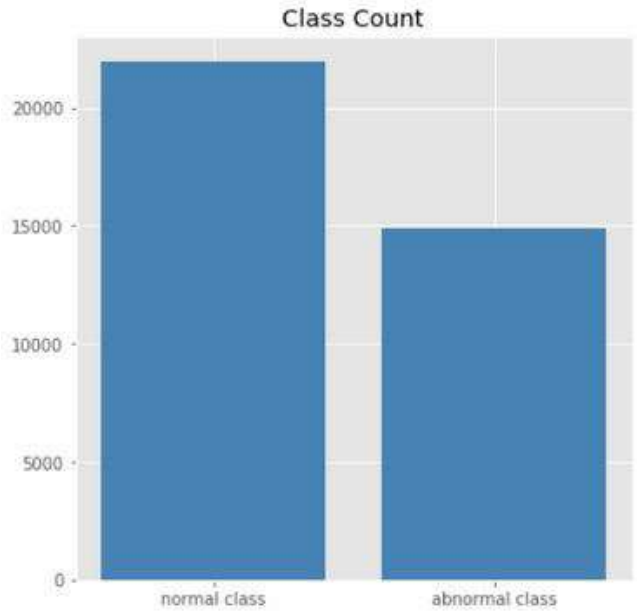

Figure 7. Normal and abnormal classification of the trained images

In the same way we get classification of various bones in normal and abnormal classes. We can see the same in the graph shown in Figure 8.

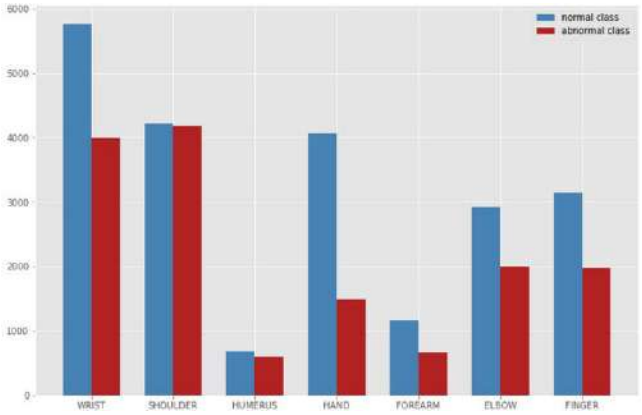

Figure 8. Class count by bone type for train data

Classification of the train images makes it easy for further procedures and gets the results accordingly.

Output / Screenshots:

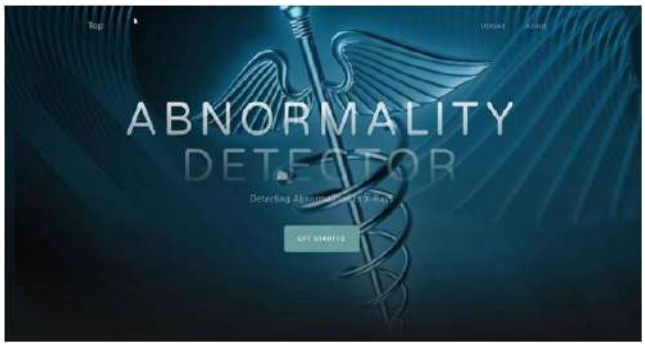

Figure 9. System on startup

The figure 9 shows the first view of the system. It will take X Ray as input that wants to be detected. On proceeding we get another image as output in which the system is able to show where the fracture has occurred and also the percentage of confidence on its detection.

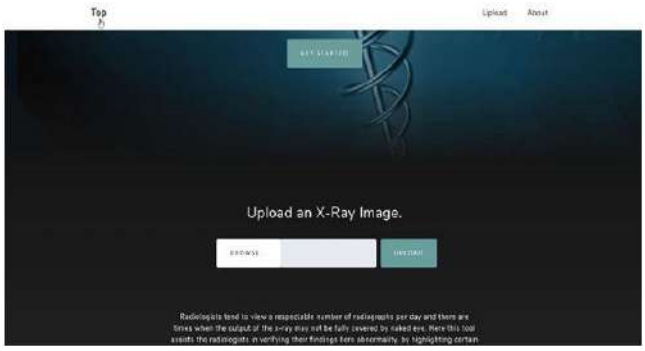

Figure 10. Section for uploading an image

Figure 10 shows the area where the user can browse for required x-ray images and upload to the system in order to detect any abnormality.

Figure 11. About me section of the system.

Figure 11 shows the developers of the system and any message if they need to convey to the users.

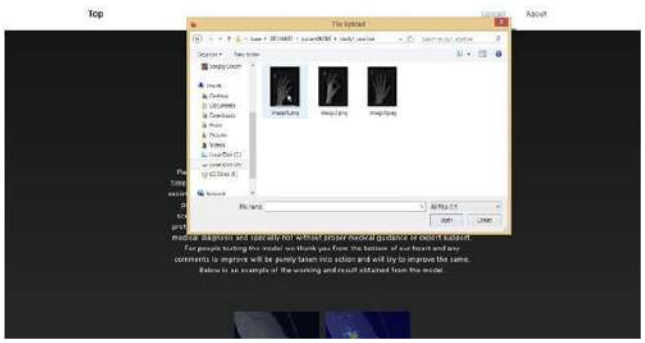

Figure 12. File upload section.

The user can upload a required image from their device system as seen in Figure 12.

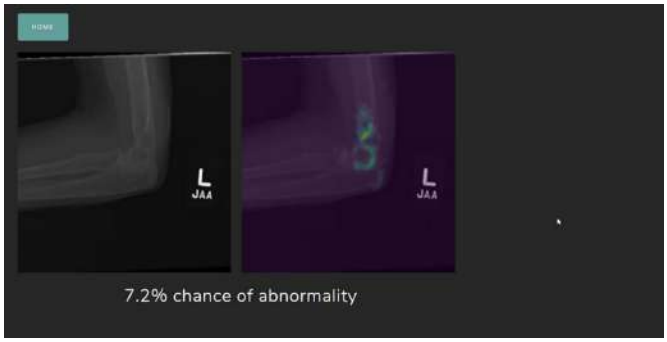

Figure 13. Area where the detected image result is seen.

Once the image is selected and clicked on upload, some time is taken in order to get the result. Then we get the result. This resultant image is in negative form. It also contains the highlighted area of fracture. In Figure 13 the result can be seen of a normal bone x-ray image. Therefore the percentage of abnormality detected is very less.

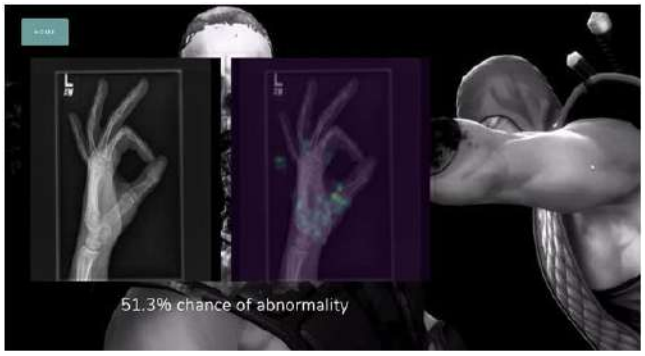

Figure 14. The resultant image of normal bone.

We can see in Figure 14 that the result comes with a high percent of abnormality. As we can see some problems in the bone which causes high percent of abnormality detection.

5. Requirement Analysis

We have used some set of software in order to develop and train our system. They mainly are Tensorfow, Anaconda and Jupyter Notebook.

Tensorflow is a symbolic math library and is used for ML applications such as neural networks. We use this for the classification of bones whether abnormal or normal.

Anaconda is a free and open-source distribution of Python as well as R programming languages for scientific computing, that aims to simplify package management and deployment.

Jupyter notebook is created to develop open-source software, open-standards, and services for interactive computing across dozens of programming languages.

REFERENCES

[1] Mahmoud Al-Ayyoub, Ismail Hmeidi, Haya Rababah Detecting Hand Bone Fractures in X- Ray images (September 2013).

[2] Pierre Sermanet and Xiang Zhang OverFeat: Integrated Recognition, Localization and Detection using Convolutional Networks arXiv: 1312.6229v4 (February 2014)

[3] S. Febrianto Kurniawan, I.K.G. Darma Putra and A.A. Kompiang Sudana Bone Fracture Detection using OpenCV (June 2014)

[4] Nancy Johari and Natthan Singh Bone Fracture Detection using Edge Detection Technique (January 2018)

[5] Pranav Rajpurkar1, Jeremy Irvin1, Aarti Bagul, Daisy Ding, Tony Duan, Hershel Mehta, Brandon Yang, Kaylie Zhu, Dillon Laird, Robyn L. Ball, Curtis Langlotz, Katie Shpanskaya, Matthew P. Lungren, Andrew Y. Ng MURA: Large Dataset in Musculoskeletal Radiographs arXiv:1712.06957v4 (May 2018)

[6] Mariam M Saii and Ali M Mayya Hand and Finger Fracture Detection and Type Classification Using Image Processing (August 2018)

[7] Wint Wah Myint, Khin Sandar Tun, Hla My Tun Analysis on Leg Bone Fracture Detection and Classification Using X-ray Images (January 2018)

[8] Dennis Banga, Peter Waiganjo Abnormality Detection in Musculoskeletal Radiographs with Convolutional Neural Networks (Ensembles) and Performance Optimization. arXiv:1908.02170v1 **[cs.CY] (**August 2019)

[9] Jianan Li, Xiaodan Liang, Yunchao Wei, Tingfa Xu, Jiashi Feng, Shuicheng Yan Perceptual Generative Adversarial Networks for Small Object Detection.arXiv:1706.05274 (June 2017)

[10] Thomas Schlegl, Philipp Seeb¨ock, Sebastian M. Waldstein, Ursula Schmidt-Erfurth, and Georg Langs Unsupervised Anomaly Detection with Generative Adversarial Networks to Guide Marker Discovery. arXiv:1703.05921 (March 2017)

[11] Jie Hu, Li Shen, Samuel Albanie, Gang Sun, Enhua Wu Squeeze-and-Excitation Networks. arXiv:1709.01507v4 **[cs.CV]** (May 2019)

[12] Kaiming He, Xiangyu Zhang, Shaoqing Ren, Jian Sun Deep Residual Learning for Image Recognition. arXiv:1512.03385v1 **[cs.CV]** (December 2015)

Child Safety and Tracking Management system for Mobile Devices

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***Abstract*— Children use different types of mobile devices with no constraints. Parents are concerned about the effect of the technical explosion on their children's development. Also,nowadays lots of cases are seen of missing childs.Controlling, monitoring, and managing approaches are in need to help in overcoming some of these worries.The proposed system will help parents to control and evaluate their kids use of mobile devices.The system will provide real time location tracking of child using GPS with the help of A* algorithm and allows parents to view the child's calls and sms details even if the internet connectivity is not present.It enables parents to track the browsing activity and applies a time limit on the internet usage.In a case of emergency an alert message can be sent to parent by shake gesture or by calling a unique number.The parent can set a boundary in order to restrict the child from going outside the safe premises using Geofencing. All the data is stored in the database in an encrypted format using Advanced Encryption Standard(AES) and the same is decrypted at the receiver side.The system uses a client-server based architecture and Firebase realtime database.The realtime location tracking will be implemented using Google places API and location services.Telephony services will be used to retrieve the sms and call details. The application will be deployed on android and ios platform.**

I. INTRODUCTION

In the digital century where technology reaches kid's hands, guardians may worry about the effect of this very open world on their kids' development. They may worry about the detrimental effect of this technology on their educational, emotional, and social developments. To help overcome some of these worries, guardians may need to have some controlling technology to check and track their children's usage for personal devices. Android devices are one of the most used technologies by children in our society, guardians will need to have some automated technologies to observe and supervise the time and quality of their children's usage for these devices.

The proposed system will help parents to control and evaluate their kid's use of mobile devices. The system consists of two main subparts, one is the parent side and other will consist of a hidden application that will be in stealth mode in the child's device. The overall advantage of the system is taking control of a child's device that allows parents to get a greater understanding of what kids are using and how they are using them.

Objectives of ChildSafety and Tracking Management system for Mobile Devices are as follows:

1. To block or prevent access to specific websites and limit child's exposure to inappropriate content. 2. Controlling a child's device by limiting the use of the device. 3. Device monitoring,keeping an eye on kids mobile activities. 4. Tracking a child's location. 5. To set a screen limit so that health is not affected. 6. To teach cyber etiquette. 7. To establish good cyber safety habits. 8. To help defend online reputation.

Scope is to improve the project by means of computational intelligence,modifying and installing it in mobile devices,to develop an application which helps parents to control child's use over mobile in android platform as well as in IOS platform,to make application work even in low or no internet through offline SMS services and to build a system where parents can force enabling of GPS overriding child's preference.

II. RELATED WORK

The basic idea of this project came from the observation that without a proper guidance and observation, the children might be trapped in between the contentment that technology can possibly offer. We have gone through several papers to gather information about various techniques for child safety and tracking. Some of these reference papers are mentioned below.

Prof Rohini Temkar, Sandesh Nambiar, Sidharth Purohit [1] proposed an Android Parental Control app which maintains control by monitoring ,which includes web content filtering,app blocking,time management and location tracking.Proposed System contains two modes parent and child .System provides control of features such as location, messages and call logs, website and application usage to parents. Data from child's mobile is stored in database which can be read by parents using parent mode. On child,s mobile it is a background process.

Ahmed M. Elmogy,Khawater Elkhowiter [2] proposed a system which is a mobile application titled as "Times Up". It is mainly used by parents or guardians to control the kids' usage of mobile devices. The proposed application will allow users to set policy and restrictions for other applications, as well as to time out the usage duration for application or for over the entire device. It also allows the users not only to control their kids' usage, but also to evaluate the time their children spent on using mobile device and to 3 have an overview of the usage based on the restrictions by displaying diagrams to compare and evaluate the device usage for certain time

Aditi Gupta , Vibhor Harit [3] proposed a model for child safety through smart phones that provides the option to track the location of their children as well as in case of emergency children is able to send a quick message and its current location via Short Message services. The main aim of the author is to rectify the worries of their parents regarding their child's security.The four main services mentioned in paper are Global Positioning System(GPS),Geofencing,Short messaging service(SMS),Child Tracking.

Walter Fuertes, Karina Quimbiulco,Fernando Galárraga, and José Luis García-Dorado [4] proposed a system which is a web application. It is mainly used by parents or guardians to control the kids' usage on the world wide web.

III. PROPOSED SYSTEM

A. Exising system Architecture

The existing system is a mobile application titled "Times Up". Times Up is mainly used by parents or guardians to control the kids' usage of mobile devices. It allows users to set policy and restrictions for other applications, as well as to time out the usage duration for application or for over the entire device. The application allows the users not only to control their kid's usage, but also to evaluate the time their children spend using mobile devices. The application will also allow users to have an overview of the usage based on the restrictions by displaying diagrams to compare and evaluate the device usage for certain time. The flow diagram of the application is as shown in fig 3.1. The system does not provide any detail related to the child's live location. The system of live location tracking is implemented as a different application.

The system does not provide any detail related to the child's live location. The system of live location tracking is implemented as a different application. The author proposed a model for child safety through smart phones that provides the option to track the location of their children as well as in case of emergency children are able to send a quick message and its current location via SMS. The 6 main aim of the author is to rectify the worries of their parents regarding their child's security.The four main services mentioned in paper are Global

Positioning System(GPS), Geo-fencing,Short messaging service(SMS), Child Tracking.

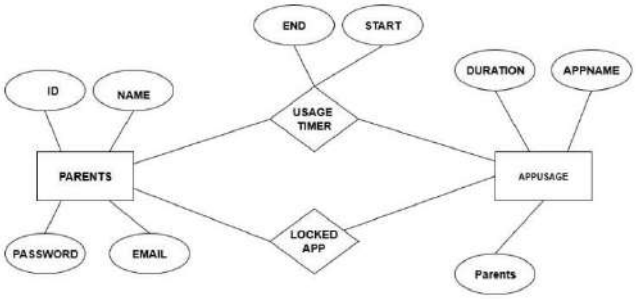

Fig 3.1: Existing system architecture

B. Proposed System Architecture

The previous sections discussed the strengths and weaknesses of the existing system. In order to achieve better results, we are using the following architecture which seeks to inherit advantages and eliminate disadvantages.

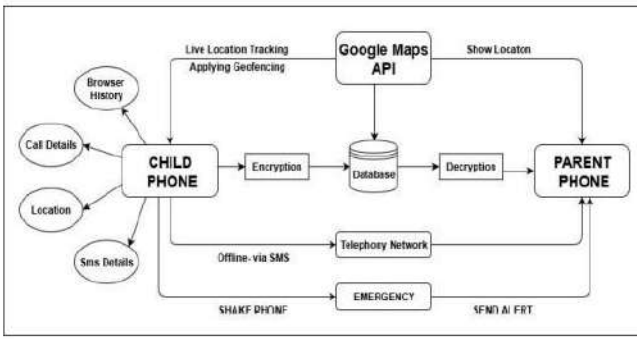

Fig. 3.2 Proposed system architecture

a. *Real Time Location Tracking:*This module is used for getting the Location Details of the child's Device. It Initialises the GPS Tracker,then Creates an instance of GpsTracker by passing context as parameter.If the instance is not null then it calls the GetLocation() ,method. Then stores the details in encrypted format in the Database.This data is then sent/fetched by the Parent's application where is it decrypted and displayed on the Parent's device.In case of non availability or poor internet connection,this data or live location is send to the parent device through offline SMS.

b. *SMS and Call Details:*This module is used for getting the SMS and Call details of the child's Device.For SMS it uses the query " content://sms" and for Call details it Creates an instance of CursorLoader by passing CallLog.Calls.CONTENT_URI as a parameter.The data is then stored into the database after encryption.This data is then sent/fetched by the Parent's application where is it decrypted and displayed on the Parent's device.In case of non availability or poor internet connection,this data or SMS/call details is send to the parent device through offline SMS.

c. *Check weather application is installed or not:*This module is used for checking weather the application is installed or not in the child's device.Using this module the parent's can confirmed if the child has deleted the application on his/her device.It checks the package name of the application using isPackageAvailable() method.This module is launched in the background after every one hour and the result is stored in the database.This data is then fetched by the parent's application and the result is displayed.

d. *Encryption and Decryption using AES Algorithm:*This module is used for encrypting the data before storing it in the Firebase Database.It uses Advanced Encryption Standard algorithm for Encryption and Decryption. More details on AES encryption and decryption is mentioned in the latter sections.

e. *Telephony Network:*One of the major disadvantages of previous system was that is was completely dependent on internet connection.Even the slightest loss in internet connectivity,reduces the performance.The proposed system overcomes this disadvantage by sending offline SMS about the child's phone to the parent.It uses telephony services for sending an offline SMS to the parent. This module first checks weather the internet connection is available on the child's application.It uses the -------- package to check weather internet connection is available or not,also the "ACCESS NETWORK STATE " permission is required.If internet is not available then the SMS,call,location details is passed as a text message to the number previously registered.

f. *Emergency Alert:*This module uses shake feature for sending SMS alert at the time of Emergency.Just by using gestures like shaking the device an emergency alert can be sent to the parent device.Other gestures such as double tap/three fingers swipe can also be implemented but shake gesture is the most convenient of all.The module uses the SensorManager class and register the sensor with desired flags.We can set the threshold for detecting weather it is a shake or not.

g. *Text to speech:*This module is used for converting the output from the parent's device to speech.This helps the parents to use the app even if they are less educated.This module can read the SMS details, numbers in the call details also weather the applocation is installed or not in the child's device.This module uses the TextToSpeech class provided by android.To use this class we need to initialize object of this class and specify the initListener.Language can be set by calling the setLanguage() method.

IV. IMPLEMENTATION

This section explains the details of the proposed system developed for child and parent. Including the languages to be used, functions, and screens. The following languages, database and software are used to develop the proposed applications.

A. Integrated Development Environment (IDE):

An integrated development environment (IDE) is a software application that provides comprehensive facilities to computer programmers for software development. In our system we have developed a native android application using Android Studio IDE. The Android Studio is the official programming environment that allows developers to build Android apps. These features include Project Structure, Gradle Build System, Debug and Profile Tools, Memory and CPU monitor, Data file access, Code inspections, Annotations in Android Studio, and Log messages[6].

B. Emulator:

The Emulator is one of the used tools within the Android SDK. The importance of having such tool is to provide developers with a virtual mobile device showing on the screen. The Emulator uses the virtual mobile device for testing developed apps with no need to have actual mobile devices

C. *Languages:*

a. *Java:*The Java language is a key pillar in Android, an open source mobile operating system. Although Android, built on the Linux kernel, is written largely in C, the Android SDK uses the Java language as the basis for Android applications. Depending on the Android version, the bytecode is either interpreted by the Dalvik virtual machine or compiled into native code by the Android Runtime.

b. *XML (Extensible Markup Language) :*XML stands for Extensible Markup Language. XML is a markup language much like HTML used to describe data. XML tags are not predefined in XML. We must define our own Tags. Xml as itself is well readable both by human and machine. Also, it is scalable and simple to develop. In Android we use xml for designing our layouts because xml is lightweight language so it doesn't make our layout heavy.

D. DataBase:

FireBase Realtime DataBase:-The Firebase Realtime Database is a cloud-hosted database. Data is stored as JSON and synchronized in realtime to every connected client. Database is discussed in more detail in next chapter.

V. EXPERIMENTS AND RESULTS

The application was tested on different android versions. Various features of the application with their respective results have been presented .

The parent application displays the call and sms details as shown in figure 1 and figure 2 respectively. Parent can also see the child's live location and trace it using google maps as shown in figure 3 and figure 4 respectively.

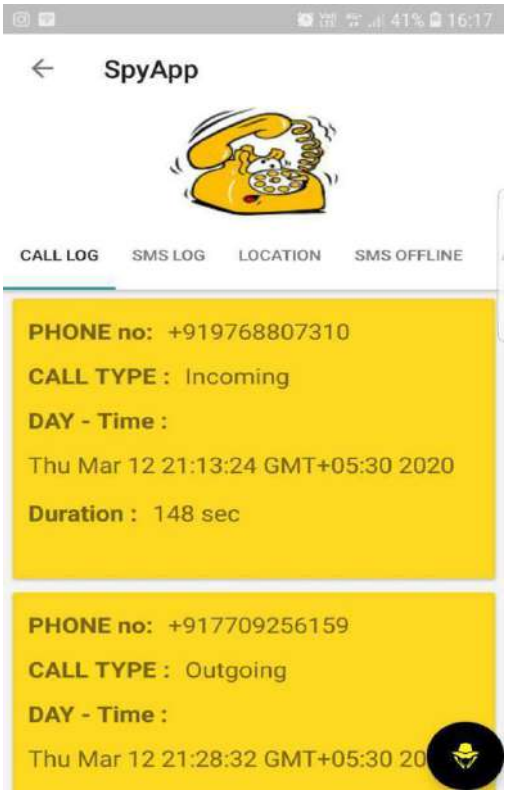

Fig 1: Call Log fragment

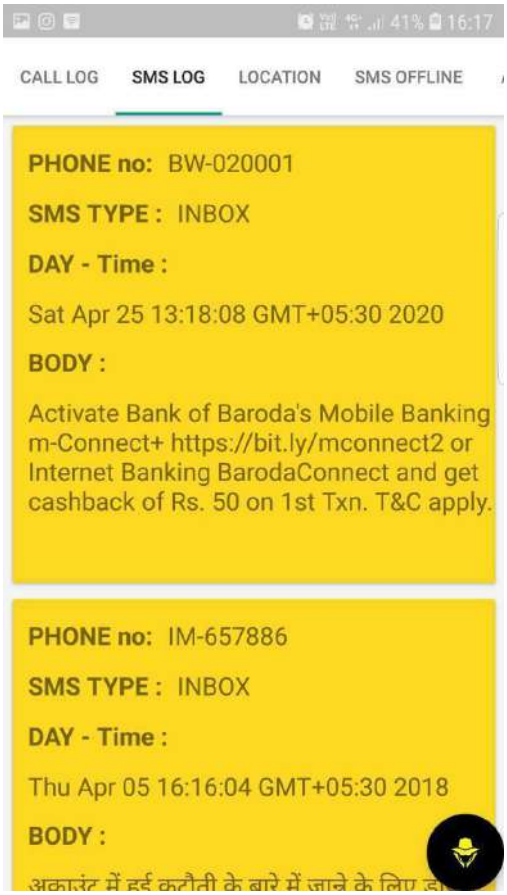

Fig 2: SMS Log fragment

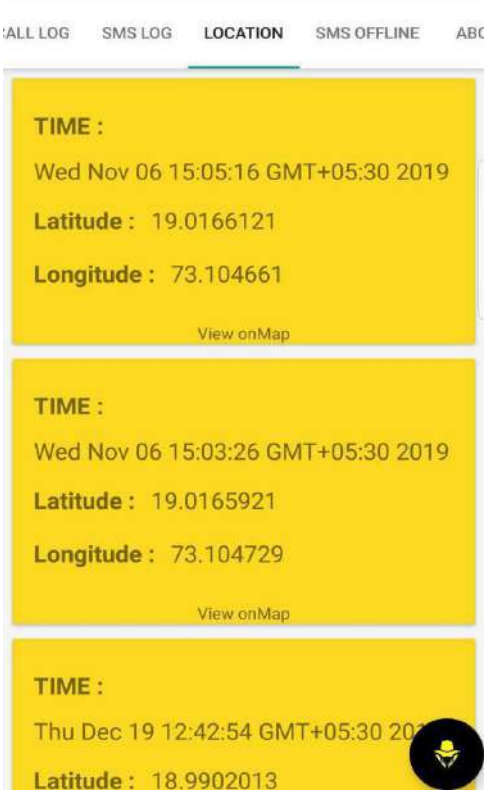

Fig 4.3 : Location detail fragment

Fig 4: Location tracking using google map

Different Evaluation criteria such as Response time,CPU usage,Memory usage,Disk space have been considered to observe the Application's performance on both SpyApp(Parent's side) and Stealth(Child's side). The table gives the score of all the tests.

Device Version	Response time (ms)	Memory Usage (MB)	CPU Usage (%)	Disk Space (MB)
API 22 (SpyApp)	LRT-1122,1022 **(2G,4G)** FRT-7032,2020 **(2G,4G)**	115	21	23.25
API 22 (Stealth)	LRT-568,448 **(2G,4G)** FRT-1122,698 **(2G,4G)**	26	15	6
API 26 (SpyApp)	LRT-1321,966 **(2G,4G)** FRT-6653,1890 **(2G,4G)**	117.6	12	23.36
API 26 (Stealth)	LRT-784,416 **(2G,4G)** FRT-1012,686 **(2G,4G)**	24.21	7	6.21
API 28 (SpyApp)	LRT-986,845 **(2G,4G)** FRT-5692,1836 **(2G,4G)**	112.5	7	23.31
API 28 (Stealth)	LRT-496,398 **(2G,4G)** FRT-1122,686 **(2G,4G)**	21.21	4	6.21

Fig 5.1: Response Time,Memory usage,CPU Usage,Disk Space scores on all devices.

Based on the results following Graphs were obtained.

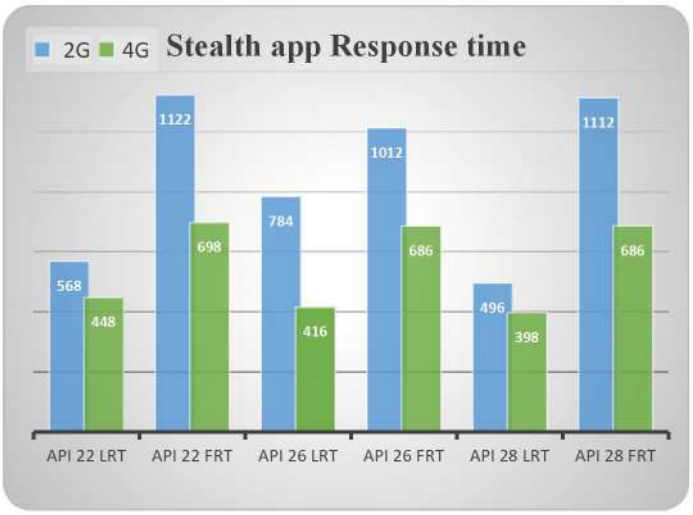

Fig 5.2(a): Response time comparison for stealth app (child's side)

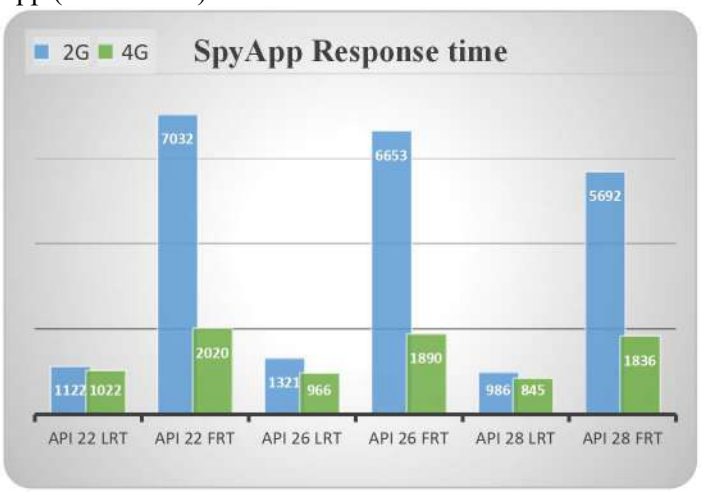

Fig 5.2(b): Response time comparison for SpyApp(parent's side)

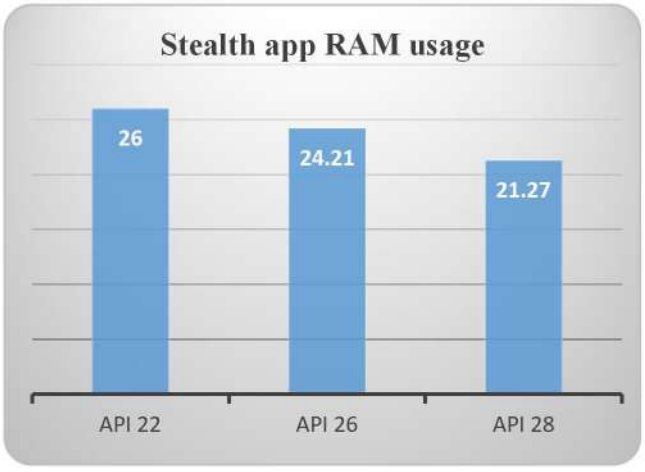

Fig 5.3(a): RAM usage on child side

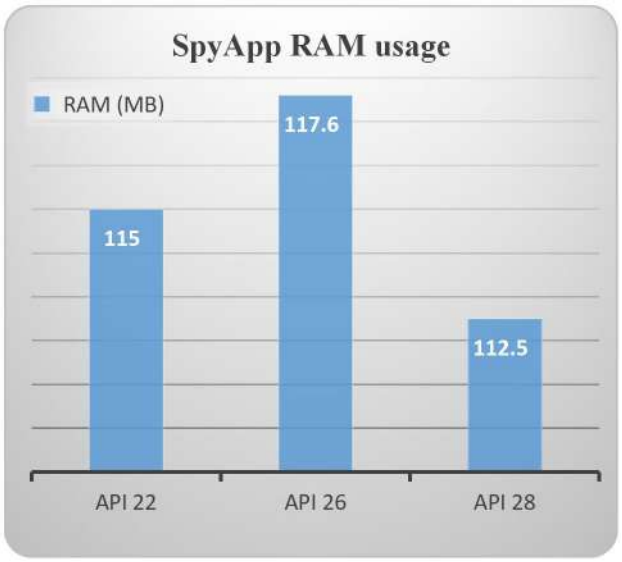

Fig 5.3(b): RAM usage on parent side

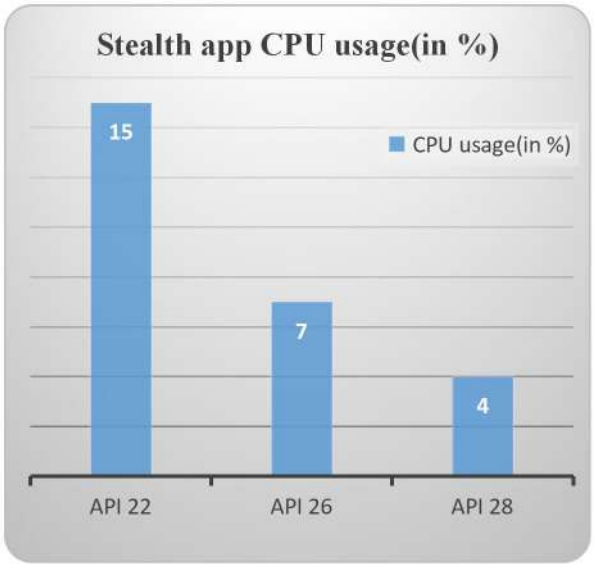

Fig 5.4(a): CPU usage on child side

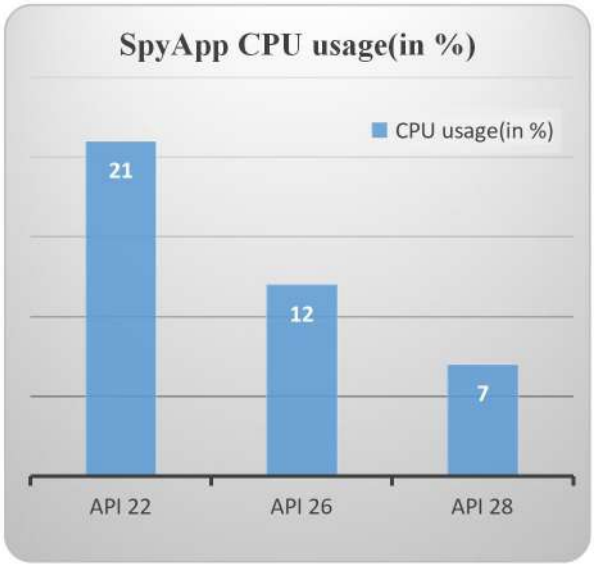

Fig 5.4(b): CPU usage on parent side

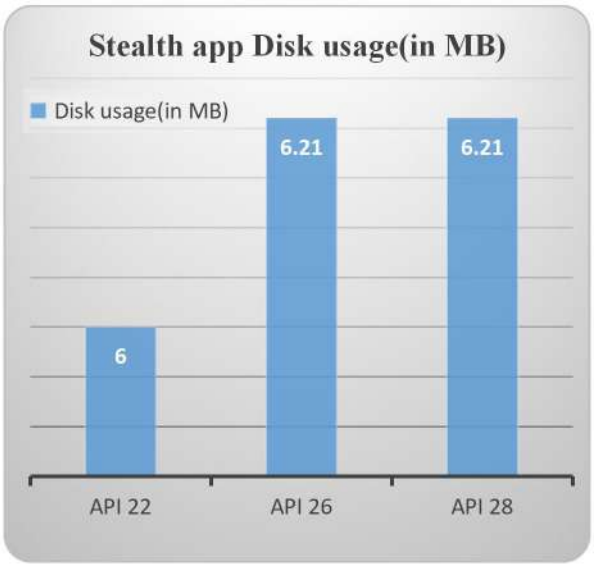

Fig 5.5(a): Disk usage on Child's side

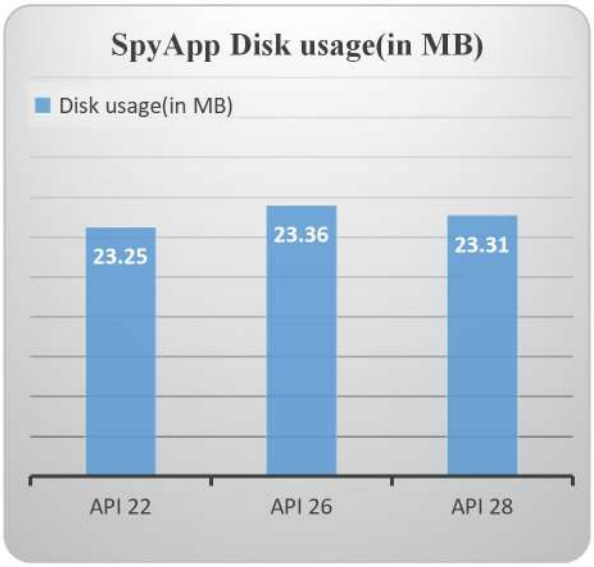

Fig 5.5(b): CPU usage on parent's side

VI. CONCLUSION

Children are shaped by the information they are exposed to. The kind of information they are exposed to not only can grant them healthy social life but also affect their decision making in a negative manner. It is a responsibility of parents to decide what content is healthy and useful to their children.Child Safety and Tracking Management system for Mobile Devices has various modules to facilitate this without curbing the child's knowledge about worldly things or putting a stop to their curiosity. It gives control to the parents about what their children view, which keeps them away from negative influences.This application is

designed for locating missing children. The solution represented in this paper takes advantage of smart phones which offer rich features like Google maps, GPS, SMS etc. Some of the best works implemented in the past relies on SMS based tracking which is not helpful to get an accurate location in our proposed system we have provided real time tracking. We have added Emergency messaging services to enhance the system.

Live Control panel can be implemented to view the phone's screen (Live Screenshot*) and location live, perform remote control commands, and obtain the phone's information instantly.Web History can also be implemented to discover which sites the child has visited.

VII. REFERENCES

[1] “An Android Parental Control”,Prof Rohini Temkar,Sandesh Nambiar, Sidharth Purohit,IOSRJournalofEngineering(IOSRJEN)2250-3021,Vol.08,Issue6(June.2018)

[2]“Parental Control System for Mobile Devices”,Ahmed M. Elmogy,Khawater Elkhowiter,InternationalJournalofComputerApplications(0975–8887)
Volume177–No.3,November2017

[3] “Child Safety & Tracking Management System”,Aditi Gupta , Vibhor Harit,2016 Second International Conference on Computational Intelligence & Communication Technology Tomohiro Fujita,2017.

[4]“OntheDevelopmentofadvancedParentalControl Tools”,WalterFuertes,KarinaQuimbiulco, Fernando Galárraga, and José Luis García-Dorado-2015 1st International Conference on Software SecurityandAssurance

A Novel Approach for Land Record keeping using Blockchain

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***Abstract*—The current land records management system is outdated, and handicapped by lack of coordination between agencies, delayed updates of records and aspersions on accuracy of documents. Blockchain technology offers a robust solution through real time update of records and transparent transactions thereby increasing public trust in the system. Studies show blockchain is best suited for trade finance and property governance. The project envisages that all the entities involved in a transaction will have a digital file representing the agreement of ownership of the real estate, mortgage deeds and the transaction processes. These files will be stored in locally in a cloud or locations of the entities' choosing. The authenticity of the process, the signatures of the file confirming the ownership, etc. will be secured with a blockchain by the land records department, but the blockchain will also be stored and validated by all participating entities. It will therefore be easy for authorized third parties to verify information. All files uploaded by the land registration department will be completely transparent and visible to all parties.**

I. INTRODUCTION

Land Records Management

The project envisages that all the entities involved in a trans- action will have a digital file representing the agreement of ownership of the real estate, latest property register documents, tax bills and copy of the original old sale deed [1]. These files will be stored in locally, in a cloud or locations of the entities' choosing. The authenticity of the process, the signatures of the file confirming the ownership, etc. will be secured with a blockchain by the land records department, but the blockchain will also be stored and validated by all participating entities.

Blockchain

Blockchain technology - a completely unique from of distributed ledger that cryptographically secures records of transactions – is transforming the creation and keeping of records [2]. Blockchain is a type of distributed ledger technology in which validated sets of transaction records are grouped into blocks, which are then chained together cryptographically (i.e., using hashes, 256-bit random numbers generated from input information), computationally validated and broadcast throughout a peer-to-peer mesh network [2].

Blockchain Recordkeeping solution

Documents are represented as transactions. They are stored in immutable blocks and form part of the blockchain. Documents are available to all participants in their ledgers as well as the ledger of the land registration department. The blocks are

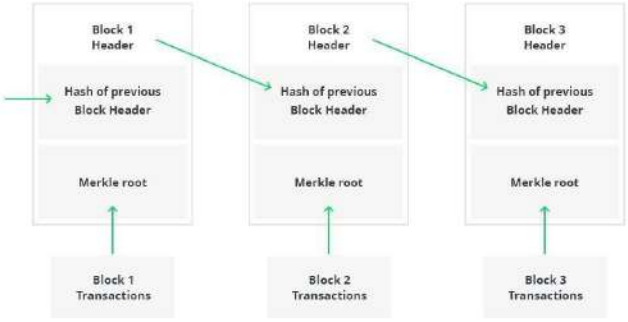

Figure 1 Block Chain overview

encrypted with SHA256 hashes and nonce values are used to link each block with previous and next blocks [3]. Changes made to any transaction will also change the hash values of all other documents in the chain making the transactions invalid. Thus the transactions a re protected. Deployment of the transactions into the blockchain are done using smart contracts [4].

II. Existing System

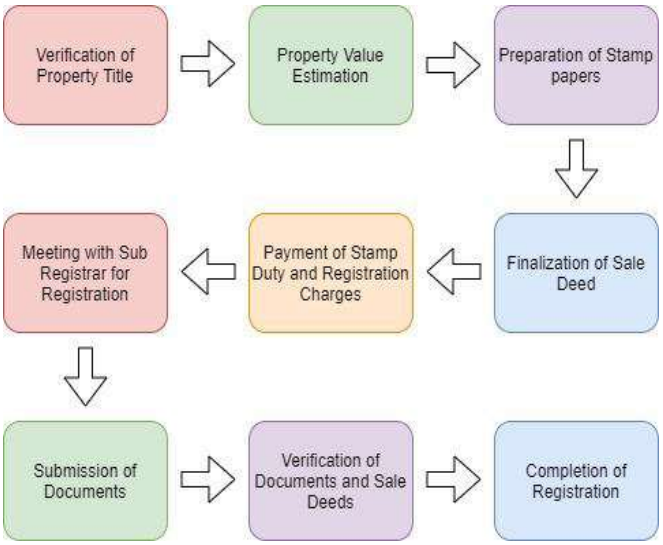

Figure 2 Existing System architecture used for Land Registration System

The most common land transaction is that the purchase of a personal residence. Let us first review the process involved in this transaction as it stands today. Real estate transactions by private persons via real estate agent today involve the following seventeen steps, which often take 3-4 months to complete. 1. A property owner wants to sell their property.

2. The property owner, i.e. the Seller, contacts a true realtor and draws up an agreement for managing the sale of the property.

3. The agent collects records of the property from the land department in order to check the information about the property, i.e. that the seller is in fact the owner and is eligible to sell the property.

4. The agent puts the property up for sale and markets the property to potential buyers.

5. The Buyer goes to a bank, the Buyer's bank, and asks for a loan commitment. The bank checks the Buyer's credit rating and approves the loan commitment up to a specified limit.

6. The Buyer makes an initial inquiry about credit options for the specific residence with the Buyer's bank.

7. The Buyer's bank evaluates the property, does due diligence of the property accessing the same records from the same department as the agent to satisfy itself of the legitimacy and legality of the property.

8. The bank approves the purchase price and loan.

9. The agent checks that the customer actually features a loan commitment from the bank.

10. The agent arranges for signing of the Agreement to Sell between the buyer and the seller. Often four copies of the contract are created, one for the seller, one for the Buyer, one for the agent and one for the Buyer's bank.

11. The contract is sent by the Buyer to the Buyer's bank.

12. The bank sends credit documents to the Buyer.

13. The Buyer sends the signed loan agreement to the Buyer's bank.

Disadvantages of Existing System

It is estimated that $700 million is being paid in bribes at land registrars across India. There have been many land registry fraud cases in India. Many of land properties are sold for much higher prices than actually bought. Signatures in the documents are faked. For the cases of NRIs, there is misuse of power of attorney. There is forgery of title deeds or wills. Every party is the transaction is not accurately authenticated.

Due to the shortage of maintenance of streamlined land records, there are litigations, scams and property disputes over land ownership. Hence, a digital and secured department has to be set up, for better maintenance of land records. Thus Blockchain is being used to create unique digital units for assets like land property, to verify digital file authenticity, identity, order in time and places and to have a secured control on all the processes.

III. Proposed System

This system shows how the land records process in blockchain will work, from the producing documents to storing the documents in the blockchain.

Land Registration Department: Buyer and Seller will produce their verified documents to the land registration department. [6]

The documents will contain the information about the property in question which verifies the legitimacy of the seller, buyer's bank statement, both buyer and seller's identity proof, ownership of real estate, property registration documents, tax bills, etc.[6]

The documents will be digitally available through the land registration department.

Creation of Transaction: The documents will be collected and processed by the application. A transaction will be created over these documents which will contain the date of relation, parties involved, documents submitted, date of verification, etc [5] [2] [1].All these information will be stored as a single unit transaction [5].A transaction in this case is a digital record that contains all the information related to the property[5].

Deploying Transaction into blockchain as a new block: The transaction will be deployed into the blockchain by using smart contracts[3] [4] [8]. Smart contracts will convert the transaction into byte code and Application Binary Interface(ABI)[8].

The smart contract will create an instance of itself in the blockchain network [8].It will then deploy the transaction into the blockchain network[8]. The deployed transaction will be stored as a separate block which links to the previous and the next block. In other words, blocks are basically transactions that are linked to each other[4][3] [8].

IV. Detailed Functioning of Transaction process

Algorithm / Technique

Technique - Smart Contract[4][8][5]

Since its advent, the Blockchain was inherently supposed to be used in combination with cryptocurrencies but currently this technology is being used in other areas as well. One particular area based on the distributed ledger technology that has grabbed the attention of many technologists and financial marketers is "Smart Contracts". A Smart Contract is a pre-written computer code/logic that is stored in a Blockchain network and can result in ledger (shared) updates. Smart Contracts helps in reducing the risk of registering incorrect information. It also assists in getting sales deed and the confirmation from the land registry of ownership of the land. Thus it helps to utilize unique digital fingerprint to regulate and control the workflow, correctness of the document, and the rules & order of authorization.

By utilizing digital signatures in all steps in the process of selling a house, the total time of doing a deal is reduced from several months to few days. The use of digital signature will reduce the time even for a centralized database, but it is susceptible to 'attacks' when a history is changed Together with a Blockchain network, Smart Contracts adds a chain of evidence that comes from a history that cannot be altered. There are multiple copies of data (transaction/changes) stored with all parties involved. This process helps in eliminating those fraudulent cases in which people sell what they don't own. Only the parties involved; buyers, sellers, land registry, real estate

agents can see the same information.

Algorithm- Proof of Work (PoW)[4][5]

Smart Contracts use the algorithm called proof of work to perform perform verification of contracts. PoW is a protocol for solving a mathematical puzzle and achieving a guaranteed consensus required to define an expensive computer calculation, also called mining, that needs to be performed to create a new group of trust less and decentralized transactions on a blockchain. Mining is executed for two reasons: i) to verify the validity of a transaction and avoiding the double-spending [2]which is the risk that a digital currency can be spent twice by copying the original digital token and sending it to the receiver, ii) to create new digital currencies by rewarding miners for performing the previous task[5].

• Depending on the mining difficulty a target hash value is specified. This target hash value is a unique set of hash values where the hash must start with a certain amount of 0s (say 0x0000…..)

• The mining difficulty of the block is automatically determined by the platform which is being used.

• The block containing the new data to be pushed into the blockchain is referred to as the new block.

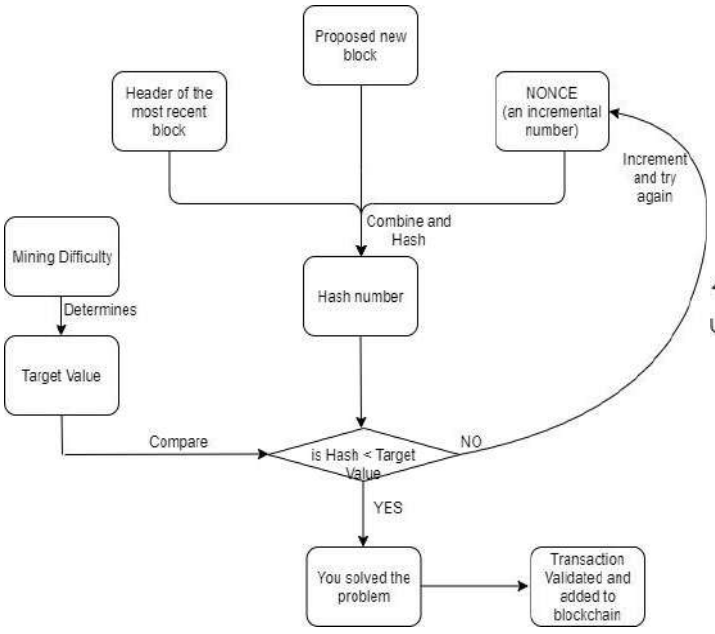

Figure 3 Functioning of Proof of Work

V. Implemented System

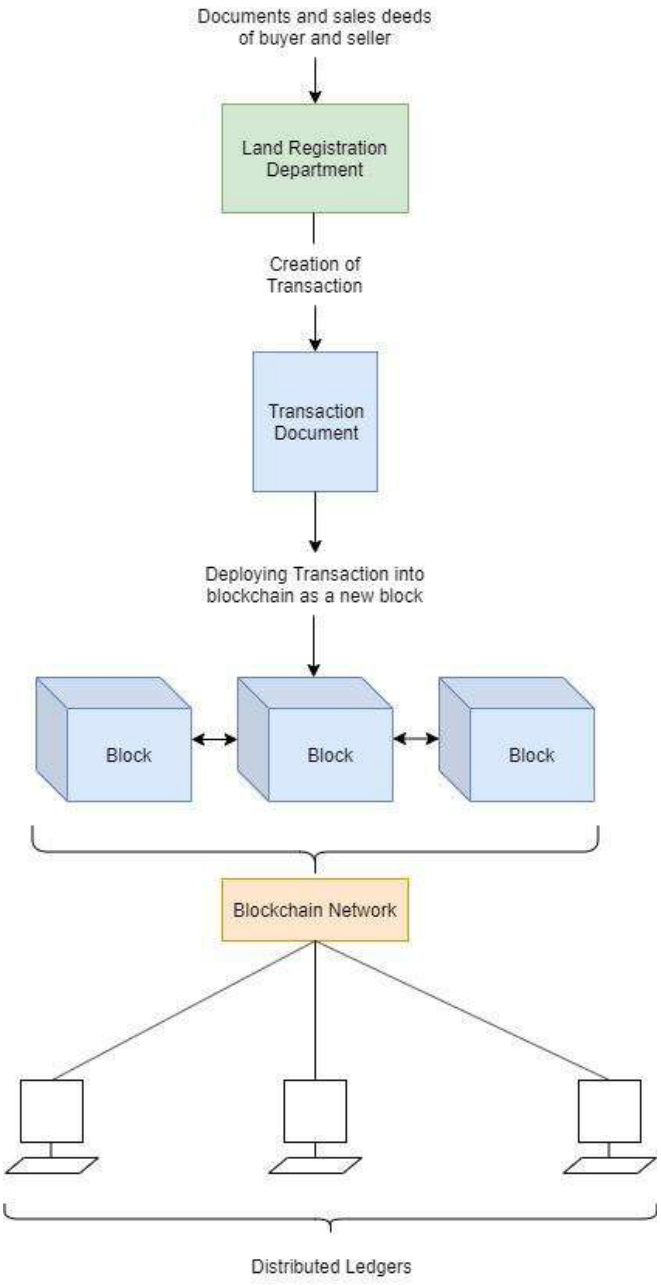

Figure 4 Implemented System Architecture

VI. Possible Application

There are various applications of this domain system. The applications are listed here.

4.1 Security for Registration Documents

Since every block containing the documents are secured with combined hashes and linked to the previous block, the system as a w hole becomes immutable. This means no block can be altered or new unauthorized blocks can be added without appropriate verification (i.e mining). And since data is digital and available in a distributed infrastructure, Even during any calamities, loss of da ta will not happen.

4.2 Prevention of Forgery

Blockchain in its nature cannot be altered. Only new blocks can be added, existing blocks can neither be changed, updated or deleted. This makes blockchain perfect for storing archives and secure, mission critical data. In practice, it is almost impossible to modify multiple ledgers at once and if there are many ledgers available, hacking it becomes practically impossible .

4.3 Prevention of Fraud

It is estimated that $700 million is being paid in bribes at land registrars across India. There have been many land registry fraud cases in India. Many of land properties are sold for much higher prices than actually bought. Signatures in the documents are faked. For the cases of NRIs, there is misuse of power of attorney. There is forgery of title deeds or wills. Every party is the transaction is not accurately authenticated. Due to the lack of maintenance of streamlined land records, there have been litigations, scams and property disputes over land ownership. Hence, a digital and secured department has got to be found out, for better maintenance of land records. Thus Blockchain is being used to create unique digital units for assets like land property, to verify digital file authenticity, identity, order in time and places and to have a secured control on all the processes.

VII. Conclusion

In this report, the fundamental working of blockchain technology is presented. Along with it, a primitive concept of implementing land registration system using blockchain is presented. The documents required for registration are assumed to be verified beforehand by the land registration department. Smart contract algorithm will be used to deploy the transactions containing the documents into the blockchain network. The records will be stored in all systems in the blockchain network as distributed ledgers. All transactions stored in blocks point towards the previous and next block. Any updation in the form of future additions of transactions is automatically reflected into all distributed ledgers. This ensures integrity of the data is always maintained**.**

VIII. **References**

1 .P. Tasatanattakool and C. Techapanupreeda, "Blockchain: Challenges and applications," (2015) .

2. V. Lemiex, . 'A typology of blockchain record keeping solutions and some
reflections on their implications for the future of archival preservation." (2015).

3. M. Vinayak, H.A.P.S. Panesar. and S. dos Santos. "Analyzing Financial Smart Contracts for Blockchain.- and others. Ed. (2017).

4. S. Wang.Y.Yuan- and X-Wang. "An Overview of Smart Contract: Architecture, Applications. and Future Trends." and others. Ed. (2018)

5. S. Singh and N. Singh. "Blockchain: Future of financial and cyber security." (2016).

6. A. and S. Chowdhury, "Development of digitalization of leased land in Bangladesh." (2015).

7. M. Afanasev. Y. Afanasev. A.A.K. Sergye. and Shorokov. Land Registry using Blockchain." (2017).

8. L. Ouyang.. Y.Y.X.N.X. Han. and . F.-Y Wang, "Blockchain-Enabled Smart Contracts: Architecture. Applications. and Future Trends."(2016)

Emoticon Suggestion System Using Natural Language Processing

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Abstract*—Emojis are a very important part of communication in today's world. It is used to express emotions during a conversation. Building a system which can suggest emoticons based on the text provided can be very useful. It can be used to express emotions efficiently and easily. While dealing with the semantics of the sentence it can be used to predict the emotion in the sentence and emojis can be predicted accordingly. In our project the system identifies consistent information related to emotions and different things and it is updated with all the latest additions to the text manipulation dataset. Using tools such as data mining techniques and the project focuses on suggesting emoticons.There are hundreds of emoticons which can be used to express the meaning of words contained in sentences or inputs. These emoticons when used correctly can be very useful. It makes sentences more understandable and appealing. A system which can help in quoting the correct emoji into a sentence easily can be very useful in today's world. It can be used to quickly decide which emojis to add to express emotion correctly. The main aim of this project is to provide as many emoji suggestions as possible by analyzing the sentence provided.

.Keywords—Emoticon,Suggestion,Semiotic, Recommendation,Expression,N-GRAM.

1. Introduction

Living in the world of social media conversation through text and messages play a very important role. In each and every aspect of life for communication messages are used. It is very important to frame the messages correctly so that the meaning of the message is conveyed to the point. At this stage the role of emoticons comes into existence. With the use of accurate emojis the meaning of the message can be conveyed easily. Picking the correct emojis from a list is a time consuming task. So an emoticon suggestion system can be of great help for effective communication.

Use of emoticons can be very useful as the type of emotion expressed in the sentence can be clearly quoted. Emoticons make sentences more lively and appealing. With text based communication being a very important part of our day to day life a suggestion system can help in making this work easier.

2. Literature Survey

A.Emoticon Recommendation System Reflecting User Individuality A Preliminary Survey of Emoticon Use (Taichi Matsui and Shohei Kato)-The research and survey done in this paper shows that the way of using emoticons for each individual differs widely. Dividing the emoticons into different clusters and predicting the emojis further according to the cluster the selected emoji belongs to makes the prediction easier. Each individual has a different way of using emoticons. With the help of division of clusters the way of use by different individuals can be predicted. The survey done in this paper shows how a limited number of people prefer using emojis by observing the statistics of their connection circle.

B.Emoticon Suggestion based on Recurrent Neural Network (Dineshika Dulanjalee Wijerathna)-This paper suggests using recurrent neural networks for the prediction of emoticons. In this approach there would be

a recurrent neural network which would consist of the first layer, the hidden layer and the last layer. When the user uses any emoticon, its sequence would be recorded and thus one of the neurons in the first layer would hold the value of that emoticon. Based on the number of times the emoticon is used in that particular sequence, the weightage of that neuron would increase. Many such neurons would be holding different values or different sequences in which emoticons were used. When the user types a sentence, its sequence would be used to predict the emoticon. Out of all the sequences of sentences and emoticons used previously, the most likely emoticon would be suggested.

C.Impact of Semiotics on Multidimensional Sentiment Analysis on Twitter: A Survey (Darsha Chauhan, Kamal Sutaria and Rushabh Doshi)-Sentiment Analysis plays a very important role in any text based prediction system. In this paper the research is done on sentiment analysis in which text based input is processed to find the sentiments related to the input. In this method the keyword extraction of the given text is done. Each keyword shows the sentiment related to it from the dataset. Analysis based on the sentiments extracted from the input is further used to describe the complete sentiment of the given input.

D.Emoticon Recommendation System for Effective Communication. (Yuki Urabe, Rafal Rzepka and Kenji Araki)-This paper used the ML Ask approach. In this approach the system separates the emotive utterances from non emotive utterances. This utterance is then used for determining the emotive utterance. The different emotive utterance that it uses are joy, delight, anger, excitement, sadness, gloom, liking, fear, relief, dislike, surprise, amazement and shyness. This system is said to produce an accuracy of 71.3%.

E.Research on Building Chinese Micro-Blog Semantic Lexicon (Bin Wen, Ping Fan, Wenhua Dai, Ling Ding)-In this paper the text input is classified into different classes based on the text which include positive, negative, disgust, happiness, sadness etc. Micro blog semantic helps in dividing the given sentence into these classes. With division into different classes, the type of a particular sentence can be identified. It includes supervised classification of sentences according to the type of sentence based on the given data for learning.

F.Psychological Analysis of Emoticons Used for E-mails on Cellular Phones (Yasutaka Toratani, Makoto J. Hirayama)-In this paper the use of sentiment score is taken into consideration. Like the hit ratio of each emojis the number of times an emoji is used in the means of communication is taken into consideration. With the use of each emoji the sentiment score is increased this results in the creation of a pattern which can project the use of emoticons. As the number of times an emoticon is used increases the sentiment score increases which helps in the further prediction of the emoticons which will be used by the user.

G.Exploiting Emotion on Reviews for Recommender Systems (Xuying Meng, Suhang Wang,Huan Liu and Yujun Zhang)-Discusses how to model emotion in global and local perspectives using the two assumptions i.e, one in which we weigh the importance of each rating based on global emotion information from all users, and predict each individual's preference based on local emotion information from the user himself.We propose

a new framework guided by the two assumptions which integrates emotion information to matrix factorization based recommender systems.

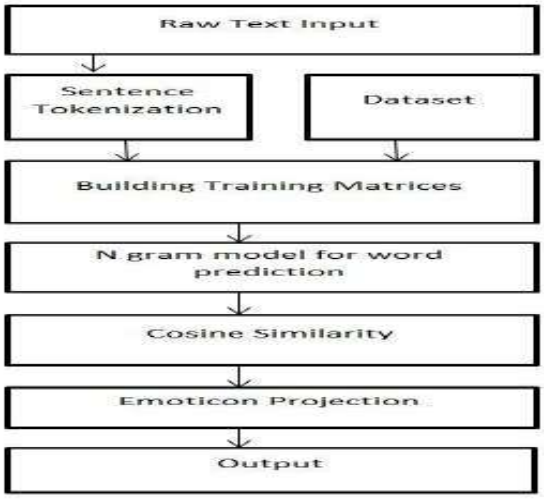
H.The Importance of Understanding Emoji: An Investigative Study (Shatha Ali A Hakami)-Understand the influence of emoji on people's real lives by reviewing studies in three aspects of human science psychology,sociology and linguistics alongside some health and marketing studies.It also studies the global popularity of using emoji and its meaning in different contexts, followed by some emoji technical implications.

3. Proposed Work

Our System will take raw text as input and process the words and convert it into tokens. These tokens are then processed to compare with the emoticon dataset. Finally emoticon unique code will be suggested and displayed to the user.

3.1 System Architecture

The system architecture is given in Figure 1. Each block is described in this Section.



Fig(1):Proposed System Architecture

A.Raw Text Input: This will be the input which is provided by the user of the system. It can consist of any type of sentences which are used in the day to day life. This text will act as the input to the system. To test the system the input should consist of keywords which can be represented using existing emoticons. Though in normal life scenarios text input can be any data but for a system to provide emoticon data should be relevant data.

.

B.Word Prediction: Provides the ability to autocomplete words and suggests predictions for the next word. This makes typing faster, more intelligent and reduces effort.

C.Input Dataset: GloVe file is used to condition and map emoticon description provided in emoticon dataset with the glove vectors. It is an unsupervised learning algorithm for obtaining vector representations for words. Training is performed on aggregated global word-word co-occurrence statistics from a corpus, and the resulting representations showcase interesting linear substructures of the word vector space. A dataset of emoticons consists of emoticon description and their respective unicodes. The emoticon dataset has a high bias towards american culture.

D.N-Grams Model:Probabilistic models are used for computing the probability of an entire sentence or for giving a probabilistic prediction of what the next word will be in a sequence. This model involves looking at the conditional probability of a word given the previous words

E.Emoticon Projection: The input data is vectorised to compare with the map of glove vector and emoticons. The system uses cosine similarity method to compare the data with each vector in the map and then find the vector to which it is closest to i.e having the highest cosine similarity. The data is converted to emoticons if its cosine similarity crosses the provided threshold value.

4.Requirement Analysis

The implementation details are given in this section.

4.1 Software Details

SN	Software	Specifications
1.	Operating System	Windows 10 Creator
2.	Programming Language	Python

4.2 Hardware Details

SN	Hardware	Specifications
1.	Processor	2.8 GHz Intel i5
2.	Hard Disk	1 TB
3.	RAM	4 GB
4.	VCard	2 GB

4.3 Dataset and Parameters

1.Emo_uini

An experiment is conducted in order to identify the input/output behavior of the system. Identify inputs. Specify the sample inputs that would be used in the experiments. The sample dataset used in the experiment is identified.

#	column_a	code	browser	cldr_short_name
1556	U+1F983			turkey
1557	U+1F414			chicken
1558	U+1F413			rooster
1559	U+1F423			hatching chick

2. Brown Corpus:

The Brown Corpus was the first million-word electronic corpus of English, created in 1961 at Brown University. This corpus contains text from 500 sources, and the sources have been categorized by genre, such as *news*, *editorial*, and so on.

ID	File	Genre	Description
A16	ca16	news	Chicago Tribune: Society Reportage
B02	cb02	editorial	Christian Science Monitor: Editorials
C17	cc17	reviews	Time Magazine: Reviews
D12	cd12	religion	Underwood: Probing the Ethics of Realtors

Conclusion

Developing a system helps to make some tasks easier. The same way an emoticon suggestion system can be of great use in the world of texting.It has the ability to autocomplete and predict the next word based on the previous words which will increase the speed of typing and increase the efficiency of the system hence making the system more intelligent. The system will increase the statistics of use of emoticons in conversation. With a prediction system the manual task of selection of emojis is reduced. This increases the use of unused emoticons.

With the use of accurate emojis the meaning of the message can be conveyed easily. Picking the correct emojis from a list is a time consuming task. So an emoticon suggestion system can be of great help for effective communication.

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REFERENCES

1. Urabe, Yuki & Rzepka, Rafal & Araki, Kenji, "Emoticon Recommendation System to Richen Your Online Communication", International Journal of Multimedia Data Engineering and Management (IJMDEM),Vol. 5,No.1, June 2014
2. Taichi Matsui and Shohei Kato,'Emoticon Recommendation System Reflecting User Individuality-A Preliminary Survey of Emoticon Use' ,ICAART, 2017
3. Dineshika Dulanjalee Wijerathna, 'Emoticon Suggestion based on Recurrent Neural Network', University of Moratuwa, 2017
4. Darsha Chauhan, Kamal Sutaria and Rushabh Doshi,'Impact of Semiotics on Multidimensional Sentiment Analysis on Twitter: A Survey', IEEE,2018
5. Yuki Urabe, Rafal Rzepka and Kenji Araki, 'Emoticon Recommendation System for Effective Communication', IEEE , August 2013
6. Bin Wen, Ping Fan, Wenhua Dai, Ling Ding, 'Research on Building Chinese Micro-Blog Semantic Lexicon', MEC, 2013
7. Yasutaka Toratani, Makoto J. Hirayama, 'Psychological Analysis of Emoticons Used for E-mails on Cellular Phones', IEEE, October 2011
8. Jeffrey Pennington,Richard Socher & Christopher D. Manning, 'GloVe: Global Vectors for Word Representation'[Online].Available: https://nlp.stanford.edu/projects/glove/
9. Medium.com,'Using Perplexity to Evaluate a Natural-Language Model',[Online].Available: https://medium.com/@davidmasse8/using-perplexity-to-evaluate-a-word-prediction-model-8820cf3fd3aa
10. Jaysidh Dumbali, Nagaraja Rao A. ,'Real Time Word Prediction Using N-Grams Model',International Journal of Innovative Technology and Exploring Engineering (IJITEE) , Volume-8,Issue-5, March 2019.
11. Xuying Meng, Suhang Wang, Huan Liu and Yujun Zhang,'Exploiting Emotion on Reviews for Recommender Systems'
12. Shatha Ali A Hakami,'The Importance of Understanding Emoji: An Investigative Study',2017.
13. Alison P. Ribeiro and Nadia F. F. da Silva,'#TeamINF at SemEval-2018 Task 2:Emoji Prediction in Tweets ',2018
14. Ruobing Xie1 , Zhiyuan Liu1 , Rui Yan2 and Maosong Sun1,'Neural Emoji Recommendation in Dialogue Systems',2016

Sign Language To Text Converter System

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Abstract— The Sign Language is the primary medium used by speech or hearing impaired people so as to communicate with rest of their peers. Sign language is how specially abled persons express their emotions. In this project we will create an interface where the video input will be taken and hand gestures will be recognized to find the hand region by eliminating all other unwanted portion in video with the help of OpenCV. In the first part we make a classifier model using the Keras implementation of convolutional neural network using python [1]. Based on this approach the results are predicted and the word is obtained. The Word Segmentation module that includes techniques like dividing the text, parsing, scoring and segmenting will be used in the next phase to obtain the final textual output which corresponds to the sign provided as input. There are almost 138 to 300 sign languages used across the globe. We would be using the American Sign Language(ASL) that uses single handed gestures as the input and generate the corresponding letters or text in English.

Keywords—OpenCV, CNN, Word Segmentation, Parsing

I. INTRODUCTION

The project will create an interface where the video input is taken and hand gestures will be recognized . OpenCV is used to find the hand region by eliminating all other unwanted portions in the video and it will be further processed and stored. The second phase of the project will focus upon the NLP techniques. The word segmentation module provided by natural language processing which includes techniques like parsing, scoring and segmenting is used to obtain the final output which is the text that corresponds to the language. American Sign Language (ASL) is used and that uses single hand gestures as the input and generate corresponding text or letters in English language. A deep learning approach will be used which can classify the sign using the convolutional neural network. In the first part we make a classifier model using the Keras implementation of convolutional neural network (cnn) using python . In the next phase another real-time system which used skin segmentation to find the Region of Interest in the frame which shows the bounding box. The segmented region is fed to the classifier model to predict the sign [1].

II. LITERATURE SURVEY

A. Feature extraction and Selection

It is observed that the authors have followed the classical machine-learning workflow. Each of the 12 datasets used was randomly shuffled 10 times. The differences between the results were quantified using statistical methods on the 12 databases, 10 shuffles, 4 folds, 12 classifiers which gives a total of 5760 measurements. In 8 cases of classifiers out 12, the greedy search leads to the worst classification results.The largest PCC values were obtained by evolutionary algorithms, reranking search, linear forward selection, the tabular search[7].

B. Digital image processing

The research team observed that large number of image processing applications, tools and techniques helps to extract complex features of an image. Image processing works on single dimensional image to multidimensional and see what actually in the image. Image processing is the really important for developing technologies in the real time aspect. This paper discusses the overview of an image processing applications, tools and techniques.But OpenCv

is the optimal tool used as it provides all the basic algorithm[9].

C. Parsers and Parsing Approaches

It is observed that the dependency parsers constructed using the dependency parsing technique can be quite helpful as can serve as resources for various research purposes. In this method the sentence is given as input to the system and an output is produced which is basically a dependency tree.The Paninian framework is the basis that can be used for parsing English language. It can also be understood that for the Indian languages the same framework can be used however with much better accuracy results.From the research of the authors it is also observed that Minipar Parser performs worse as far as the quality of the results are concerned while the MST parser is very complex machine learning approach.The major advantage of this framework is that its offers good performance and produce all the grammatical information of the sentences.The major advantage of the dependency parser is that it resolves ambiguity to a great extent[4].

D. Sign Language using Convolutional Neural Network

CNNs takes its inspiration from the visual cortex of the human brain. The artificial neurons connects to a region called a receptive field. This is obtained by performing discrete convolutions on the image with filter values as weights that are trainable. More than one filters are applied for each channel, and together with the activation functions of the neurons, they form what is called a feature maps. This is followed by a scheme of pooling , where only the interesting information of the feature maps are clubed together. These techniques are performed in multiple layers[1].

E. Extraction Of Features from an image

Feature extraction is finished once the preprocessing inovate character recognition system. the first task of pattern recognition is to require Associate in Nursing input pattern and properly assign it as one of the potential output categories. This method maybe categorized into 2 general stages: Feature selection and Classification. It is vital to the entire process since the classifier won't be able to acknowledge from poorly hand-picked options. As patterns have totally different orientation, styles etc., numerous image preprocessing techniques area unit applied first off. mistreatment this paper, a quick overview of feature extraction techniques could also be taken and it may be determined that that feature extraction technique can be higher for the work to be done supported complexness, type of image (e.g. grey, color image)[6].

III. PROPOSED WORK

The process of taking in the hand gestures as inputs requires algorithms that produces an accurate output that is the corresponding text to the hand gesture. The proposed architecture is a six step process that starts from taking in input followed by the preprocessing state and the NLP techniques to obtain the final textual output.

3.1 System Architecture

The system architecture is given in Figure 1. Each block is described in this Section.

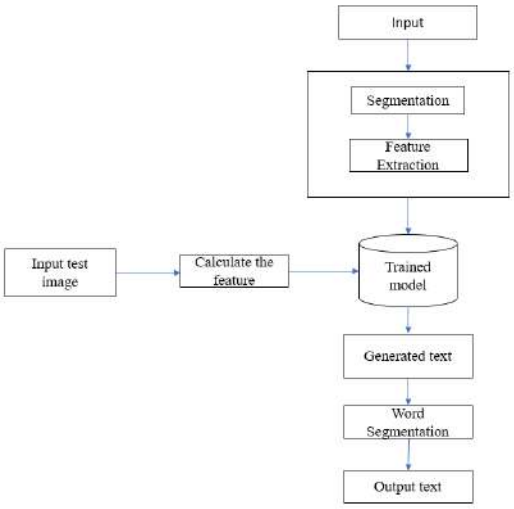

Fig.1 Proposed system Architecture

A. Input : The first step is to provide the input sign on which all the further processes needs to be carried out to obtain the desired result.

B. Preprocessing: Preprocessing is concerned with the task of removing unwanted noises from the input provided. The preprocessing consists of Segmentation, Feature Extraction and Image Detection.Segmentation refers to the

process of partitioning the images into different segments. Here segmentation includes separation of the background and other such undesired parts from the captured images. Preprocessing is concerned with the task of removing unwanted noises from the input provided. The preprocessing consists of Segmentation and Feature Extraction. Segmentation refers to the process of partitioning the images into different segments. Here segmentation includes separation of the background and other such undesired parts from the captured images

C. Image Classification: After the preprocessing stage, the image that is obtained is compared with the images present in the sample gestures dataset. The dataset contains multiple images for the signs. The image generated is compared with these images. If it matches with the image already stored, it can be carried ahead for further processing ,otherwise the generated image would be discarded. The CNN classifier is trained and used in this procedure.

D. Word Segmentation: The final stage of processing is word segmentation. It is carried out to obtain proper and meaningful sentences that corresponds to the input that was provided. Word segmentation means the problem of dividing a string of written language into its component words. This is done with the word segment which is an Apache2 licensed module for English word segmentation, written in pure-Python, and based on a trillion-word corpus.[11]

E. Output: The segmented words are taken as the meaningful output text.

IV . METHODOLOGY

The image processing, classification and segmentation is done with the help of Convolutional Neural Networks (CNN) and Word segmentation is used on the generated text from CNN.

4.1 CNN Algorithm

1.Start with an input image.

2.Apply filters or feature maps to the image, which gives us a convolutional layer.

3.The image become ready for the pooling step, the purpose of which is providing our convolutional neural network with the facility of “spatial invariance”.

4.After we are done with pooling ,we end up with a pooled feature map.

5.Then flatten our pooled feature map before inserting into an artificial neural network.

4.2 Word Segmentation

Word segmentation is the process of dividing written text into meaningful units, such as words, sentences, or topics. As the generated text from the CNN part does not contain any spaces between the words, we use WordSegment module which is an Apache2 licensed module for English word segmentation, written in pure-Python, and based on a trillion-word corpus, to generate meaningful text as output.

The word segment module provides the following functions

Clean and Divide: This function eliminates all non-alphanumeric characters. The divide function yields the prefix and suffix pairs from the text with length of prefix not exceeding the limit.

Load: The load function loads all the unigram and bigram counts from the disk. The unigram data includes the most commonly used 333,000 words. Similarly, bigram data includes only the most commonly used 250,000 phrases. Every word and phrase is lowercase+ and the punctuations are removed.

Parse: In this stage parsing is done. This function reads and parses the tab separated file word and count pairs.

Segment: Finally a list of words is returned that is the best segmentation of the text that is generated.

Output: The segmented words are taken as the meaningful output text.

V. SAMPLE DATASET

The sample dataset used for the experiment is shown in the Table 5.1 below. For the actual implementation the dataset used consisted of all the 26 alphabets of the English language.

Table 1. Sample Dataset

Alphabets	Gestures
A	

B	
C	
D	
E	

VII. EXPERIMENTAL OUTPUT

Some random letters, words and sentences were generated and the outputs of the same were captured to give a better understanding of the working of the project.

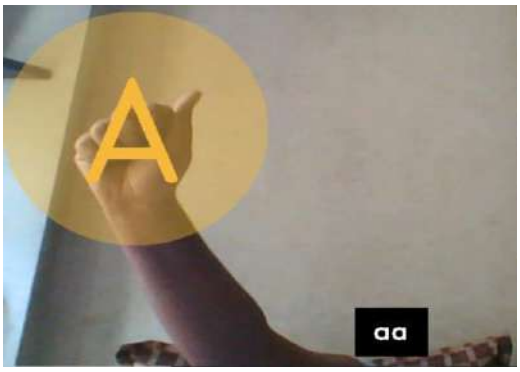

Fig. 2 Letter A

Fig. 3 Word- Hope generated

Fig. 4 A Sentence generated

VIII. RESULT ANALYSIS

In order to evaluate the proposed system, experiments were conducted on the data to test the accuracy of the alphabets present in the dataset. The data was divided into 200 epochs to evaluate the loss or accuracy and thus 80% training data and 20% testing data was used for the evaluation purpose. It was observed that there existed difference in the accuracy of different letters present. To test this accuracy we performed the experiment on 50 samples of each letter from A to Z on a simple background and observed the number of times correct response was generated for each of these 26 alphabets present in our dataset.

Table 2. Accuracy of Alphabets

Alphabets	Accuracy (in %)
A	85
B	94
C	90
D	90
E	92
F	90
G	89
H	92
I	89
J	95
K	90
L	98
M	88
N	85
O	100
P	95
Q	90
R	96
S	88
T	97
U	92
V	96
W	94
X	91
Y	95
Z	86

Based on the above analysis, the graph is generated which displays the accuracy per alphabet.

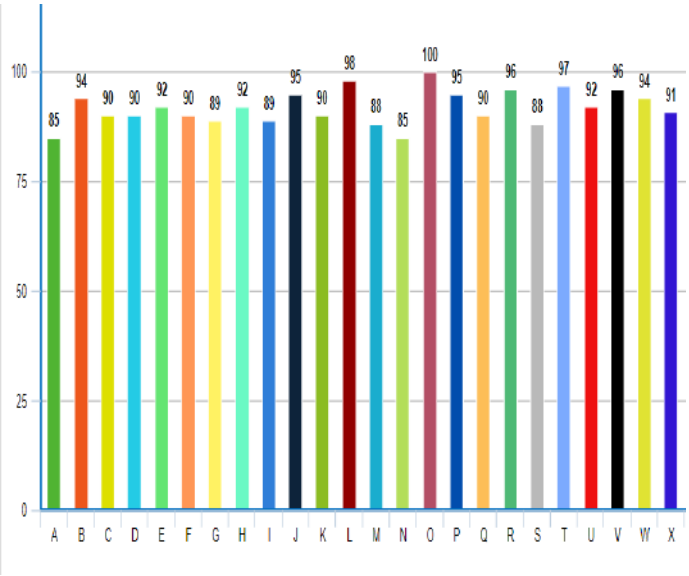

Fig. 5 Bar graph for result analysis

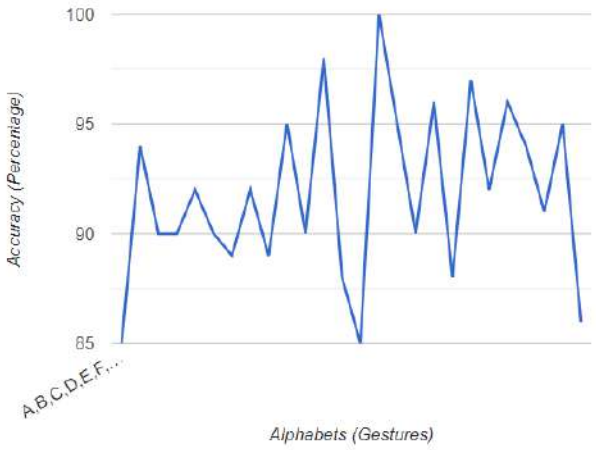

Fig. 6 Line graph for analysis

IX. CONCLUSION

The project Sign language to text converter system aimed at reducing the communication gap that exists between the specially abled people and the rest. The converter system is developed in two phases, the first phase involves Image processing and the next phase involves Natural Language Processing. The gesture input is taken in from the user. The signs used in the project is from the standard sign language called the American Sign Language(ASL). This input then undergoes the various stages of image processing namely segmentation, feature extraction and classification. The CNN is used for classification purposes. The gesture thus processed is compared with the sample dataset. If the gesture and image matches the further procedure to obtain the final results can be carried out. For the NLP part the word segmentation modules provided by NLP is used thus the words or sentences corresponding to the input gesture is finally obtained. The different standard datasets or variable inputs are defined that may be used in experiment for this domain systems. This domain has various applications like in B2B setting, Video call features and also removes the need of interpreters.

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REFERENCES

[1] Madalina Cosmina Popescu, Lucian Mircea Sasu, "Feature Extraction, Feature selection and Machine Learning for Image Classification: A case study",(2018)

[2] Gaurav Kumar, Pradeep Bhatia,"A Detailed Review of Feature Extraction in Image Processing Systems",(2017).

[3]G.Anantha Rao, K.Shyamala , P.V.V.Kishore, A.S.C.S.Sastry ,"Deep convolution Neural Networks for Sign Language Recognition ", (2018).

[4] Lionel Pigou,Sander Dieleman,Pieter-Jan Kindermans and Schrauwen, "Sign Language Recognition Using Convolutional Neural Networks",(2014).

[5] Dr V. Arulmozhi,"Digital Image Processing-A Quick Review",(2015).

[6] Timothy G. Wade , James D. ,"Mapping patterns with morphological image processing",(2015).

[7] Elisa Sibarani,MhD.Nadial,Evy Panggabean,"A Study of Parsing Process on
Natural Language processing ",(2015).

[8] Amita Rani,Komal Mehla,Ajay Jangra,"Parsers and Parsing Approaches:Classification and State of the Art",(2015).

[9] Sampada Wazalwar,Urmila Shrawankar,"Interpretation of sign language into English using NLP techniques",(2013).

[10]Sayli Dixit and Urmila Shrawankar,"Framing Sentences from Sign Language Symbols using NLP ISBN-13:978-93-5260-126-4"(2013).

[11] https://textprocessing.org/getting-started-with-python-word-segmentation

[12] https://norvig.com/ngrams/

[13] https://ai.googleblog.com/2006/08/all-our-n-gram-are-belong-to-you.html

[14] https://catalog.ldc.upenn.edu/LDC2006T13

[15]https://www.quora.com/What-is-max-pooling-in-convolutional-neural-networks

[16]https://www.superdatascience.com/blogs/the-ultimate-guide-to-convolutional-neural-networks-cnn

Lie Detection System using Machine Learning

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***Abstract*—There exist different methods of detecting lies. Machine learning can be used to create a reliable and efficient system to detect lies. The objective of this project is to use speech, natural language processing techniques and facial cues to determine whether an individual is lying, given a video and audio recording of them speaking. We are using nonverbal human behaviors to detect lies using machine learning. We used Columbia-SRI-Colorado (CSC) corpus for identifying deception. We extracted acoustic, lexical, and prosodic features and fed them into several machine learning models (e.g. logistic regression, a support vector classifier, and a recurrent neural network) to search for speech patterns correlated with lying. This lie detection system is also based on micro-expressions of human beings which uses Facial Landmark Detection System and Azure Machine Learning. Movements of individual facial muscles are recorded while a person answers some certain questions. By using the two algorithms Two Class Support Vector Machine and Linear Regression, we attempted to create a machine that can detect lies.**

I. INTRODUCTION

Over the years, people have built many machines and software to detect lies. These traditional lie detectors rely upon calculating changes in a person's blood pressure, heartbeat/pulse, respiration and skin conductivity. These methods determine abnormal behavior within a person and thus come to the conclusion if that person is lying or not. However, this procedure is quite weak as it only measures comfort level rather than lie detection. Moreover, it can easily be cheated by people who have professional training in hiding their discomfort. This is why we have introduced artificial intelligence in this affair for better lie detection. By using machine learning, we can determine the facial movements and micro-expressions of a person when he/she is telling the truth and when he/she is telling a lie. Firstly, the idea is to ask the person some common questions of which the answers will be known to us, this is for the AI to gain some data of that person's visual morphology as everyone has different facial expressions. Later when we actually want to know if the person is lying or not, the machine will analyze the person's micro-expressions and facial movements such as eyebrow movement, lip positioning and so on, and compare the newly obtained information with the previously stored data, it will come to a conclusion if that person is actually lying or not. This method is far more superior and efficient than traditional polygraph and it is sure to produce more accurate results providing a proper implementation. In addition to advances in lie detection, research in automatic sentiment and emotion detection using speech patterns has gained significant traction in recent years, and has many potential applications, ranging from detecting depression and stress to frustration and anger.

II. PROBLEM DEFINITION

Lie detection is an evaluation of a verbal statement with the goal to reveal a possible intentional deceit. Lie detection can also be called as a cognitive process of detecting falsehood which is done by evaluation of message content as well as non-verbal cues. It also may refer to questioning techniques used along with technology that record physiological functions to ascertain truth and falsehood in response. There are a wide variety of technologies available for this purpose and the most common and long used measure is the polygraph. A polygraph test, in quintessence, measures one thing that is anxiety or consternation. But a polygraph test can sometimes be correct, and sometimes be wrong.As per the Controlled lab studies, it was found that the tests are generally capable of correctly identifying a person lying at rates greater than chance, but also incorrectly indicate that a whole lot of honest people are lying too. And the trials are flawed, because they depend on people's responses to mock crimes, which probably don't reflect real-world emotions. When accused of an actual crime, many people tend to become anxious, even if they're speaking the truth and are innocent.

III. LITERATURE SURVEY

During the Literature survey we collected some of the information about lie detection mechanisms currently being in use.

A. First method for lie detection was used in China 1000

BC by spitting out rice

The suspected person who is lying was required to fill his/her mouth with a handful of dry rice. After a while, s/he was to spit out the rice. If the expectorated rice remained dry, the suspect was found guilty of fraud. On the basis of physiological principle, and the assumption that experiencing fear and anxiety is accompanied by decreased salivation and a dry mouth.

B. Polygraph

Lie detection as a technique of investigating guilt has been around for years. Though the orthodox techniques are manual and depend mostly on the analysis of the human who is acting as an investigator. The most popular technique of lie detection is with the help of a polygraph. Polygraph measures and records a few physiological pointers, for example, blood pressure, heartbeat, breathe, and skin conductivity. We can say that the hypothesis/theory this strategy stands on is that suspicious or misleading answers will create physiological reactions that can be separated from those related to non-misleading answers. But the problem with polygraph is, it is a highly expensive approach and it is highly invasive.

C. Lie detection using Voice Stress Analysis.

Computer Voice Stress Analysis (CVSA) and Voice stress analysis (VSA) are together a pseudoscientific technology that aims to deduce deception from stress measured in the means of voice. The CVSA uses a microphone which records the human voice and the technology is based on the principle that the non-verbal, low-frequency content of the voice fetch information about the physiological and psychological state of the desired speaker. Usually utilized in settings based on investigation, which aims to differentiate between stressed and non-stressed outputs in response to stimuli (e.g., questions posed), with high stress seen as an indication of deception.

D. Using Machine Learning for Lie Detection: Classification of Human Visual Morphology

By using machine learning, we can determine the facial movements and micro-expressions of a person when he/she is telling the truth and when he/she is telling a lie. Firstly, the idea is to ask the person some common questions of which the answers will be known to us, this is for the AI to gain some data of that person's visual morphology as everyone has different facial expressions. Later when we actually want to know if the person is lying or not, the machine will analyse the person's micro-expressions and facial movements such as eyebrow movement, lip positioning and so on, and compare the newly obtained information with the previously stored data, it will come to a conclusion if that person is actually lying or not.

IV. EXISTING SYSTEM

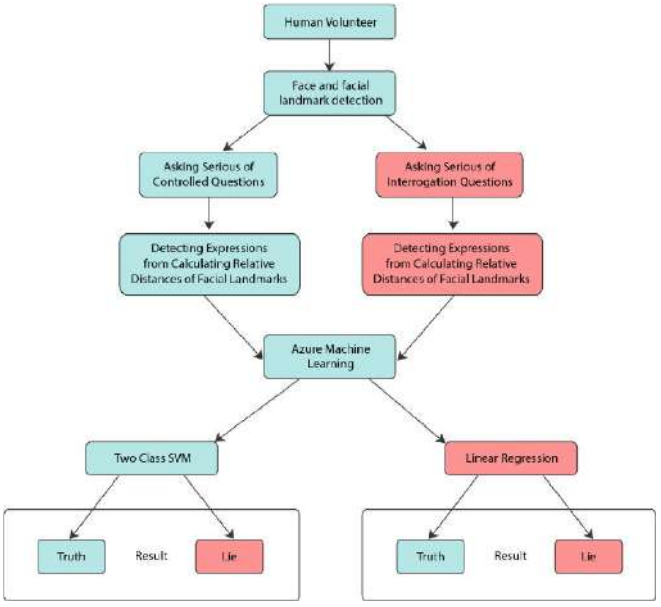
Methodologies:

A. Polygraph

A polygraph also well-known as a lie detector test, is a device that measures and keeps the track of several physiological indicators such as pulse respiration, blood pressure and conductivity of skin when a person is asked and answers a series of questions. The belief that holds up the utilization of the polygraph is that false/deceptive answers will produce physiological responses which will be different from those related to non-deceptive answers. However, there are no specific physiological reactions associated with lying, making it very tough to identify factors that separate liars from the ones who tell the truth. Polygraph examiners also lay on the fact that to use their own individual scoring method, against computerized techniques, as they may more easily defend their own evaluations. In polygraph the examiner usually starts polygraph test sessions with a pre-test interview in order to gain some introductory information which later can be used to develop diagnostic questions. Then the tester will explain how the polygraph will work, by focusing on the fact that it can detect lies and that it is important to answer truthfully. Then a "stim test" is conducted every often: the subject is asked to deliberately lie and then the tester reports that he was able to detect this lie.

B. Facial Morphology

Detecting lies is crucial in many areas, like airport security, police investigations, counter-terrorism, etc. One technique using which lies can be detected is through the identification of facial micro-expressions, which are brief, involuntary expressions shown on the face of humans once they struggle to cover or repress emotions.Measuring of micro-expressions manually is hard labor, time consuming, and not precise in nature. By using machine learning, we'll determine the facial movements and micro-expressions of a private when he/she is telling the truth and when he/she is telling a lie. Firstly, the thought is to ask the person some common questions of which the answers are getting to be known to us, this is often for the AI to understand some data of that person's visual morphology as everyone has different facial expressions. Later once we actually want to know if the person is lying or not, the machine will analyse the person's micro-expressions and facial movements like eyebrow movement, lip positioning then on, and compare the newly obtained information with the previously stored data, it'll come to a conclusion if that person is basically lying or not.



C. Detecting Lies via Speech Patterns

When someone is lying to you, they'll begin to breathe heavily. The liars are out of breath because their pulse and blood flow change. The body experiences these sorts of changes when an individual is nervous. As a result they could speak during a higher pitched voice (as vocal cords tighten) and sometimes clear their throat (as saliva dries up). during this speech and tongue processing techniques were wont to determine whether a private is lying, given an sound recording of them speaking. Using the Columbia-SRI-Colorado (CSC) corpus, we extracted acoustic, lexical, and prosodic features and fed them into several machine learning models (e.g. logistic regression, a support vector classifier, and a recurrent neural network) to look for speech patterns correlated with lying.

V. PROPOSED SYSTEM

a. Methodology

Rather than using physiological indicators like vital sign , pulse, respiration, and skin conductivity, we'll be using psychological indicators like nonverbal behavior (micro-expressions), voice stress and eye-tracking for classification. This technology measures pupil dilation, reaction time , reading and rereading time, and errors. Data is recorded while subjects answer true or false questions on a computer. they need found that more effort is required by lying than giving the reality and thus their aim is to seek out indications of diligence . Individuals not telling the reality might, as an example , have dilated pupils while also taking longer to answer the question. Voice stress analysis (also called voice risk analysis) uses computers to match pitch, frequency, intensity and micro tremors. during this way voice analysis detects minute variations within the voice thought to signal lying. However, its reliability has been debated by critique journals. When an individual lies, an involuntary interference of the nerves causes the vocal cords to supply a distorted acoustic wave , namely a frequency level which is different from the one produced by an equivalent person when telling the reality . People often evaluate lies supported non-verbal behavior, but are quick to put an excessive amount of merit in misleading indicators, such as: avoidance of eye contact, increased pauses between statements, and excessive movements originating from the hands or feet.

The emotional-based approach has its roots in Darwin's book, The Expression of Emotions in Man and Animals, where he proposed a famous theory called the inhibition hypothesis: some facial actions that are the foremost difficult to make voluntarily also are the toughest to be inhibited. Further development during this direction was made in 1980 by Ekman et al., who reported an inventory of Action Units (AUs)4. Each AU is said to the movement of one skeletal muscle and may produce motion of a facial part or appearance changes during a facial region. supported Darwin's inhibition hypothesis, AUs like sadness (AU1+AU4) are hard to inhibit. Therefore, AUs are shown to be potential indicators for distinguishing liars from truth-tellers in high-stakes situations, supporting the existence of micro-expressions. Now the implementation for micro-expression includes 68 facial landmarks which is predicated on the iBUG 300-W dataset, which the dlib facial landmark predictor was trained on.

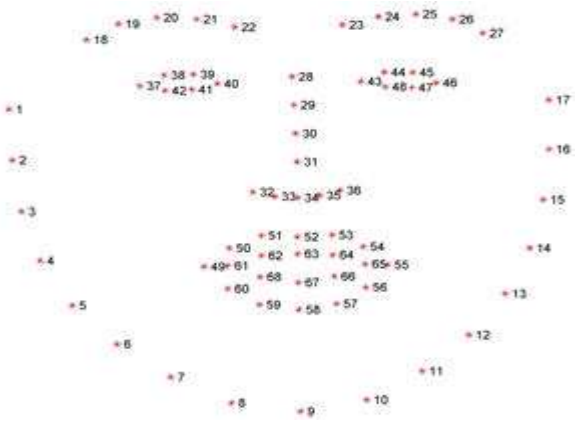


Figure 2: 68 facial landmarks detected via dlib.

For eye blinking Eye ratio is employed as a metric. There are 6 facial landmarks related to the attention . For each video frame, the attention landmarks are detected. the attention ratio (EAR) between height and width of the attention is computed.The advantage of using EAR rather than traditional image processing methods should be evident: firstly, we avoid both eye localization and thresholding to seek out the white of the eyes and, secondly, we don't got to determine whether the "white" region of the eyes disappear for a period of your time (indicating a blink) or not.

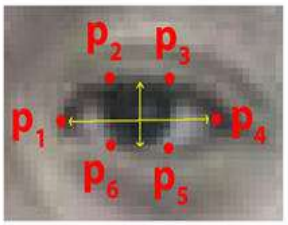


Figure 3: 6 facial landmarks of the eye.

b. System Architecture

In the proposed model, we will be using all three non-physiological features for identifying if someone is lying or not. The queues or features or indicators include facial expression, eye ball movement and voice stress. By doing so, we will be eliminating drawbacks of existing models by combining the advantages of all. As input a video will be given as input from which video and voice will be segregated. Then using facial expressions identifier, we will try to identify deception. Parallelly we will be processing voice input, and will try to find deception through that too.

Working:

- A well-planned set of questions will be asked and the answers to the questions will be recorded.
- First basic questions will be asked to identify the resting facial structure and voice of the culprit.
- Later on, the questions will be directed on the topic for which deception is needed to be checked.
- The facial classifier will identify the facial cues given by the culprit.
- Also, the culprits voice pitch, frequency and intensity will be compared with the observed rested data recorded earlier.

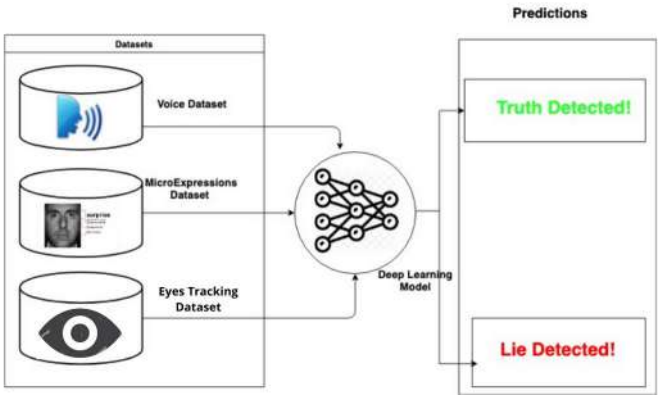


Fig. 1.3 System Architecture

Description: Input will be collected and all necessary features will be extracted from the input. These extracted features will be used for identification of deception.

VI. METRICS

Precision: A measure of exactness, the fraction of relevant items retrieved out of all items retrieved. Precision (P) it's given in Equation 2.1.

$$P = \frac{TP}{TP + FP} \tag{2.1}$$

Recall: A measure of completeness, determines the fraction of relevant items retrieved out of all relevant items. Recall R is given in Equation 2.2.

$$R = \frac{TP}{TP + FN} \tag{2.2}$$

Accuracy: it's the ratio of the amount of correct predictions to the entire number of input samples. It works well as long as there are an equal number of samples belonging to every class .

$$Accuracy = \frac{Number\ of\ Correct\ predictions}{Total\ number\ of\ predictions\ made} \tag{2.3}$$

The performance has been evaluated not only in terms of the numbers of correctly classified blinks (true positives), but also considering the important cases when a video frame was misclassified as a blink (false positives) or when a blink was missed (false negatives). The SVM blink detector was first validated on some videos from the iBUG 300-W dataset and its performance was therefore compared with the OpenCV blink detector. The aim of this stage was to test the two system's blink detection ability, independently of variations in pose, expression, illumination, background, occlusion, and image quality.

VII. RESULTS

Here we report the two most significant results obtained not only from a lie detection
point of view, but also in terms of accuracy when there is the combined force of all three approaches which includes datasets which we have used.

As per the working of all the three approaches in our project, the very first-time evaluation will be done on the basis of voice morphology where the pitch, frequency of voice and the intensity at which the person speaks would be tested and evaluated. Further working will be supported by the next approach which will be the driving force and the most crucial one for detection of lies; the micro-expressions dataset where the evaluation of the micro-expressions such as small curves and wrinkles on entire facial part when person speaks out the answer for the asked question would be taken into consideration. Last but not the least, our eye tracking approach will add additional accuracy in giving out more relevant predictions where the number of eye blinks, eye movements in all directions while the person is speaking the answers of asked questions will be calculated. Combined results of all three approaches will design graphs of each one of the approaches used and will show up the accuracy, finalizing and drawing the concluding graph where the average accuracy will be counted and the final results will be displayed whether the person is lying or innocent.

REFERENCES

[1] Anna Rita Bentivoglio, Susan B Bressman, Emanuele Cassetta, Donatella Carretta,
Pietro Tonali, and Alberto Albanese. Analysis of blink rate patterns in normal
subjects. Movement Disorders, 12(6):1028–1034, 1997.

[3] Charles Darwin and Phillip Prodger. The expression of the emotions in man and
animals. Oxford University Press, USA, 1998.

[11] Adrian Rosebrock. Eye blink detection with opencv, python, and dlib. URL
https://www.pyimagesearch.com/2017/04/24/eye-blink-detection-opencv-python-dlib/.

How to Detect Lies: Micro Expressions by
Nick Babich
https://medium.com/@101/how-to-detect-lies-microexpressions-b17ae1b1181e

When everybody lies: Voice-stress analysis tackles lie detection by Susan Miller
https://gcn.com/articles/2014/03/18/voice-risk-analysis.aspx

RAAHI : Route guiding Augmented reality based Autonomous Humanoid Instructor

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Abstract*— *RAAHI is an autonomous robot which guides the user to their desired destination with the help of voice commands. It provides assistance and information to the people in an innovative way and is used for indoor navigation. While navigating, the robot introduces the user to the surrounding using computer generated graphics and voice over to provide information about the organization. For this the visitor first needs to give the destination as input over the voice commands. The robot then plans the path of the tour based on the user input. The places (to be introduced) are associated with a tag and a unique ID. While navigating the robot detects such places using the detector and delivers information about it using the digital device display and the sound generator module. This will help the users by navigating them to their destination and will utilize the time of the tour effectively to promote the organization which in turn will enrich user experience. Hence, RAAHI can be a great help for the museums, industries, exhibition centers, schools, colleges and big organizations.

Keywords—assistance, autonomous, computer generated graphics, navigation**,** voice commands.

1. Introduction

There are no such tools which can be used for Indoor navigation so RAAHI provides a great help along with many additional benefits. It will not only give the instruction to be followed to reach the destination but can also take the user to its requested destination. While navigating it will introduce the surrounding environment to the new user using Augmented Reality. This will not only help the user to reach its destination but will make the user more aware of the ambience of the organization.

2. Literature Survey

A. Line Following Robot [2] ***:***The Line follower robot is a mobile machine that can detect and follow the line drawn on the floor. Generally, the path is predefined and can be visible like a black line on a white surface or any similar high contrast color or it can be invisible like a magnetic field.Capturing the line position with optical sensors mounted at the front end of the robot[7]. Most are using several numbers of photo-reflectors.Steering the robot to track the line with any steering mechanism.Controlling the speed according to the lane condition. The speed is less during passing a curve due to the friction between the tire and the floor.

Advantages : Most efficient and useful where the structure of the organisation is static.

Disadvantages : Slow speed and instability on different line thickness or hard angles.

B. Enhanced User experience through Augmented Reality [3] ***:***This paper discusses the use of Augmented Reality (AR) applications for the needs of tourism.AR is a visualization technique that superimposes computer-generated data, such as text, video, GPS data and other multimedia formats, on top of the real-world view, as captured from the camera of any digital device..

Advantages :

1. Tourists can navigate themselves interactively with the help of the direct annotations of the selected locations.

2. Highly portable, can function as a tourist guide.

Disadvantages :

1. Lack of interoperability across mobile platforms.

2. Users need to be equipped with smartphone devices.

C. RFID Technology [4] ***:*** Radio frequency identification (RFID) is used to identify objects uniquely through tags which have distinct id associated with it . It comes under the broad category of automatic identification technologies. In this paper Basic Principles of RFID technology along with its types are discussed. RFID

(Radio Frequency Identification) enables identification from a distance, and does not require line of sight. RFID tags support a larger set of unique IDs which is not present in systems using barcode and can incorporate additional data such as manufacturer, product type, and even measure environmental factors such as temperature.

Advantages :

1. Tags can have read/write memory capability.

2. No line-of-sight is required.

Disadvantages :

1. Cost of tags depends on their type.

2. Reading several tags simultaneously can lead to collision and loss of data.

D. Voice Controlled Robot [5] ***:***The idea that stands behind this project is exploring how to use voice commands to control a device like an Arduino or ESP8266. To build this voice-activated project, an Android app is used to capture the user's voice and transform it into a set of commands that are sent to the device. The user will use an android powered smartphone to give voice command. The command can be fetched using an app which will convert the voice command into text. The phone will be connected to the microcontroller using a Bluetooth module. After conversation of the voice command into text the app will send necessary data to the microcontroller using Bluetooth of the phone and microcontroller will receive the data using Bluetooth module. According to the command, the robot will move forward, backward, left, right or fully autonomous.

Advantages : Arduino is controlled using Voice commands without using an external voice module.

Disadvantages : Use of external speakers which is not required since mobile speakers can also be used.

3. Proposed Work

This robot helps in guiding the user to their desired destination with the help of voice commands. It provides assistance and information to the people in an innovative way and is used for indoor navigation. While navigating, the robot introduces the user to the surrounding using computer generated graphics and voice over to provide information about the organization. The robot plans the path of the tour based on the user input. The places are associated with a tag and a unique ID.

3.1 System Architecture

The system architecture is given in Figure 1. Each block is described in this Section.

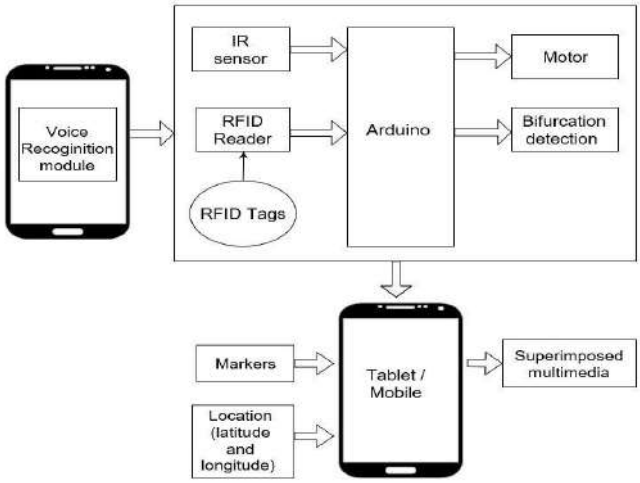

Fig. 1 Proposed system architecture

A. Input Block Description:An Android app is used to capture the user's voice and transform it into a set of commands that are sent to the device. The Android app communicates with the user by listening to the voice commands. Then, the app translates the voice commands to understandable form to the IoT device .

B. Path Planning Module:Path planning module is used to determine a route from one coordinate location to another along a set of waypoints. For determining the best path from the current location of the robot to where it needs to be you would use the Path Planning module to determine the shortest or best path to the desired location. To find the shortest distance between any points the path planning problem can be converted to the. The Floyd-Warshall algorithm is used for calculating a shortest path for graphs. It computes the shortest distances between every pair of vertices in the input graph. It does so by comparing all possible paths through the graph between each pair of vertices and that too with $O(V^3)$ comparisons in a graph.

Create a |V| x |V| matrix, M, that will describe the distances between vertices:

For each cell (i, j) in M:

```
    if i == j:
        M[i][j] = 0
    if (i, j) is an edge in E:
        M[i][j] = weight(i, j)
        else:
        M[i][j] = infinity
for k from 1 to |V|:
    for i from 1 to |V|:
        for j from 1 to |V|:
            if M[i][j] > M[i][k] + M[k][j]:
                M[i][j] = M[i][k] + M[k][j]
```

The line follower robot is a self-operating mobile machines that follows a line drawn on the floor. The path can be a visible black line on a white surface (reverse). Following are the basic operations of the line follower :

• The line sensing process requires high resolution and high robustness. The microcontroller sends instructions to the driver after processing the data coming from the sensors part. The driver gives voltage to the motors according to the inputs.

C. Output Block Description:Augmented reality (AR) is a term used for overlaying computer generated graphics, text and three dimensional (3D) models over real video stream. Virtual information is embedded into the real world, thereby augmenting the real scene with additional information. Augmented reality proved to be useful in several tourist cases. The AR system consists of a camera which is mounted on the robot's gripper. In order to generate the virtual simulated scene for the same view.

4. Working Snapshots

Before

After

Fig 2. Augmented Reality

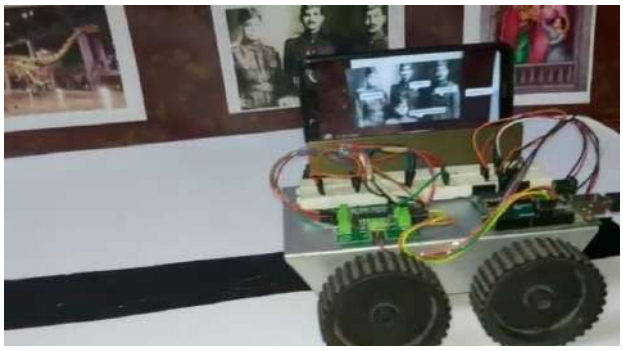

Fig 3. Working prototype

ACKNOWLEDGMENT

We remain immensely obliged to our project guide Prof. Gayatri Hegde, for her valuable guidance, patience, keen interest, constant encouragement and for her valuable support. We would like to thank Dr. Sharvari Govilkar, Head, Department of Computer Engineering for her valuable support. We would also like to thank Dr. Sandeep M. Joshi, Principal for his valuable support and for providing an outstanding academic environment. We would like to thank all staff members of the department of Computer and Information Technology for their critical advice and guidance without which this project would not have been possible. Last but not the least we would also like to acknowledge with much appreciation the crucial role of our family members especially our friends who have been a constant source of inspiration during this project work. The completion of project would not have been possible without them. We would like to say that it has indeed been a fulfilling experience working on this project.

REFERENCES

[1] *How Augmented Reality (AR) is Changing the Travel & Tourism Industry*. [online] Available at: https://towardsdatascience.com/how-augmented-reality-ar-is-changing-the-travel-tourism-industry-239931f3120c .

[2] Çakir, A. and Sreawi, A. (2017). Between Two Line Follower Stand Before the Barrier Mobile Robot- Design and Implementation. *Indonesian Journal of Electrical Engineering and Computer Science*, 5(2), p.433.

[3] Kounavis, C., Kasimati, A. and Zamani, E. (2016). Enhancing the Tourism Experience through Mobile Augmented Reality: Challenges and Prospects. *International Journal of Engineering Business*

Management, 4, p.10.

[4] Kaur, M., Sandhu, M., Mohan, N. and Sandhu, P. (2015). RFID Technology Principles, Advantages, Limitations & Its Applications. *International Journal of Computer and Electrical Engineering*, pp.151-157.

[5] Holmquist, L. and Forlizzi, J. (2014). Introduction to Journal of Human-Robot Interaction Special Issue on Design. *Journal of Human-Robot Interaction*, 3(1), p.1.

[6] Wen-Chung Chang, Huan-Chen Ling (2014). Existing System Architecture. *Visual navigation and control of mobile robots,* p.2.

[7] Pakdaman, Mehran & Sanaatiyan, Mohammad Mehdi & Rezaei, Mahdi. (2010). A line follower robot from design to implementation: Technical issues and problems. 5 - 9. 10.1109/ICCAE.2010.5451881.

E-Governance Using E-Learning

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Abstract— We are living in a world of internet where we do all our basic activities on internet. Internet has become the part and parcel of our life. So as internet has gained a huge hype , people spend more time on internet. We acquire more personalized type of experience. So nowadays our government has also started accepting all the things through internet , but as internet is a new phenomena it gets difficult to use internet for those who don't have its habit. Government forms are also filled online into their site ,which gets difficult for people. So to solve the gap between the people and online work we have introduced a concept called as e learning which will help them to do all the online related work easily. So a E learning application is created which will help people to fill the online forms as well as submit it . Thus it will help people to easily use all the government websites easily by simply following the instructions giving by the E learning application prepared by us.

Keywords -- E-Governance,E-Learning

I. INTRODUCTION

The Project will create an mobile application which be running on android platform. As we all know working on government webistes is difficult as it is not easy to understand all the processes which are to to followed to fill a government form easily. So this application will provide the user the privilage to learn to use the websites through this application. The application has multilingual support which will allow people to learn to use the application in their native language. Thus anyone from across the country can learn to use the application for their convenience. The tutorials are given in many formats such as audio, video, plain text ,PDFS etc. Visual learning is provided as visual learning is very beneficial to understand things easily. The images guide has the liguistic support where everthing provided with language support. The app has also the features to contact the developer for the support. The app stores all its infoemation in its firebase database which is provided by google. There is a signup page where after signup the progress of the user can be tracked .There is also an option to skip the sign up page.The application comprises of websites such as Mahadbt, Income tax filling, Kdmc, MSEB etc. This websites are the sites which are very much needed for a usual user. These are some of the very important websites. The regional languages which are added in the Application are also based on the place of the webiste. Like MSEB website the format is in hindi english and Marathi.

II. LITERATURE SURVEY

Technique Category One

The working of e- learning in this century is studied through Samani Ahmed is reviewed by us. Hence we understood how can we use e learning in the current scenario. The working of e governance system is studied in the paper of Sylvester Hatsu which is a case study of appliacation of e governance in a developing country. The Third paper focuses on the working of android application and development of an android application.

2.1.1 Technique One

It was developed by Samani Ahmed . It presents how elearning is used in the modern century. It also shows the new roles of the student, curriculum and teacher.
It consists of management, information and communications technology, education, ethics, education, evaluation.

2.1.2 Technique Two

It was developed by Sylvester Hatsu .It is a case study about srilanka where e governance is used to educate them. Information and Communication Technology (ICT) have become an integral part of the social fabric of many countries.
One of the major causes of the failure of e-Government projects in developing world has been due to a lack of monitoring and evaluation and a failure by sponsoring bodies to realize that the projects that worked in the developed world may not necessarily do so in the developing world because of differences in socio-economic realities.

2.2.3 Technique Three

This paper was developed by G T Priyankara where it is a case study of a under developed country like
Srilanka where an android application is used to learn the basic reading and writing. The tool was designed as an Android application for tablets and was tested with a focus group. The backgrounds, sounds and colors are especially designed to

maintain the attention of kid.

III.PROPOSED WORK

Distance education in the form of internet based which is called e-learning is gaining urge in bringing basic and advanced education in remote locations. In India many rural areas where e-learning is not practiced in day to day life, people there find it difficult to apply or fill forms on government websites to avail facilities provided by the same. This proposes a model deployment of e-learning system . The model includes all the important components from communication infrastructure and link analysis to required facilities at the remote location along with the course information. The analysis includes choice of natural communication technology where multiple lingual support is provided for better understanding for illiterate people and the available footprint from established systems . Additionally ,currently available technology infrastructure are also studied to facilitate the proposed e-learning model deployment in order to support the every service the model provides. Required IT facilities at the rural school premises along with suitable course contents are presented so as to the make the proposed model convenient ,efficient and in transparent manner, which is self-contained complete system that can be adopted for bringing quality education within the reach of common people in India. In this proposed model we have included the function of firebase database wherein the record of the users is analyzed and store it for authentication purposes. Firebase is a mobile and web application development platform developed by Firebase. The best part of Firebase is that it provides Real-time database, which is an API that that synchronizes application data across iOS, Android, and Web devices, and stores it on Firebase's cloud. In the proposed model authentication of the user is mandatory in order to maintain security and easy track of the user using the application. Firebase acts as a bridge between app user and the app owner who manages the running of application. Using Google Authentication API firebase decrypts the encrypted data and convey it to the app owner.
The proposed model using e learning had made an effort to assist the illiterate individuals to fill forms on government website. For each websites image, video guide has been provided, mentioning each and every step and guiding where to fill details.

3.1 System Architecture

The system architecture is given in the diagram below
We provide an application based platform for E-learning where user can learn about some government websites. With the help of this system user can able to learn about form filling of some of the government websites like Mahadbt as well as MSEB websites. Initially user has to sign up for the application (also there is guest login for temporary purpose) then after that he/she can choose option of the websites (i.e. mahadbt, sales tax, Aadhar card etc.) then user can choose in which format he/she wants to learn (e.g. Videos, Plain Text, PDFs, Image Formats etc.) then user can choose suitable language for the selected format.

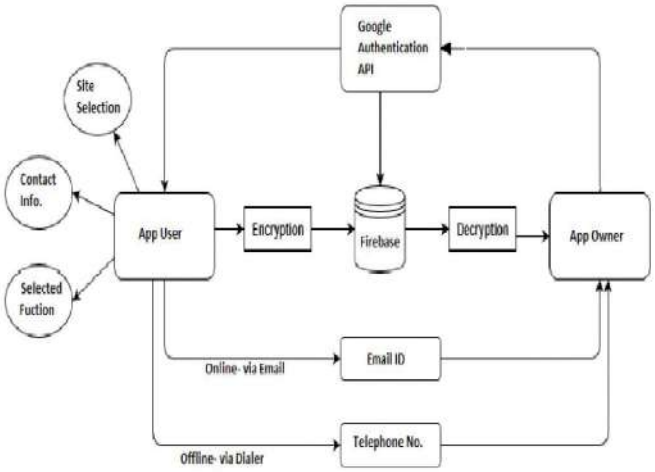

Fig.1 Proposed System Architecture

In this way the proposed system worked. All the data is to be saved in a firebase .The firebase works through google Authentication api. This data is encrypted and stored in a firebase. Then it is decrypted and send to to app owner so as to maintain the security of the data.

User Details: As the user will login to the page the application will automatically take all the required information such as email id ,contact no and will a;lso take the site which is to be studied by the user. It also takes the entry of the language required by the user..

Firebase: The firebase is a database provided by the google to store all the information of the user . The details are stored in key list format and the data is encrypted and is entered using google authentication API.

Google Authentication API: This is very essential because the authentication removes all the redundant user data and will give clean data for the further process. Hence it is a very essential thing for data cleaning.

Encryption/Decryption: As the owner integrity is very essencial the encryption as well as decryption is done. The information is converted to a encrypted format and then it is stored inside the Firebase. The passwords as well as the email ID is stored.

3.2 Requirement Analysis:

The implementation details is given below. The project is carried out by a android mobile phone where the application is to be installed. This app is made in android studio which is a software available in pc.

Hardware Requirements:

Processor	2 GHz Intel
HDD	512
RAM	4 GB

The application was built in android studio which is a platform given by google for developing android application
This application needs atleast 4 gb ram in the computer for its usage. It gives all the features required to build the application.

Software Requirements:

Android version	4.1.2(Jellybean)
Programming Language	XML AND JAVA
Database	Firebase

It requires an android mobile phone to launch this application .The application supports API 15 that ie it can work on almost 90 percent of the android devices. The languages used to make the software is Java and XML is used to form the UI of the application.

IV.ACKNOWLEDGEMENT

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V. REFERENCES

1] Samani Ahmed ,"The Roll of E-learning To face the challenges of the century"
2013 Fourth International Conference on e-Learning "Best Practices in Management, Design and Development of e-Courses: Standards of Excellence and Creativity"(7 – 9 May 2013)

[2] Sylvester Hatsu," A Framework for the Monitoring and evaluation of e-governance projects in developing countries"Ernest Ketcha Ngassam 2016 IST-Africa Week Conference (11-13 May 2016)

[3] K. W. T. G. T. Priyankara, "Android based e-Learning solution for early childhood education in Sri Lanka"
2013 8th International Conference on Computer Science & Education (26-28 April 2013)

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Image Completion Using Feature Engineering in Convolution Neural Networks

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Abstract*—Image completion is one of the most challenging problems, as the reconstruction algorithms should render the missing pixels. Recent studies have achieved promising advances in photorealistic human face synthesis and generation. However, these approaches are limited to deal with general or structure specified images which involve large datasets. When there is a lack of training data, it becomes difficult to handle the algorithm, for which Low-Shot learning is introduced.In this project, we aim to combine the perceptual way with the Low shot learning using Feature Engineering to increase the size of the training dataset in ways such that, it improves the accuracy and robustness of Image Completion that overcomes the missing values . Based on extensive experimental study, we will conduct the analysis on how each dataset affects the identification accuracy. Based on the recent studies on this topic it suggests that the algorithm for completing images is effective in improving the identification accuracy and precision..

Keywords - Photorealistic Image Synthesis, Low-shot Learning, Feature Engineering, Image Completion, Image Inpainting

1. Introduction

An Image Completion System inputs an incomplete jpeg image or a masked image and uses machine learning algorithms to complete it. It uses previously trained images to determine how newly input images will be completed. It replaces black pixels with image patterns in accordance with the background image. Also, it allows removing unwanted objects and generates occluded regions.

2. Literature Survey

A. Face Generation for Low-shot Learning using Generative Adversarial Network : Authors - Junsuk Choe, Song Park, Kyungmin Kim Joo Hyun Park, Dongseob Kim and Hyunjung Shimks tried techniques to improve the increase in the size of training dataset in various ways to improve the accuracy and robustness of face recognition. This was proposed to handle the lack of training data in machine learning. The paper presents studies and experiments to conclude that the proposed algorithm for generating faces is effective in improving the identification accuracy and coverage using both the base and novel set. [1]

***B. Deep Portrait Image Completion and Extrapolation* :** It was developed by Xian Wu, Rui-Long Li, Fang-Lue Zhang, Jian-Cheng Liu, Jue Wang, Ariel Shamir and Shi-Min Hu where deep portrait image completion technique was used. A general image completion and extrapolation method fails as the task requires more accurate structure details and appearance synthesis. Whereas the deep portrait technique performs a two stage deep learning framework to tackle the limitation faced by general image completion method. Hence it provides a better and more efficient structural map recovery and a faster training and generation cycle. [2]

C. Image Completion with Deep Learning in Tensorflow : In this paper authors Richard Davies and Brandon Amos uses GANs algorithm for the process of image completion.In this experimental study the images are interpreted as being samples from a probability distribution. This interpretation of images helps learn how to generate fake images. This understanding leads to finding the best fake images that are most similar to the nearby surrounding regions of the missing pixels. For this the image generator and discriminator has to be trained first, so as to generate an approximate image similar to the real one and which also fools the discriminator to be able to generate a real like and consistent image. [3]

D. High-Resolution Image Inpainting using Multi-Scale Neural Patch Synthesis : This technique is used by Yang, Chao and Lu, Xin and Lin, Zhe and Shechtman, Eli and Wang, Oliver and Li, Hao. Given an image, we use the content and texture network to jointly infer the missing region. A multi-scale neural patch synthesis approach is proposed based on joint optimization of image content and texture constraints which produces for a high-frequency details by

matching and adapting patches with the most similar mid-layer feature correlations of a deep classification network.This approach produces for a sharper,coherent and more accurate image inpainting. [4]

E. Globally and Locally Consistent Image Completion using celebA datasets: The technique of fully convolutional neural network was used by Satoshi Iizuka, Edgar Simo ,Hiroshi Ishikawa and Waseda to complete images of arbitrary resolutions by filling-in missing regions of any shape.Local and global discriminators were used to assess the realness and the completeness of the image while the image completion network is trained to fool both the discriminators.Thus this approach can distinguish the images and generate fragments that allows to naturally complete the images of objects with familiar and highly specific structures. [5]

2.1 Literature Survey Summary

The overview of different works are given in Table 1.

Table 1. Overview of literature survey

Literature	Advantage	Disadvantage
Junsuk Choe, Song Park, Kyungmin Kim-(2017) [1]	Realistic visual and impressive content result generated	Huge computation and tough to train
Xian Wu, Rui-Long Li, Fang-Lue Zhang, Jian-Cheng Liu, Jue Wang, Ariel Shamir(2018) [2]	Once trained, predictions are pretty fast, can be trained with any number of layers	Slow training time if low quality GPUs are used, high computational cost
Richard Davies, Brandon Amos (2017) [3]	GANs can learn messy and complicated distributions of data.	"Realistic" but not real. Fake patterns can be created for small scale structures or non-nature objects like text..
Satoshi Iizuka, Edgar Simo, Hiroshi Ishikawa(2017) [5]	TensorFlow helps to retrieve discrete data onto an edge and therefore offers a great debugging method.	TensorFlow does not offer symbolic loops feature, but there is a workaround using finite unfolding.

3. Proposed Work

Inpainting is the process of restoring the lost or disintegrated portions of images and videos. In the museum world, in case of a treasured painting, this task would be carried out by a skilled art conservator or art restorer. In the digital world, inpainting refers to the appliance of sophisticated algorithms to replace lost or corrupted parts of the image data. A discriminator network, such as the one in a conventional GAN, can prove useful at such points. Its main use in such a scenario is to ensure that the final image obtained after filling in the gaps doesn't look obviously fake. When compared with the original image, it needs to look reasonably similar, containing minimal differences.

3.1 System Architecture

The system architecture is given in Figure 1. Each block is described in this Section.

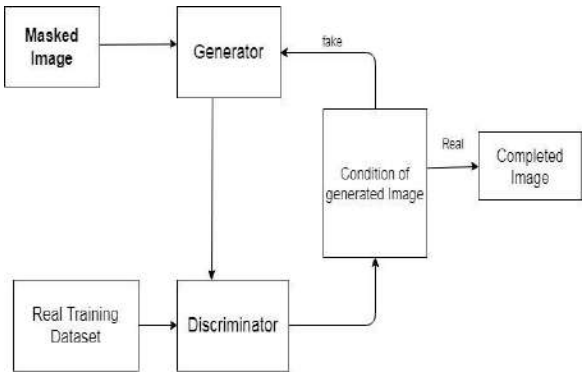


Fig. 1 Proposed system architecture

A. Masked Image: Masking of the image is the first part of the architecture.Image masking is the process of removing a specific feature or background from the image. Masking involves setting some of the pixel values in an image to zero, or other "background" value. It can be done manually or using a vector mask using Photoshop and other tools.

B. Generator: From the name itself, we can understand that it's a generative algorithm. Generator is a type of inverse Convolutional Neural Net, which means it works exactly opposite to what CNN does. In CNN, an real image is provided as input and a corresponding label is obtained as an output. But in Generator, a random noise (vector having some values) is supplied as input to the Inverse CNN and a generated image is expected as an output. In simple terms, it generates new data from an existing piece of data on its own.

C. Discriminator: Discriminator is a Convolutional Neural Network consisting of many hidden layers and a single output layer. The big difference here is the output layer of GANs can have only two outputs, unlike CNNs, which can have outputs equal to the abels it is trained on. The output of the discriminator is binary because of a specifically chosen activation function for this task, if the output is 1 then the given data is real and if the output is 0 then it suggests that the data is fake. Discriminators are trained on the real data so that they learn to recognize what real data looks like and based on what features should the data be classified as real.

D. Condition of Generated Images: The Generator starts to generate data from a random input and then that generated data is supplied to Discriminator as input. Now, Discriminator analyzes the data and checks its proximity to realness. If the data generated lacks enough features to be classified as real by the Discriminator, then the data and the weights associated with it are sent back to the Generator using back-propagation, so that the weights associated with the data can be readjusted and new data, significantly superior to the previous data, can be generated. This newly generated data is again passed to the Discriminator and it continues. This process keeps imitating for as long as the Discriminator keeps classifying the generated data as fake, for every time the data is classified as fake and with every back-propagation the quality of data keeps improving and there comes a time when the Generator becomes so accurate that it becomes hard to distinguish between the real data and the data generated by the Generator.

E. Image Dataset: The dataset that has been used in the architecture is the CelebA and Places2 dataset. CelebA is great for training and testing models for face detection, particularly good for identifying facial attributes such as locating people having brown hair, grinning, or wearing spectacles. The Places2 dataset contains millions of unique images of various sceneries and backdrops, and is particularly good for identifying the attributes like sky color, elevation and various landscapes.

F. Completed Image: The Discriminator keeps classifying the generated data as fakes, for every time data is classified as fake and with every backpropagation the quality of data keeps improving and there comes a time when the Generator becomes so accurate that it becomes hard to distinguish between the real data and the data generated by the Generator. A completed image is obtained when the discriminator is not able to identify whether the input is real or fake.

4. Requirement Analysis

4.1 Software

The experiment setup is carried out on a computer system which has the software specifications

Operating System	Windows 7/ Ubuntu
Programming Language	Python 3.6
Softwares	Pytorch, OpenCV

4.2 Hardware

The experiment setup is executed on a computer system which has the hardware specifications

S. No.	Hardware	Description
1.	Processor	Intel Core i5 or above
2.	Storage	180 GB(SSD Recommended)
3.	RAM	Minimum 8GB RAM
4.	Graphics	Nvidia GeForce 940MX or above

4.3 Libraries Used

OpenCV (Open Source Computer Vision Library) is a computer vision and machine learning software library. OpenCV was built to provide a common infrastructure for computer vision applications and to complement the usage of machine perception in industrial products.

Pytorch is an open source ML library based on the torch library, used for applications like computer vision and natural language processing. It was developed by Facebook's AI research lab.

3.4 Dataset and Parameters

CelebFaces Attributes Dataset (CelebA) is a massive face features dataset with more than 2 lakh celebrity images, each having around 40 attribute annotations. Images in this dataset cover large poses as well as background clutter. CelebA consists of large diversities, quantities, and rich annotations, including 10k+ number of identities, 2lakh+ number of face images, and 5 landmark locations, 40 binary attributes annotations for each image. The dataset can be employed as the training and testing dataset for computer vision tasks like face feature recognition, face detection, landmark localization, and face manipulation & synthesis.

Places Dataset, developed by Bolei Zhou, Agata Lapedriza, Aditya Khosla, Antonio Torralba, Aude Oliva, MIT contains 10million+ images having 400+ unique scene categories. The dataset features 5000 to 30,000 training images per class which is consistent with real-world frequencies of occurrence. Using convolutional neural networks, Places dataset allows learning of deep scene features for various scene recognition tasks, with the goal to establish new state-of-the-art performances on scene-centric benchmarks.

5. Implementation

5.1 Algorithm used

Fast Marching Algorithm

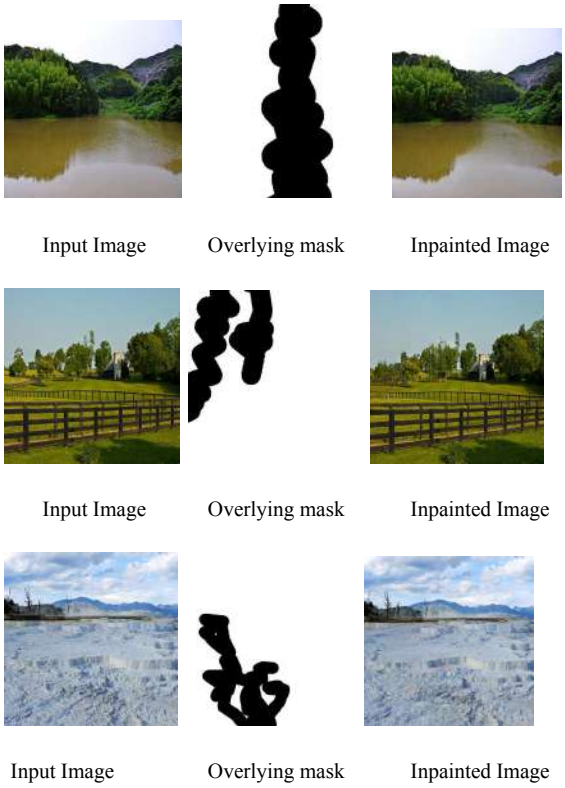
The fast marching method is a numerical approach created by James Sethian for solving boundary value problems of the Eikonal equation: Typically, such an issue describes the evolution of a closed surface as a function of your time with speed within the normal direction at some extent on the propagating surface.

The fast marching algorithm slowly moves inward and takes the weighted sum of the neighbouring pixels to form the colour pixel that will replace the mark region.When we mark the region on the image a separate layer consisting of the mark vision will be created. This layer mask will be imported along with the base image without the pixels marked on the layer mask. Now, when the image inpainting begins the fast marching algorithm will first record the pixels mark on the mask layer.

For the outermost pixel the algorithm takes the average of the weighted sum of the neighbourhood pixels to create a colour approximate for the pixel at the outermost part. This, along with the previously trained data is now used to detect the colour of the pixel which will replace the marked pixel. Thus, the outermost pixel present on the marked region is now replaced with coloured pixel which is a close approximation to the boundary of the image.

5.2 Sample Implementation

Places dataset model was first trained using the described algorithm. For testing, sample images of nature from the internet were used and the following results were obtained.



Input Image Overlying mask Inpainted Image

Input Image Overlying mask Inpainted Image

Input Image Overlying mask Inpainted Image

Accuracy :

Accuracy in proposed model - 70%

The accuracy of the model is solely dependent. on the size of the dataset used to train it. Here, as the data set used is small the accuracy remains constricted to 70%. However, if we use a larger dataset to train the model, we can achieve a higher percentage of accuracy.

Conclusion :

Image generation techniques are attractive in various computer vision applications, especially because of the difficulties of labeled data collection for training. Among those, we attempted to generate face images and place images with several attributes and poses using GAN, enlarging the novel set to achieve increased performance. With the increased dataset, we verified increased performance on the missing portions of the image. Moreover, we demonstrate that duplicating original data effectively regularized excessive influences from augmented data.

REFERENCES

1. *Junsuk Choe, Song Park, Kyungmin Kim,* Face Generation for Low-shot Learning using Generative Adversarial Networks, Yonsei University (2017*)*
2. *Xian Wu, Rui-Long Li, Fang-Lue Zhang, Jian-Cheng Liu, Jue Wang, Ariel Shamir, Members*, Deep Portrait Image Completion and Extrapolation, IEEE Computer Society (2018)
3. *Richard Davies, Brandon Amos*, Image Completion with Deep Learning in TensorFlow (2017)
4. *Chao Yang, Xin Lu, ZheLin, Eli Shechtman, Oliver Wang , Hao Li*, High-Resolution Image Inpainting using Multi-Scale Neural Patch Synthesis (2017)
5. *Satoshi Iizuka, Edgar Simo, Hiroshi Ishikawa*, Globally and Locally Consistent Image Completion using celebA datasets, Waseda University (2017)