

IOT BASED FACIAL RECOGNITION SYSTEM FOR VISUALLY IMPAIRED PEOPLE

Submitted in partial fulfillment of the requirements for
the award of

Bachelor of Engineering degree in Computer Science and Engineering

by

M S V Praveen Pallapothu (38110426)

Poturi Ganesh Varma (38110413)



**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
SCHOOL OF COMPUTING**

SATHYABAMA

**INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERISTY)**

Accredited with “A” by NAAC

**JEPPIAR NAGAR, RAJIV GANDHI SALAI,
CHENNAI – 600119**

APRIL 2022



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Accredited with "A" grade by NAAC
Jeppiaar Nagar, Rajiv Gandhi Salai, Chennai - 600119

www.sathyabama.ac.in



DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

BONAFIDE CERTIFICATE

This is to certify that this Project Report is the bonafide work of **M S V Praveen Pallapothu (38110426)** and **Poturi Ganesh Varma (38110413)** who carried out the project entitled "**IOT BASED FACIAL RECOGNITION SYSTEM FOR VISUALLY IMPAIRED PEOPLE**" under my supervision from November 2021 to April 2022.

Internal Guide

Dr. G. Mathivanan M.E., Ph.D.,

Head of the Department

Submitted for Viva voce Examination held on _____

Internal Examiner

External Examiner

DECLARATION

We **M S V Praveen Pallapothu (38110426)** and **Poturi Ganesh Varma (38110413)** hereby declare that the Project Report entitled as “**IOT BASED FACIAL RECOGNITION SYSTEM FOR VISUALLY IMPAIRED PEOPLE**” project done by me under the guidance of Dr. G. Mathivanan M.E., Ph.D., and at Sathyabama Institute of Science and Technology is submitted in partial fulfillment of the requirements for the award of Bachelor of Engineering degree in Computer Science and Engineering.

DATE:

SIGNATURE OF THE CANDIDATE

PLACE:

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ABSTRACT

The healthcare area is actually among the most crucial aspects which are actually explored by many scientists to build the best system. Although there were many differences as well as revolutionary methods created, there are usually certain problems that demonstrate in the niche which must be resolved. In days or weeks that are previous, there had been plenty of functions that were not possible to do as well as had a lot of risk factors related to the affected person. In this specialized era that has been altered, extremely main businesses can also be completed with a lot of great ease. Increasing the variety of the public has additionally viewed a growth in the selection of individuals who are actually created visually impaired or perhaps drop their visual sight whenever they close to the older age period of theirs. It's always quite difficult for visually impaired individuals to exist in their life with no assistance. With this paper, we suggest a face recognition process which could be utilized by the visually impaired individuals. In order to reduce the quantity of ambiguity, we've suggested a design that is actually meant for utilizing different machine learning strategies as KNN algorithms. An innovative face detection, as well as recognition device, is created which could operate in a tiny form factor. The suggested effort is noticed working nicely when in contrast with some other existing programs and might be of usage that is very much for the visually impaired persons.

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CHAPTER 1

INTRODUCTION

In recent years, several frameworks based on mobile platforms and dedicated to healthcare services have emerged. The novel technologies developed aim at reducing the costs of the health sector, by increasing the empowerment of people and, in the same time, by improving the monitoring of patients with chronic diseases. Through the continuous assessment of symptoms, such systems can help the patients to managing their condition by their own, without needing direct supervision of specialized healthcare personnel. Currently, the patient monitoring systems based on internet of things (IoT) or cyber physical systems (CPS) are attracting considerable attention from the scientific community.

The healthcare area is actually among the most crucial filed that must be taken care of. Although there are many brand new scientists to update the existing methods in the submitted, currently it might be considerably improved for much better overall performance. As it deals with the lifetime of man enormous care should be provided for the exact same. The progress of Artificial Intelligence has given birth to a lot of brand new systems out of that the famous people are now being Machine Learning Approaches as well as Deep Learning Techniques. Different strategies in Artificial Intelligence are popular in many uses such as for instance healthcare picture evaluation [1], automatic robot course preparing [2], flood detection in a specific community or maybe region [3] as well as land coverage distinction [4]. Visibility is actually among the most crucial provided presents for any man. An individual created with a visual disability or maybe has lost the perception of his for some other factors such as for instance mishaps or even years element suffers a great deal for his whole lifetime. This will make the individual be determined by many other individuals to do his/her daily actions.

Medical area relates to man life and saving them will be the biggest obstacle. A lot of the brand new systems are utilized for enhancing the exact same. With this newspaper, we've suggested a program wherein the KNN algorithms are actually utilized for detection and face recognition that may be quickly employed for understanding the actual individual. Absolutely no human treatment is actually required and just the instructions provided by

the people are actually realized by the devices. This way, the movable methods are manufactured semi-autonomous as well as the effort is completed with great ease. There's absolutely no possibility of every disaster at determining the actual man or women as the picture of the individual is actually shot and it is recognized by comparing the various other pictures kept in the repository. The majority of the area can be stated as follows: Section II consists of the Literature Survey, section III consists of the strategy utilized at the newspaper as well as part III consists of different outcomes received. The newspaper is actually concluded within the last by bringing up the appropriate long term works that can be utilized or even included to the suggested deliver the results.

Such emerging technologies have been used to various purposes: facilitate smoking cessation, monitor patients with chronic heart failure, detect early signs of arrhythmia or ischemia, provide diabetes education or monitor relevant physiological markers. With a few notable exceptions (mental health and autism), the people with disabilities have not been the primary target of the emerging mobile health applications. However, individuals with disabilities are likely to engage in behaviors that can put their health at risk and there is a strong need of technologies that can improve their daily-life conditions, enable social relations, and increase their degree of autonomy and safety. In this paper, we focus on a particular case of disability, which is the visual impairment. Nowadays, more than 285 million people worldwide suffer from visual impairment (VI) with 39 million of blinds and 246 million people with low vision. The World Health Organization estimates that by the year of 2020 the number of individuals affected by VI will significantly increase.

The visually impaired people adapt to normal life by using traditional assistive aids, such as white canes or walking dogs. The white cane is preferred because it is easy to use, cheap and widely accepted by the blind community. However, such an assistive element shows quickly its limitations when confronted with the high diversity of situations that can occur in current urban scenes. Moreover, the white cane cannot provide additional information to users such as the degree of danger of the encountered obstacles or recognition of persons that are present in the scene. In the absence of such information, the VI always travels on known paths while trying to guess the identity of the persons

encountered. When a VI user arrives in a social setting, the conversation has to be interrupted in order to announce which people are present.

1.1 OVERVIEW

An assistive device using computer vision technology and offline-trained with a face recognition module is designed. The existing system is able to identify in near realtime, from video camera, a set of user, which can be pre-defined by the user and which may correspond to either familiar people that the visually impaired user may encounter in real. The main problem with the existing system is that it is bulky and needs more processing power to detect face and for recognition. The visually challenged user needs a computer or a laptop for the purpose of this project. This reduced the usage of this application because of the bulk hardware and complication setup.

1.2 ORGANIZATION OF THE THESIS

Chapter 1 deals with an introduction to the project where the existing system is been discussed. It also gives an overview of how this system is able to identify the people that the visually impaired user may encounter in real.

In Chapter 2, a detailed description of the literature survey of the papers which are referred during the course of the project was summarized.

Chapter 3 deals with the methods and algorithms used. The hardware and software requirements are provided along with the system design, architecture and flow of overall project.

In chapter 4, the Results and Discussion along with the screenshots of each module has been depicted.

Chapter 5 deals with the summary and conclusion of the project. It also includes the future scope of the project.

CHAPTER 2

LITERATURE SURVEY

[1] Title: “Assisting the Visually Impaired: Obstacle Detection and Warning System by Acoustic Feedback”.

Author: Alberto Rodríguez, J. Javier Yebes

In this method Obstacle Detection and Warning System by Acoustic Feedback. The aim of this article is focused on the design of an obstacle detection system for assisting visually impaired people. A dense disparity map is computed from the images of a stereo camera carried by the user. By using the dense disparity map, potential obstacles can be detected in 3D in indoor and outdoor scenarios. A ground plane estimation algorithm based on RANSAC plus filtering techniques allows the robust detection of the ground in every frame. A polar grid representation is proposed to account for the potential obstacles in the scene. The design is completed with acoustic feedback to assist visually impaired users while approaching obstacles. Beep sounds with different frequencies and repetitions inform the user about the presence of obstacles. Audio bone conducting technology is employed to play these sounds without interrupting the visually impaired user from hearing other important sounds from its local environment. A user study participated by four visually impaired volunteer's supports the proposed system.

[2] Title: “Attention-aware Deep Reinforcement Learning for Video Face Recognition”

Author: Yongming Rao, Jiwen Lu, Jie Zhou

A Method of Attention-aware Deep Reinforcement Learning for Video Face Recognition, we propose an attention-aware deep reinforcement learning (ADRL) method for video face recognition, which aims to discard the misleading and confounding frames and find the focuses of attentions in face videos for person recognition. We formulate the process of finding the attentions of videos as a Markov decision process and train the attention model through a deep reinforcement learning framework without using extra labels. Unlike existing attention models, our method takes information from both the image space and the feature space as the input to make better use of face information

that is discarded in the feature learning process. Besides, our approach is attention-aware, which seeks different attentions of videos for the recognition of different pairs of videos. Our approach achieves very competitive video face recognition performance on three widely used video face datasets.

[3] Title: “College Smoking-Cessation Using Cell Phone Text Messaging”.

Author Name: Jami L. Obermayer, William T Riley, Ofer Asif, Jersino Jean-Mary

In this method DEEP-SEE: Joint Object Detection, Tracking and Recognition with Application to Visually Impaired Navigational Assistance, we introduce the so-called DEEP-SEE framework that jointly exploits computer vision algorithms and deep convolutional neural networks (CNNs) to detect, track and recognize in real time objects encountered during navigation in the outdoor environment. A first feature concerns an object detection technique designed to localize both static and dynamic objects without any a priori knowledge about their position, type or shape. The methodological core of the proposed approach relies on a novel object tracking method based on two convolutional neural networks trained offline. The key principle consists of alternating between tracking using motion information and predicting the object location in time based on visual similarity. The validation of the tracking technique is performed on standard benchmark VOT datasets, and shows that the proposed approach returns state of-the-art results while minimizing the computational complexity. Then, the DEEP-SEE framework is integrated into a novel assistive device, designed to improve cognition of VI people and to increase their safety when navigating in crowded urban scenes. The validation of our assistive device is performed on a video dataset with 30 elements acquired with the help of VI users. The proposed system shows high accuracy (>90%) and robustness (>90%) scores regardless on the scene dynamics.

[4] Title: ”Continuous individual support of smoking cessation using text messaging: A pilot experimental study”

Author Name: Severin Haug, Christian Meye, Gudrun Schorr, Stephanie Bauer

In this method, Design of a Mobile Face Recognition System for Visually Impaired Persons, it is estimated that 285 million people globally are visually impaired. A majority

of these people live in developing countries and are among the elderly population. One of the most difficult tasks faced by the visually impaired is identification of people. While naturally, voice recognition is a common method of identification, it is an intuitive and difficult process. The rise of computation capability of mobile devices gives motivation to develop applications that can assist visually impaired persons. With the availability of mobile devices, these people can be assisted by an additional method of identification through intelligent software based on computer vision techniques. In this paper, we present the design and implementation of a face detection and recognition system for the visually impaired through the use of mobile computing. This mobile system is assisted by a server-based support system. The system was tested on a custom video database. Experiment results show high face detection accuracy and promising face recognition accuracy in suitable conditions. The challenges of the system lie in better recognition techniques for difficult situations in terms of lighting and weather.

[5] Title: “DEEP-SEE: Joint Object Detection, Tracking and Recognition with Application to Visually Impaired Navigational Assistance”.

Author Name: Ruxandra Tapu, Bogdan Mocanu

In the proposed paper Face Detection with the Faster R-CNN, While deep learning based methods for generic object detection have improved rapidly in the last two years, most approaches to face detection are still based on the R-CNN framework [11], leading to limited accuracy and processing speed. In this paper, we investigate applying the Faster RCNN [26], which has recently demonstrated impressive results on various object detection benchmarks, to face detection. By training a Faster R-CNN model on the large scale WIDER face dataset [34], we report state-of-the-art results on the WIDER test set as well as two other widely used face detection benchmarks, FDDB and the recently released IJB-A.

[6] Title: “Design of a Mobile Face Recognition System for Visually Impaired Persons”.

Author Name: Shonal Chaudhry and Rohitash Chandra

In the paper Neural Aggregation Network for Video Face Recognition, we present a Neural Aggregation Network (NAN) for video face recognition. The network takes a face

video or face image set of a person with a variable number of face images as its input, and produces a compact, fixed-dimension feature representation for recognition. The whole network is composed of two modules. The feature embedding module is a deep Convolutional Neural Network (CNN) which maps each face image to a feature vector. The aggregation module consists of two attention blocks which adaptively aggregate the feature vectors to form a single feature inside the convex hull spanned by them. Due to the attention mechanism, the aggregation is invariant to the image order. Our NAN is trained with a standard classification or verification loss without any extra supervision signal, and we found that it automatically learns to advocate high-quality face images while repelling low-quality ones such as blurred, occluded and improperly exposed faces. The experiments on IJB-A, YouTube Face, Celebrity-1000 video face recognition benchmarks show that it consistently outperforms naive aggregation methods and achieves the state-of-the-art accuracy.

[7] Title: “Face Detection with the Faster R-CNN”

Author Name: Huaizu Jiang, Erik Learned-Miller

In the paper On RGB-D Face Recognition using Kinect, Face recognition algorithms generally use 2D images for feature extraction and matching. In order to achieve better performance, 3D faces captured via specialized acquisition methods have been used to develop improved algorithms. While such 3D images remain difficult to obtain due to several issues such as cost and accessibility, RGB-D images captured by low cost sensors (e.g. Kinect) are comparatively easier to acquire. This research introduces a novel face recognition algorithm for RGB-D images. The proposed algorithm computes a descriptor based on the entropy of RGB-D faces along with the saliency feature obtained from a 2D face. The probe RGB-D descriptor is used as input to a random decision forest classifier to establish the identity. This research also presents a novel RGB-D face database pertaining to 106 individuals. The experimental results indicate that the RGB-D information obtained by Kinect can be used to achieve improved face recognition performance compared to existing 2D and 3D approaches.

[8] Title:” Neural Aggregation Network for Video Face Recognition”.

Author Name: Jiaolong Yang, Peiran Ren, Dongqing Zhang, Dong Chen, Fang Wen, Hongdong

In the paper Toward personal e-Health in cardiology. Results from the EPIMEDICS telemedicine project, Despite many attempts to improve the management of acute myocardial infarction, only small trends to shorter time intervals before treatment have been reported. The self-care solution developed by the European EPI-MEDICS project (2001-2004) is a novel, very affordable, easy-to-use, portable, and intelligent Personal ECG Monitor (PEM) for the early detection of cardiac ischemia and arrhythmia that is able to record a professional-quality, 3-lead electrocardiogram (ECG) based on leads I, II, and V2; derive the missing leads of the standard 12-lead ECG (thanks to either a generic or a patient specific transform), compare each ECG with a reference ECG by means of advanced neural network-based decision-making methods taking into account the serial ECG measurements and the patient risk factors and clinical data; and generate different levels of alarms and forward the alarm messages with the recorded ECGs and the patient's Personal electronic Health Record (PHR) to the relevant health care providers by means of a standard Bluetooth-enabled, GSM/GPRS-compatible mobile phone. The ECG records are SCP-ECG encoded and stored with the PHR on a secure personal SD Card embedded in the PEM device. The alarm messages and the PHR are XML encoded. Major alarm messages are automatically transmitted to the nearest emergency call center. Medium or minor alarms are sent on demand to a central PEM Alarm Web Server. Health professionals are informed by a Short Message Service. The PEM embeds itself a Web server to facilitate the reviewing and/or update of the PHR during a routine visit at the office of the general physician or cardiologist. Eighty PEM prototypes have been finalized and tested for several weeks on 697 citizens/patients in different clinical and self-care situations involving end users (188 patients), general physicians (10), and cardiologists (9). The clinical evaluation indicates that the EPIME DICS concept may save lives and is very valuable for pre-hospitalization triage. D 2005 Elsevier Inc. All rights reserved.

[9] Title: “On RGB-D Face Recognition using Kinect”.

Author Name: Gaurav Goswami, Samarth Bharadwaj, Mayank Vatsa

In this paper Continuous individual support of smoking cessation using text messaging: A pilot experimental study, the objective of this study was to test the feasibility and acceptance of an intervention using text messaging (short message service [SMS]) for continuous individual support of smoking cessation in young adults. Additionally, the optimal feedback intensity was investigated, and short-term efficacy of the intervention was explored.

[10] Title: “Toward personal eHealth in cardiology. Results from the EPI- MEDICS Telemedicine Project”.

Author Name: Paul Rubel, PhDa, T, Jocelyne Fayn, PhDa, Giandomenico Nollo, PhDb, Deodato Assan

In this paper College Smoking-Cessation Using Cell Phone Text Messaging Although rates of smoking among college-aged students continue to rise, few interventions that focus on college smokers' unique motivations and episodic smoking patterns exist. The authors developed and evaluated a prototype program targeting college students that integrates Web and cell phone technologies to deliver a smoking-cessation intervention. To guide the user through the creation and Initialization of an individualized quitting program delivered by means of cell phone text messaging, the program uses assessment tools delivered with the program Web site. Forty-six regular smokers were recruited from local colleges and provided access to the program. At 6-week follow-up, 43% had made at least one 24-hour attempt to quit, and 22% were quit-based on a 7-day prevalence criterion. The findings provide support for using wireless text messages to deliver potentially effective smoking-cessation behavioral interventions to college students.

CHAPTER 3

METHODOLOGY

3.1 OBJECTIVE

The main aim of this project is to develop an assistive device designed to improve cognition, interaction, and communication of visually impaired people in social encounters. The project takes in to account of the fixed-size face representation that takes into the account of various video frames while remaining independent of the length of the image sequence. Effective weight adaptation scheme is introduced so that it is able to determine the relevance assigned to each face instance, depending on the frame degree of motion/camera blur, scale variation, and compression artifacts.

3.2 SCOPE OF THE PROJECT

The scope of the project defined as the face detection and recognition for the visually impaired user by eliminating the need of a computer or a laptop. By the advancement of the processing power of the IOT devices and the reduced costs will help to implement high processing time / power algorithms to IOT devices. We implement an advanced face detection and recognition system which can run in a small form factor single board computer. The project takes in to account of the fixed-size face representation that takes into the account of various video frames while remaining independent of the length of the image sequence. Effective weight adaptation scheme is introduced so that it is able to determine the relevance assigned to each face instance, depending on the frame degree of motion/camera blur, scale variation, and compression artifacts.

3.3 PROBLEM DEFINITION

- Face Image Collection and training.
- Implementing Face Detection into a portable device

3.4 EXISTING SYSTEM

An assistive device using computer vision technology and offline-trained with a face recognition module is designed. The existing system is able to identify in near realtime, from video camera, a set of user, which can be pre-defined by the user and which may correspond to either familiar people that the visually impaired user may encounter in real. This system is bulky and needs more processing power to detect face and for recognition. The visually challenged user needs a computer or a laptop for the purpose of this project. This reduced the usage of this application because of the bulk hardware and complication setup.

3.4.1 Disadvantages

- Needs more processing power.
- Complicate to setup.
- Difficult to carry.
- The new system added detection of doors in corridors and a sound interface in addition to existing features.
- Once a face was detected, it was recognized using a temporary image of the detected face.

3.5 PROPOSED SYSTEM

We propose a face detection and recognition for the visually impaired user by eliminating the need of a computer or a laptop. By the advancement of the processing power of the IOT devices and the reduced costs will help to implement high processing time / power algorithms to IOT devices. We implement an advanced face detection and recognition system which can run in a small form factor single board computer.

3.5.1 Advantages

- Advancement of processing power.
- Cost Reduction.
- Can run in a small form factor single board computer.

- The configuration has the advantage of not having to rely on a database or wireless infrastructure for access to information.
- The proposed face recognition system is designed to take advantage of the probability of mobile devices and provide a simple user interface that makes use of the system easy for the visually impaired.

3.6 SYSTEM SPECIFICATIONS

3.6.1 Hardware Requirements

The hardware requirements may serve as the basis for a contract for the implementation of the system and should therefore be a complete and consistent specification of the whole system. They are used by software engineers as the starting point for the system design. It shows what the system does and not how it should be implemented.

- Hard Disk : 500GB and above
- Processor : i3 and above
- Ram : 4GB and above
- **Raspberry Pi**

The Raspberry Pi 3 Model B is the third generation Raspberry Pi. This powerful credit-card sized single board computer can be used for many applications and supersedes the original Raspberry Pi Model B+ and Raspberry Pi 2 Model B. Whilst maintaining the popular board format the Raspberry Pi 3 Model B brings you a more powerful processor, 10x faster than the first generation Raspberry Pi. Additionally it adds wireless LAN & Bluetooth connectivity making it the ideal solution for powerful connected designs.

Specifications

Processor : Broadcom BCM2387 chipset. 1.2GHz Quad-Core ARM Cortex-A53, 802.11 b/g/n Wireless LAN

GPU	: Dual Core Video Core IV® Multimedia Co-Processor. Provides Open GL. It is ES 2.0, hardware accelerated Open CV, and 1080p30 H.264 high-profile decode. Capable of 1Gpixel/s, 1.5Gtexel/s or 24GFLOPs with texture filtering and DMA infrastructure.
Memory	: 1GB LPDDR2
OS	: Boots from Micro SD card, running a version of the Linux OS or Windows10
Dimensions	: 85 x 56 x 17mm
Power	: Micro USB socket 5V1, 2.5A
Connectors	: Ethernet10/100 Base T Ethernet socket
Video Output	: HDMI (rev 1.3 & 1.4) Composite RCA (PAL and NTSC)
Audio Output	: Audio Output 3.5mm jack, HDMI
GPIO	: 40-pin 2.54 mm (100 mil) expansion header: 2x20 strip
Connector	: Providing 27 GPIO pins as well as +3.3 V, +5 V and GND supply lines
Camera Connector	: 15-pin MIPI Camera Serial Interface (CSI-2)
Display Connector	: Display Serial Interface (DSI) 15 way flat flex cable connector with two data lanes and a clock lane
Memory Card	: Push/pull Micro SDIO

Key Benefits

- Low cost
- Consistent board format & 10x faster processing
- The main advantage of the raspberry pi module over another processor is raspberry pi is a fully functional Linux computer and also compact in size.



Fig.3.1: Raspberry Pi Module

- **Headset**

It converts into a voice output to help blind peoples. Its Audio input is 3.5mmjack. This gets the result from the raspberry Pi module and convey to the receiver.



Fig.3.2: Head set

- **Hardware Result**

By the efficient programming in the module it recognizes the feeded obstacles, faces and gave it as a required audio output through the earphone. The main purpose of this model is to help blind persons by guiding them using this system design. It recognizes the face, obstacles, humans such as known and unknown persons will be identified using face and text recognition features. It gives the scanned and recognized images in the form of audio output to help and guide the blind person. It is specially designed to blind navigation purpose. They are used by software engineers as the starting point for the system design. It shows what the system does and not how it should be implemented. The hardware requirements may serve as the basis for a contract for the implementation of the system and should therefore be a complete and consistent specification of the whole system.



Fig.3.3: Hardware output

3.6.2 Software Requirements

The software requirements document is the specification of the system. It should include both a definition and a specification of requirements. It is a set of what the system should do rather than how it should do it. The software requirements provide a basis for creating the software requirements specification. It is useful in estimating cost, planning team activities, performing tasks and tracking the team and tracking the team's progress throughout the development activity.

- Operating System : Windows 7 and above (64-bit).
- Python : 3.6

- ***Overview of Python***

Python is a widely used general-purpose, high level programming language. It was initially designed by Guido van Rossum in 1991 and developed by Python Software Foundation. It was mainly developed for emphasis on code readability, and its syntax allows programmers to express concepts in fewer lines of code. Python is a programming language that lets you work quickly and integrate systems more efficiently.

It is used for:

- web development (server-side)
- software development
- mathematics
- System scripting

Many languages are compiled, meaning the source code you create needs to be translated into machine code, the language of your computer's processor, before it can be run. Programs written in an interpreted language are passed straight to an interpreter that runs them directly. This makes for a quicker development cycle because you just type in your code and run it, without the intermediate compilation step.

One potential downside to interpreted languages is execution speed. Programs that are compiled into the native language of the computer processor tend to run more quickly than interpreted programs. For some applications that are particularly computationally intensive, like graphics processing or intense number crunching, this can be limiting. In practice, however, for most programs, the difference in execution speed is measured in milliseconds, or seconds at most, and not appreciably noticeable to a human user. The expediency of coding in an interpreted language is typically worth it for most applications.

For all its syntactical simplicity, Python supports most constructs that would be expected in a very high-level language, including complex dynamic data types, structured and functional programming, and object-oriented programming. Additionally, a very extensive library of classes and functions is available that provides capability well beyond what is built into the language, such as database manipulation or GUI programming. Python accomplishes what many programming languages don't: the language itself is simply designed, but it is very versatile in terms of what you can accomplish with it.

3.7 SYSTEM DESIGN

Effective weight adaptation scheme is introduced so that it is able to determine the relevance assigned to each face instance, depending on the frame degree of motion/camera blur, scale variation, and compression artifacts.

INPUT

The original image is stored inside the database.

BEHAVIOUR

The system detects the face that is captured and recognizes the face whether it is stored in the database or not.

OUTPUT

The face that is recognized is announced to the visually impaired person.

PERFORMANCE

The performance of the proposed system will be high due to high security.

3.7.1 System Architecture

The system architecture establishes the basic structure of the system, defining the essential core design features and elements that provide the framework for the system.

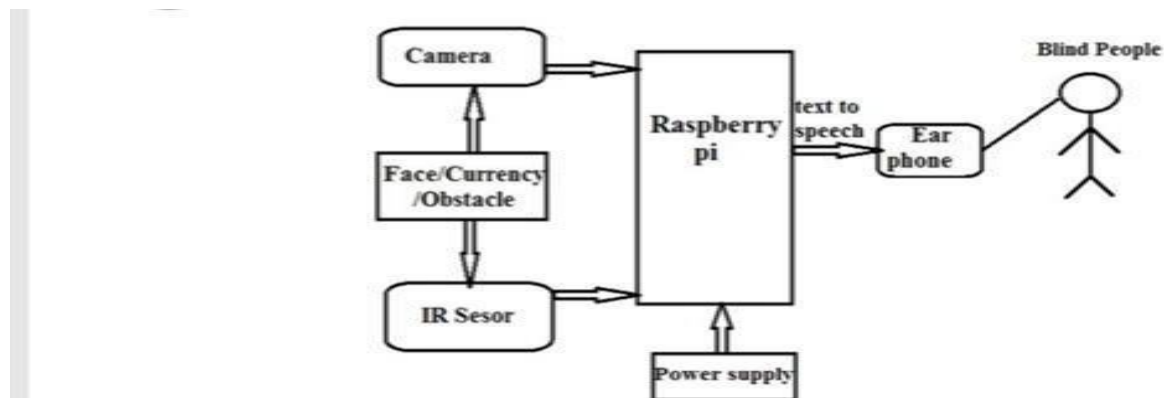


Fig.3.4: Architectural Design

The systems architecture provides the architects view of the users' vision for what the system needs to be and do, and the paths along which it must be able to evolve and strives to maintain the integrity of that vision as it evolves during detailed design and implementation.

In this system the visually impaired person at first captures the face of the person, then it automatically checks whether the face that is detected is present in the database or not. With the use of Raspberry pi and power supply the face that is detected and recognized then the name of that recognized person gets converted from text to speech and the name of the person gets announced, so that the person can be easily identified by the visually impaired.

3.7.2 Module Overview

- **Face Image collection and tagging**
- **Machine Learning using KNN**
- **Detecting and recognition Face**

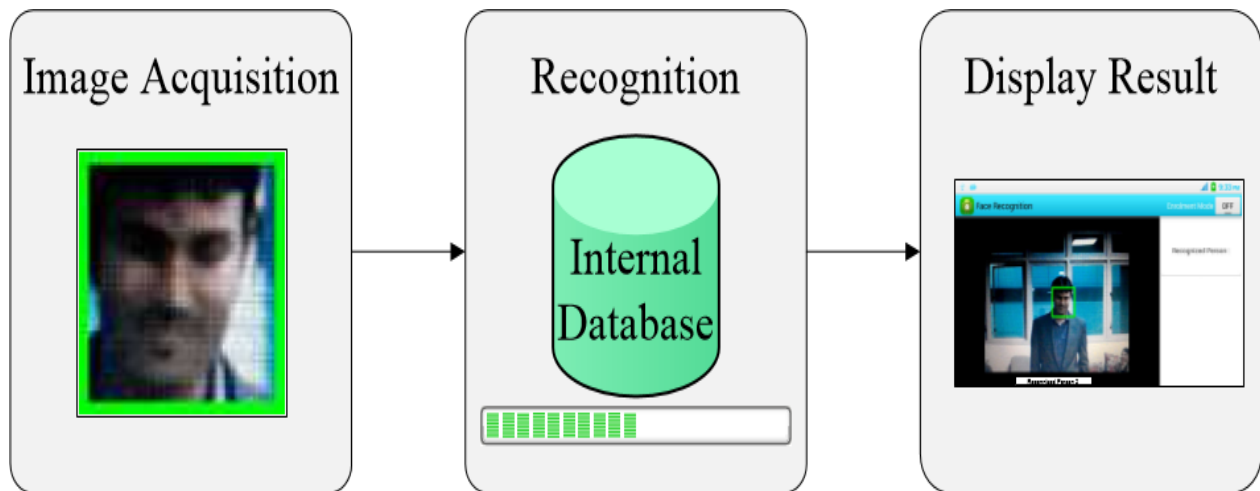


Fig.3.5: Implementation of Modules

▪ **Face Image collection and tagging**

The face images of known people for the visually impaired user is collected using different modes. More than four face images of the person are collected for better detection and recognition. The images were verified whether it has a face portion in it by running the face detection algorithm. All the images were tagged and stored in a different folder. The folders were named as the user's name. Any image without a face portion is detected and removed from the dataset.

1. Image Pre-processing

The ultimate aim for any image pre-processing technique is to improve the quality of the image. This quality enhancement is done in such a way that features of the images are more enhanced. Subsequent to the image acquisition stage, the images pass through the pre-processing stage. There will be a change in the output image for the given input image. The occurrence of this change is due to the reduction of noise and/or enhancement of contrast. Image pre-processing is needed to vary its lightning condition.

2. Image Acquisition

Facial images obtained from people are collected from Databases after capturing and detecting the faces. The file formats collected from the database are of .jpeg, .tiff, .png file formats and the file dimensions consist of rows and columns.

▪ **Machine learning using KNN**

K-Nearest Neighbors (KNN) is one of the simplest algorithms used in Machine Learning for regression and classification problem. KNN algorithms use a data and classify new data points based on a similarity measures (e.g. distance function). Classification is done by a majority vote to its neighbors. The data is assigned to the class which has the most nearest neighbors. We will start by importing the necessary libraries required to implement the KNN Algorithm in Python. We will import the numpy

libraries for scientific calculation. Next, we will import the matplotlib. pyplot library for plotting the graph

- ***Detecting and Recognition Face***

The KNN trained model is used to detect the face in the video feed. The video frame with face detected will be fed to the KNN model for face recognition. The KNN classifies the detected face with the database. The face with the highest matching score is selected. The selected ID of the highest matching face is then translated to name. The name obtained is fed to the text to speech module to speak the name to the user.

3.7.3 Proposed Algorithm

- ***K-Nearest Neighbors***

In four years of the analytics built more than 80% of classification models and just 15-20% regression models. These ratios can be more or less generalized throughout the industry. The reason of a bias towards classification models is that most analytical problem involves making a decision. For an instance will a customer attrite or not, should we target customer X for digital campaigns, whether customer has a high potential or not etc. This analysis is more insightful and directly links to an implementation roadmap. In this article, we will talk about another widely used classification technique called K-nearest neighbors (KNN). Our focus will be primarily on how does the algorithm work and how does the input parameter effect the output/prediction.

- ***KNN algorithm***

KNN can be used for both classification and regression predictive problems. However, it is more widely used in classification problems in the industry. To evaluate any technique we generally look at 3 important aspects:

1. Ease to interpret output
2. Calculation time

3. Predictive Power

Table.3.1: Placing KNN in the Scale

	Logistic Regression	CART	Random Forest	KNN
1. Ease to interpret output	2	3	1	3
2. Calculation time	3	2	1	3
3. Predictive Power	2	2	3	2

KNN algorithm fares across all parameters of considerations. It is commonly used for its easy of interpretation and low calculation time.

▪ *The KNN algorithm work*

Let's take a simple case to understand this algorithm.

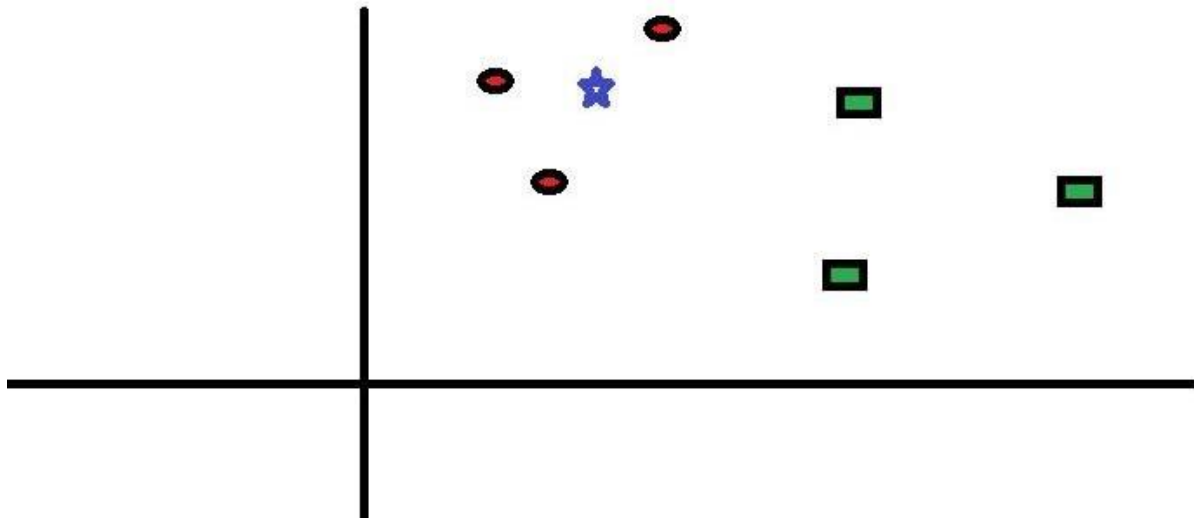


Fig.3.6: A spread of red circles (RC) and green squares (GS)

You intend to find out the class of the blue star (BS). BS can either be RC or GS and nothing else. The “K” in KNN algorithm is the nearest neighbors we wish to take vote from. Let's say $K = 3$. Hence, we will now make a circle with BS as center just as big as to enclose only three data points on the plane.

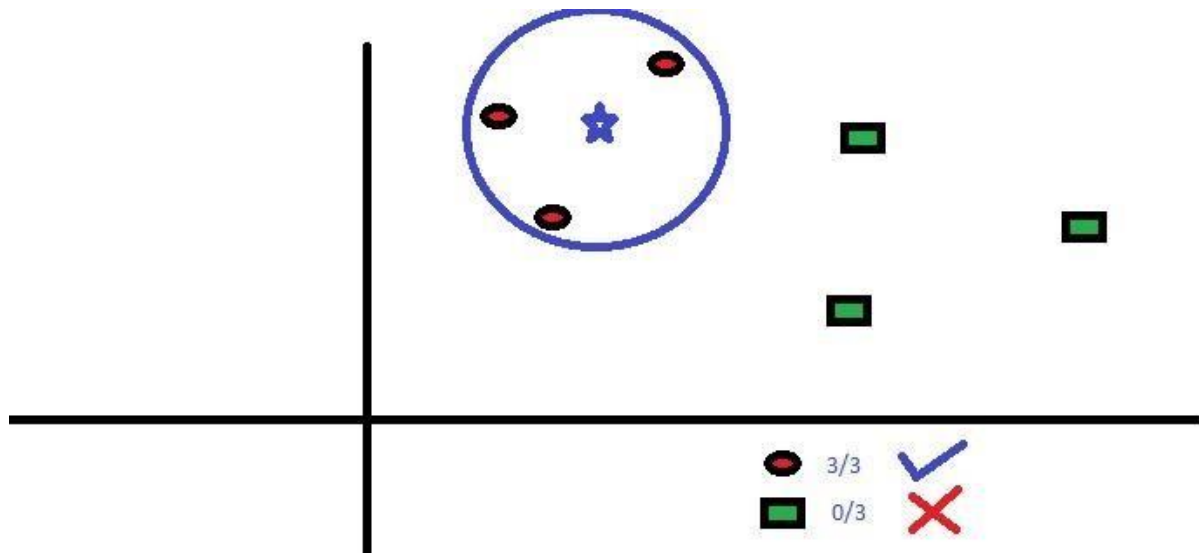


Fig.3.7: Identifying the closest neighbor using KNN Algorithm

The three closest points to BS is all RC. Hence, with good confidence level we can say that the BS should belong to the class RC. Here, the choice became very obvious as all three votes from the closest neighbor went to RC. The choice of the parameter K is very crucial in this algorithm.

- ***How do we choose the factor K?***

First let us try to understand what exactly does K influences in the algorithm. If we see the last example, given that all the 6 training observation remain constant, with a given K value we can make boundaries of each class. These boundaries will segregate RC from GS. The same way, let's try to see the effect of value "K" on the class boundaries. As you can see, the error rate at $K=1$ is always zero for the training sample. This is because the closest point to any training data point is itself. Hence the prediction is always accurate with $K=1$. If validation error curve would have been similar, our choice of K would have been.

Following are the different boundaries separating the two classes with different values of K.

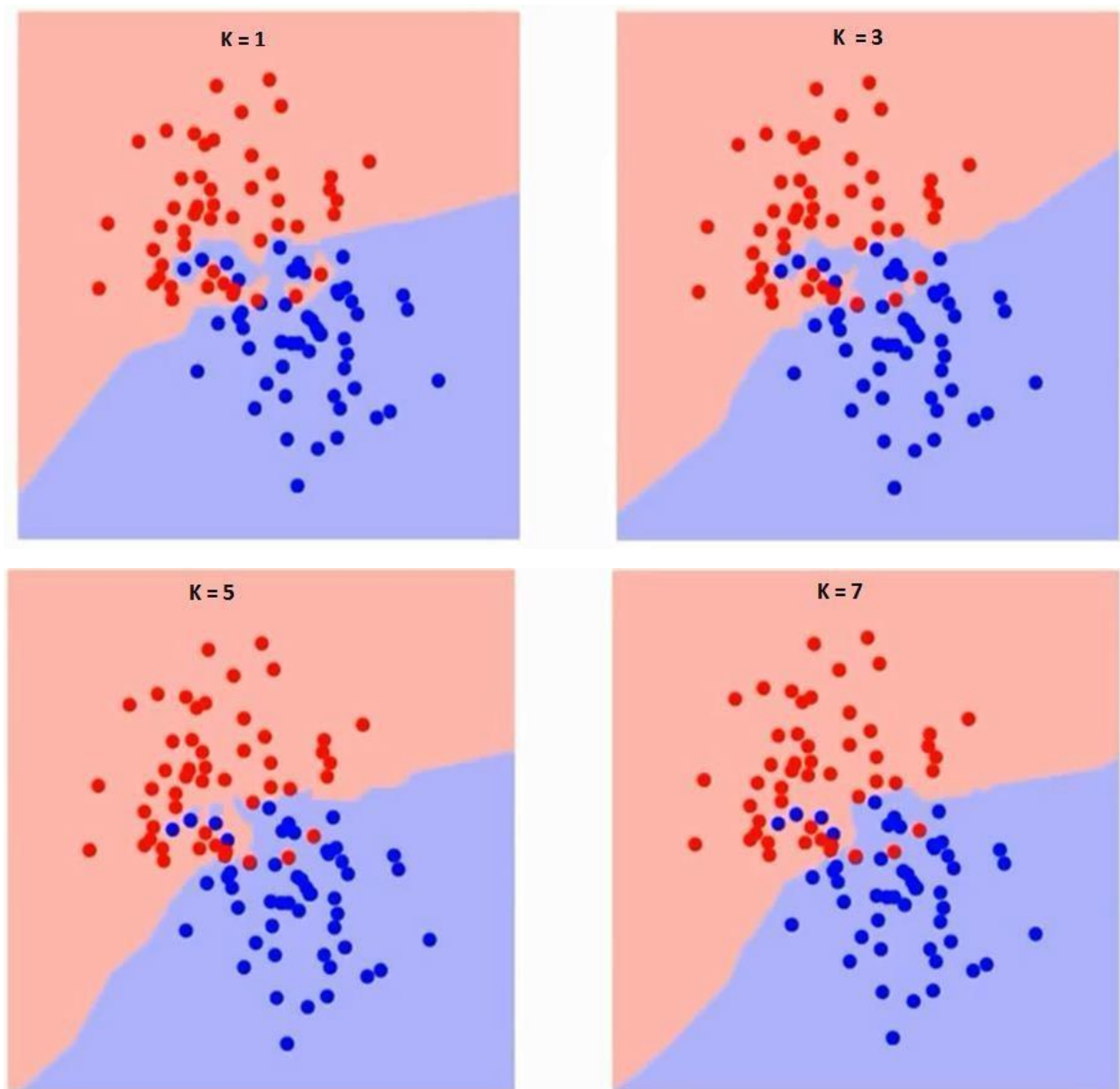


Fig.3.8: Different boundaries separating the two classes with different values of K.

If you watch carefully, you can see that the boundary becomes smoother with increasing value of K. With K increasing to infinity it finally becomes all blue or all red depending on the total majority. The training error rate and the validation error rate are two parameters we need to access on different K-value.

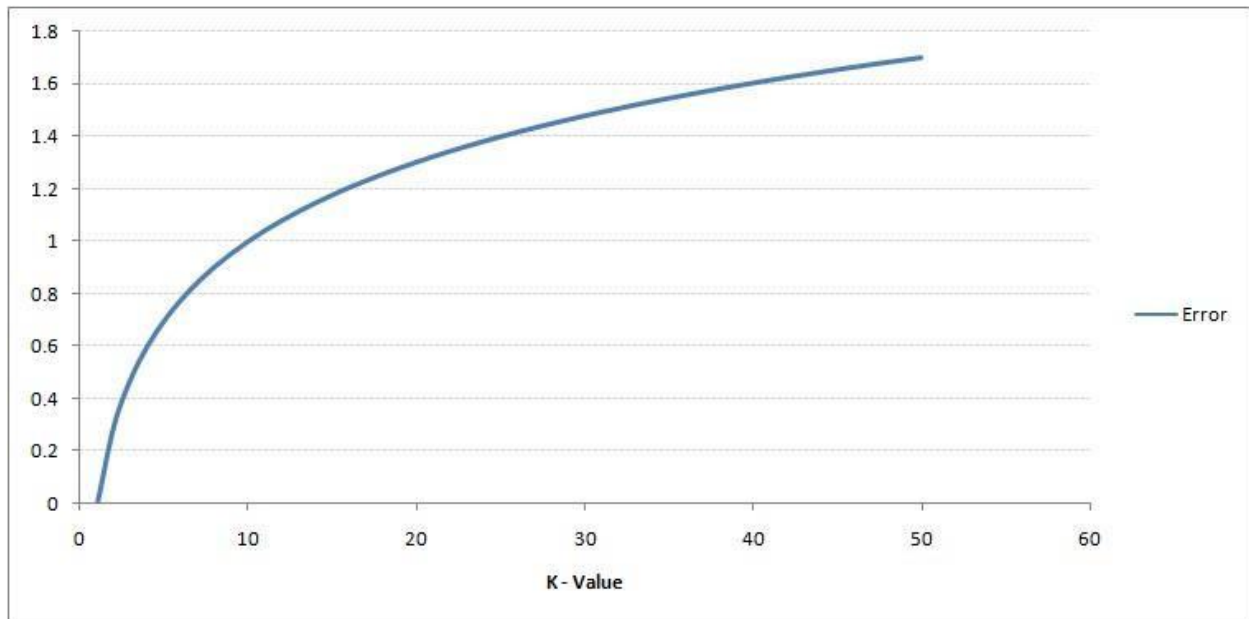


Fig.3.9: The curve for the training error rate with varying value of K

As you can see, the error rate at $K=1$ is always zero for the training sample. This is because the closest point to any training data point is itself. Hence the prediction is always accurate with $K=1$. If validation error curve would have been similar, our choice of K would have been.

- **Pseudo Code of KNN**

We can implement a KNN model by following the below steps:

1. Load the data
2. Initialize the value of k
3. For getting the predicted class, iterate from 1 to total number of training data points
 1. Calculate the distance between test data and each row of training data. Here we will use Euclidean distance as our distance metric since it's the most popular method. The other metrics that can be used are Chebyshev, cosine, etc.

2. Sort the calculated distances in ascending order based on distance values
3. Get top k rows from the sorted array
4. Get the most frequent class of these rows
5. Return the predicted class

- ***Conclusion***

KNN algorithm is one of the simplest classification algorithms. Even with such simplicity, it can give highly competitive results. KNN algorithm can also be used for regression problems. The only difference from the discussed methodology will be using averages of nearest neighbors rather than voting from nearest neighbor.

3.7.4 Design and Implementation Constraints

1. Constraints in Analysis

- Constraints as Informal Text
- Constraints as Operational Restrictions
- Constraints Integrated in Existing Model Concepts
- Constraints as a Separate Concept
- Constraints Implied by the Model Structure

2. Constraints in Design

- Determination of the Involved Classes
- Determination of the Involved Objects
- Determination of the Involved Actions
- Determination of the Require Clauses
- Global actions and Constraint Realization

3. Constraints in Implementation

A hierarchical structuring of relations may result in more classes and a more complicated structure to implement. Therefore it is advisable to transform the hierarchical relation structure to a simpler structure such as a classical flat one. It is rather straightforward to transform the developed hierarchical model into a bipartite, flat model, consisting of classes on the one hand and flat relations on the other. Flat

relations are preferred at the design level for reasons of simplicity and implementation ease. There is no identity or functionality associated with a flat relation. A flat relation corresponds with the relation concept of entity-relationship modeling and many object oriented methods.

3.8 OTHER NONFUNCTIONAL REQUIREMENTS

3.8.1 Performance Requirements

The application at this side controls and communicates with the following three main general components.

- embedded browser in charge of the navigation and accessing to the web service;
- Server Tier: The server side contains the main parts of the functionality of the proposed architecture. The components at this tier are the following: Web Server, Security Module, Server-Side Capturing Engine, Preprocessing Engine, Database System, Verification Engine, Output Module.

3.8.2 Safety Requirements

1. The software may be safety-critical. If so, there are issues associated with its integrity level.
2. The software may not be safety-critical although it forms part of a safety critical system. For example, software may simply log transactions.
3. If a system must be of a high integrity level and if the software is shown to be of that integrity level, then the hardware must be at least of the same integrity level.
4. There is little point in producing 'perfect' code in some language if hardware and system software (in widest sense) are not reliable.

5. If a computer system is to run software of a high integrity level then that system should not at the same time accommodate software of a lower integrity level.
6. Systems with different requirements for safety levels must be separated.
7. Otherwise, the highest level of integrity required must be applied to all systems in the same environment.

3.9 UML DIAGRAMS

Unified Modeling Language (UML) is a standardized general-purpose modeling language in the field of software engineering. The standard is managed and was created by the Object Management Group. UML includes a set of graphic notation techniques to create visual models of software intensive systems. This language is used to specify, visualize, modify, construct and document the artifacts of an object oriented software intensive system under development.

3.9.1 Sequence Diagram

Sequence diagrams can illustrate a succession of interactions between classes and objects instances over time. Sequence diagrams are often used to illustrate the processing described in use case scenarios. In practice, sequence diagrams are derived from use case analysis and are used in systems design to derive the interactions, relationships, and methods of the objects in the system. Sequence diagrams are used to show the overall pattern of the activities or interactions in a use case. Each use case scenario may create one sequence diagram, although sequence diagrams are not always created for minor scenarios.

The symbols used in sequence diagrams are shown in the figure below. Actors and classes or object instances are shown in boxes along the top of the diagram. The leftmost object is the starting object and may be a person (for which a use case actor symbol is used), window, dialog box, or other user interface. Some of the interactions are physical only, such as signing a contract. The top rectangles use indicators in the name to indicate whether the rectangle represents an object, a class, or a class and object.

A Sequence diagram is a kind of interaction diagram that shows how processes operate with one another and in what order. It is a construct of Message Sequence diagrams are sometimes called event diagrams, event sceneries and timing diagram.

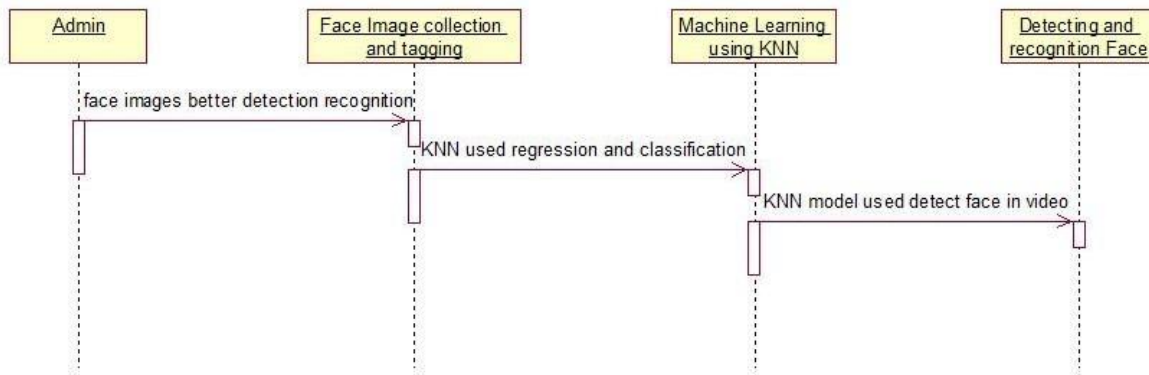


Fig.3.10: Sequence diagram

3.9.2 Use case Diagram

A Use case Diagram is used to present a graphical overview of the functionality provided by a system in terms of actors, their goals and any dependencies between those use cases.

Use case diagram consists of two parts:

Use case: A use case describes a sequence of actions that provided something of measurable value to an actor and is drawn as a horizontal ellipse.

Actor: An actor is a person, organization or external system that plays a role in one or more interaction with the system.

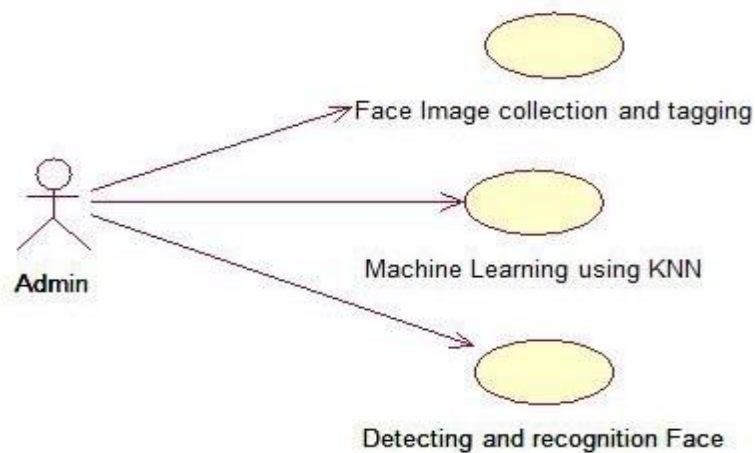


Fig.3.11: Use case diagram

3.9.3 Activity Diagram

Activity diagram is defined as a UML diagram that focuses on the execution and flow of the behavior of a system instead of implementation. It is also called object oriented flowchart. Activity diagrams consist of activities that are made up of actions which apply to behavioral modeling technology.

Activity Diagram allows you to create an event as an activity which contains a collection of nodes joined by edges. An activity can be attached to any modeling element to model its behavior. Activity diagrams are used to model,

- Use cases
- Classes
- Interfaces
- Components
- Collaborations

Activity Diagrams are used to model process and workflows. The essence of a useful activity diagram is focused on communicating a specific aspect of a system dynamic behavior. Activity diagrams capture the dynamic elements of a system. Activity diagram is a graphical representation of workflows of stepwise activities and actions with support for choice, iteration and concurrency. An activity diagram shows the overall flow of control.

The most important shape types:

- Rounded rectangles represent activities.
- Diamonds represent decisions.
- Bars represent the start or end of concurrent activities.
- A black circle represents the start of the workflow.
- An encircled circle represents the end of the workflow.

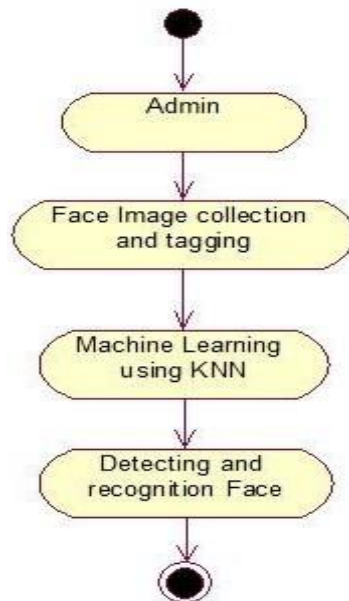


Fig.3.12: Activity diagram

3.9.4 Collaboration Diagram

UML Collaboration Diagrams illustrate the relationship and interaction between software objects. They require use cases, system operation contracts and domain model to already exist. The collaboration diagram illustrates messages being sent between classes and objects.

Collaboration Diagram represents the interaction of the objects to perform the behavior of a particular use case or a part of use case. The designers use the Sequence diagram and Collaboration Diagrams to define and clarify the roles of the objects that perform a particular flow of events of a use case.

A collaboration diagram, also known as a communication diagram, is an illustration of the relationships and interactions among software objects in the Unified Modeling Language (UML).

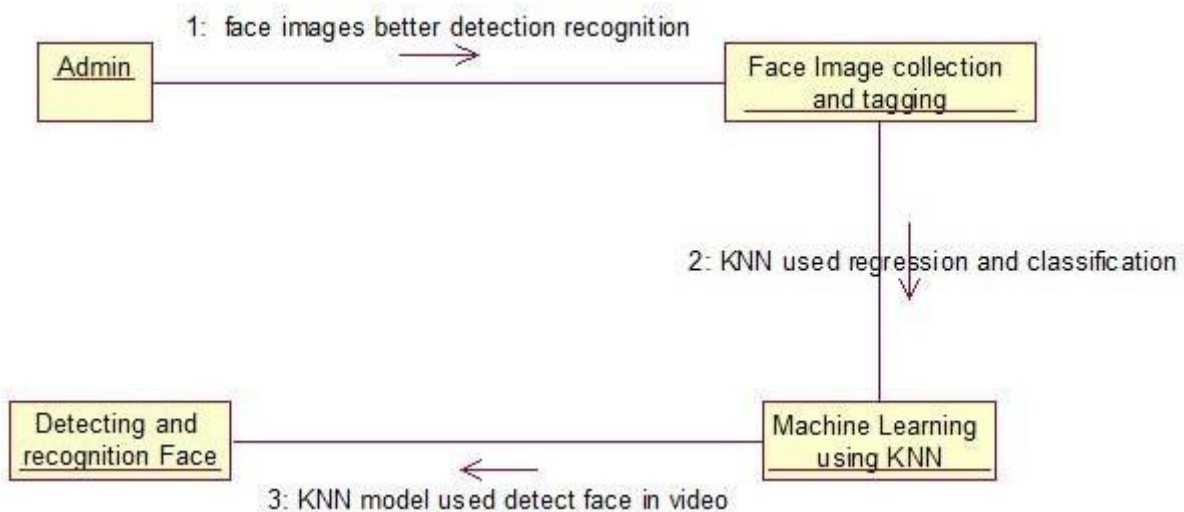


Fig.3.13: Collaboration diagram

3.9.5 Data flow Diagram

A Data Flow Diagram (DFD) is a graphical representation of the “flow” of data through an information system, modeling its aspects. It is a preliminary step used to create

an overview of the system which can later be elaborated DFDs can also be used for visualization of data processing.

A data-flow diagram (DFD) is a way of representing a flow of a data of a process or a system (usually an information system). The DFD also provides information about the outputs and inputs of each entity and the process itself. A data-flow diagram has no control flow, there are no decision rules and no loops.

Levels in Data Flow Diagrams (DFD) In Software engineering DFD (data flow diagram) can be drawn to represent the system of different levels of abstraction. Higher level DFDs are partitioned into low levels-hacking more information and functional elements. Levels in DFD are numbered 0, 1, 2 or beyond.

Level 0

A level 0 data flow diagram (DFD), also known as a context diagram, shows a data system as a whole and emphasizes the way it interacts with external entities. This DFD level 0 example shows how such a system might function within a typical retail business

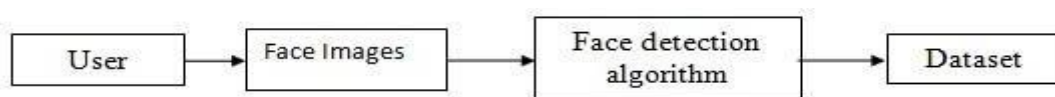


Fig.3.14: DFD level-0

In the level-0 diagram, the user image is first captured and store it in the database named dataset.

Level 1

Context diagrams (level 0 DFDs) are diagrams where the whole system is represented as a single process. A level 1 DFD notates each of the main sub-processes that together form the complete system.

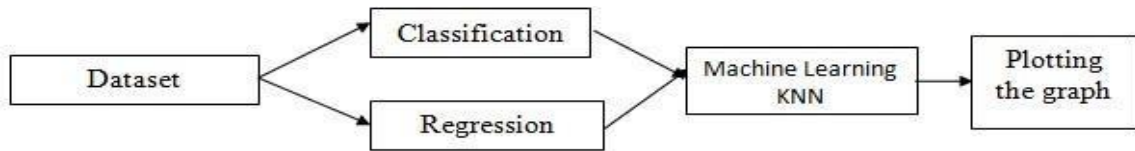


Fig.3.15: DFD level-1

In the level-1 diagram, the image that gets detected is classified using KNN algorithm and plot the graph pointing the nearest neighbors.

Level 2

A level 2 data flow diagram (DFD) offers a more detailed look at the processes that make up an information system than a level 1 DFD does. It can be used to plan or record the specific makeup of a system. You can then input the particulars of your own system.

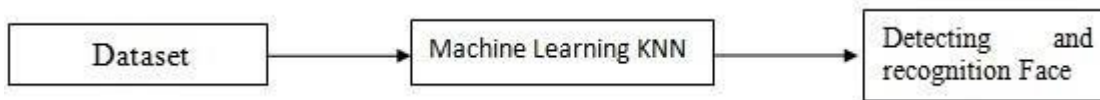


Fig.3.16: DFD level-2

In the level-2 diagram, the face gets detected and recognized using the KNN algorithm by comparing the detected face to the faces that are present in the dataset.

CHAPTER 4

RESULTS AND DISCUSSION

4.1 RESULTS

The experimental results were done on various datasets. The experiment was performed in Python and raspberry pi, where a classifier was used to train the model using the various face of persons. The face recognition is one of the critical aspects with which the model needs to be trained.

4.1.1 Capturing The Face



Fig.4.1: Capturing The Face

Here, the camera board detects the face of the person, and then we should store the detected face with a label.

4.1.2 Labelling the Detected image

The image that gets detected is labelled and then we should store it inside the database.

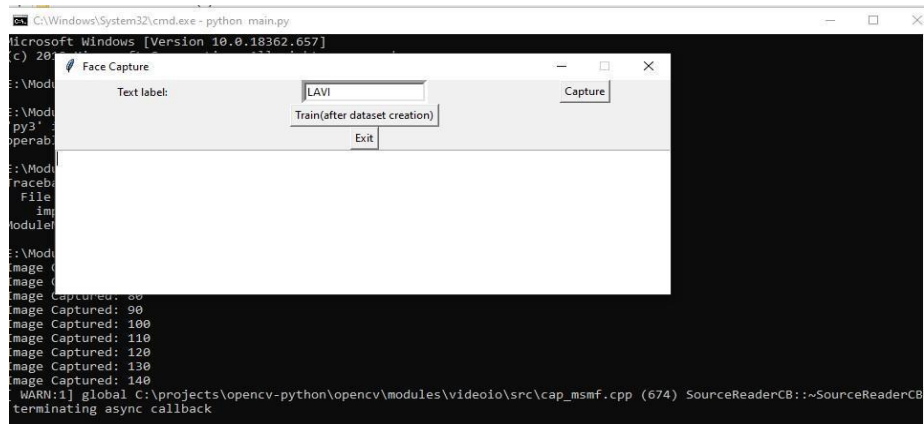


Fig.4.2: Labelling the detected image

The image that gets detected is labelled and then we should store it inside the database.

4.1.3 Files stored in the Database

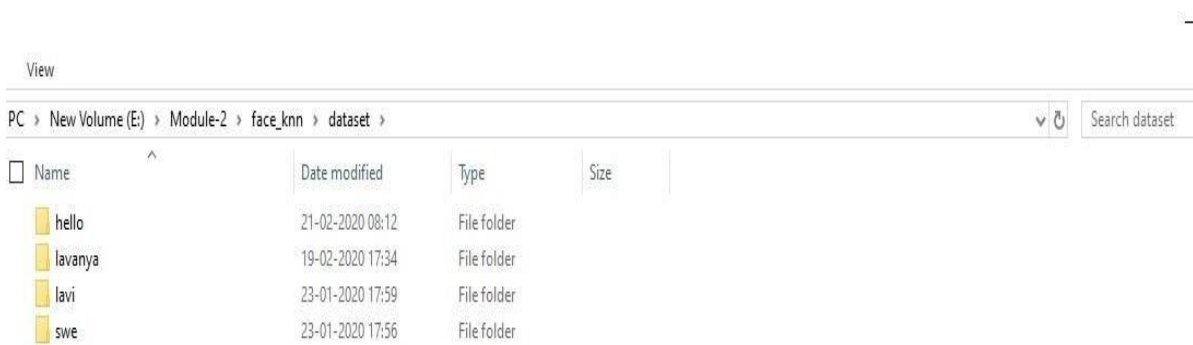


Fig.4.3: Files stored in the Database

After labelling, the files i.e., the detected images are stored in the database under the name dataset.

4.1.4 Captured Images in the Database



Fig.4.4: Captured images in the Dataset

After detecting the face, the images of that particular person are captured in all the frames and stored inside the dataset by numbering the images and stored in .jpg format.

4.1.5 Output

Using camera board, the face gets detected and gets compared to the labels that are present in the database.

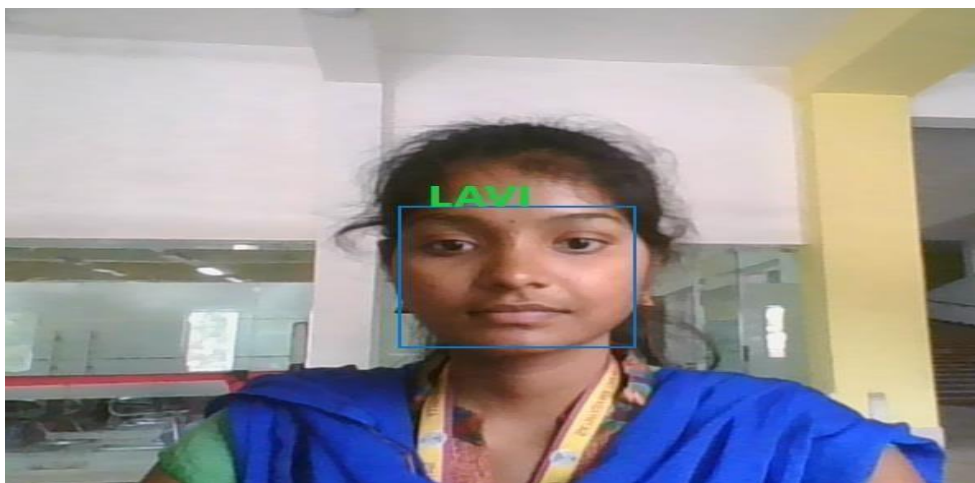


Fig.4.5: Name of the corresponding person will be displayed

If the detected face matches with the faces that are present in the database and it displays the name of that particular person whose face has been recognized.

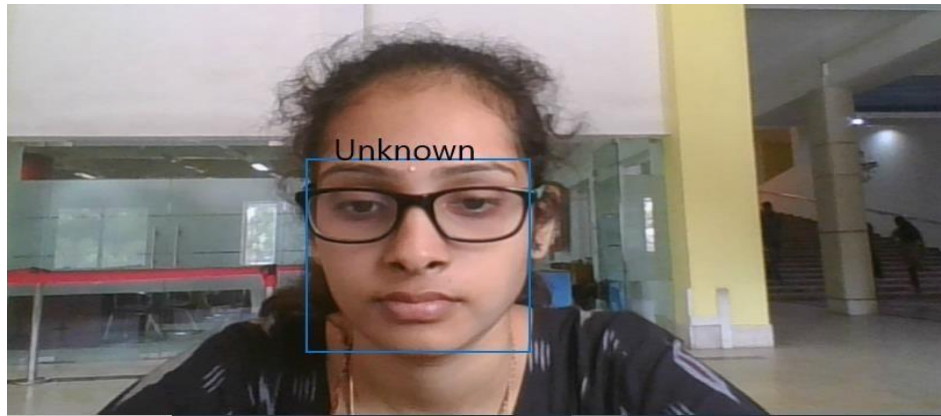


Fig.4.6: identifying the unknown person

If the detected face doesn't match with the faces that are present in the database and it displays as "Unknown".

CHAPTER 5

CONCLUSION AND FUTURE WORK

5.1 SUMMARY

The World Health Organization (WHO) reported that there are 285 million visually impaired people worldwide. Among these individuals, there are 39 million who are totally blind. There have been several systems designed to support visually-impaired people and to improve the quality of their lives. Unfortunately, most of these systems are limited in their capabilities. In this paper, we present a comparative survey of the wearable and portable assistive devices for visually impaired people in order to show the progress in assistive technology for this group of people. Thus, the contribution of this literature survey is to discuss in detail the most significant devices that are presented in the literature to assist this population and highlight the improvements, advantages, disadvantages, and accuracy. Our aim is to address and present most of the issues of these systems to pave the way for other researchers to design devices that ensure safety and independent mobility to visually-impaired people.

5.2 CONCLUSION

The medical field is one such field where though there are numerous research works going, it still needs new projection to make the existing systems perform better. Machine Learning techniques are widely used in many fields to minimize the manpower and use them for better efficiency and less processing time. In this paper, we have proposed a system that is trained with the YTF dataset for face recognition and is able to recognize the face of the humans using the images captured by the camera. It processes the images using the KNN algorithm and pre-processes it to obtain a very accurate identification of the person. The proposed model has efficiently produced the results and various parameters are also used to measure the performance of the system. Hence we have proposed a design on face and text recognition based on raspberry pi which is mainly designed for the purpose of blind navigation. Our future work will focus on detecting the emotions of the persons and recognizing more types of indoor objects and icons on signage in addition to text for indoor way finding aid to assist blind people

travel independently. We will also study the significant human interface issues including auditory output and spatial updating of object location, orientation, and distance. With real-time updates, blind users will be able to better use spatial memory to understand the surrounding environment, faces.

5.3 FUTURE ENHANCEMENT

Future study is to expand the proposed scheme to people with low vision find it difficult to socialize publicly due to lack of face recognition ability. Robust assistive solutions are available but either those are too heavy on the pocket or are not wearable. In this paper, we have proposed a low cost lightweight wearable device, based on raspberry pi 3 that uses enhanced machine learning algorithms. The device has two user selectable operation modes; recognition mode and new entry or training mode. In recognition mode, a combination of Haar-cascade and Hog features are used for face detection and recognition. The accuracy of recognition system is further improved by algorithms are next applied to each frame and the name with maximum votes is announced on the earphones. In case of unrecognized faces, system announces "Unknown". For the training mode, a web-based user interface has been proposed that can help the user for enrolling and updating entries, into the dataset. The system has been tested in real time environment. Results show the accuracy of the proposed methodology. The future enhancements are given below:

- Human emotions can be pre-programmed in order to guide blind peoples
- Unknown persons can be identified to great extent.

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APPENDIX

A. SOURCE CODE

USAGE

When encoding on laptop, desktop, or GPU (slower, more accurate):

```
# python encode_faces.py --dataset dataset --encodings encodings.pickle --  
detectionmethod cnn
```

When encoding on Raspberry Pi (faster, more accurate):

```
# python encode_faces.py --dataset dataset --encodings encodings.pickle --  
detectionmethod hog
```

import the necessary packages

from imutils import paths import

face_recognition import argparse

import pickle import cv2 import

os

construct the argument parser and parse the arguments

ap = argparse.ArgumentParser() ap.add_argument("-i", "-

-dataset", required=True, help="path to input directory of

faces + images") ap.add_argument("-e", "--encodings",

required=True, help="path to serialized db of facial

encodings") ap.add_argument("-d", "--detection-method",

```

type=str, default="cnn",    help="face detection model to
use: either `hog` or `cnn`") args = vars(ap.parse_args())

# grab the paths to the input images in our dataset
print("[INFO] quantifying faces...") imagePath =
list(paths.list_images(args["dataset"]))

# initialize the list of known encodings and known names
knownEncodings = [] knownNames = []

# loop over the image paths for (i, imagePath) in
enumerate(imagePaths): # extract the person name
from the image path    print("[INFO] processing
image {}/{}".format(i + 1,
                    len(imagePaths)))

    name = imagePath.split(os.path.sep)[-2]
    # load the input image and convert it from RGB (OpenCV ordering)
    # to dlib ordering (RGB)    image =
cv2.imread(imagePath)    rgb = cv2.cvtColor(image,
cv2.COLOR_BGR2RGB)

```

```

        # detect the (x, y)-coordinates of the bounding boxes

# corresponding to each face in the input image      boxes

= face_recognition.face_locations(rgb,

model=args["detection_method"])


        # compute the facial embedding for the face      encodings

= face_recognition.face_encodings(rgb, boxes)


# loop over the encodings

for encoding in encodings:

    # add each encoding + name to our set of known names and

    # encodings

    knownEncodings.append(encoding)

    knownNames.append(name)

# dump the facial encodings + names to disk

print("[INFO] serializing encodings...") data = {"encodings":

knownEncodings, "names": knownNames} f =

open(args["encodings"], "wb")

f.write(pickle.dumps(data))

f.close()

```

B. PUBLICATION

IOT BASED FACE RECOGNITION SYSTEM FOR VISUALLY IMPAIRED PEOPLE

M.V.S. Bhargavi Swetha

Department of Computer Science
and Engineering

Sathyabama Institute of Science
and Technology

Chennai, Tamilnadu

bhargaviswetha579@gmail.com

M.Lavanya

Department of Computer Science
and Engineering

Sathyabama Institute of Science
and Technology

Chennai, Tamilnadu

lavanyamarella1469@gmail.com

Mrs .D. Usha Nandini

Department of Computer Science
and Engineering

Sathyabama Institute of Science
and Technology

Chennai, Tamilnadu

usha.cse@sathyabama.ac.in

Abstract — The healthcare area is actually among the most crucial aspects which are actually explored by many scientists to build the best system. Although there were many differences as well as revolutionary methods created, there are usually certain problems that demonstrate in the niche which must be resolved. In days or weeks that are previous, there had been plenty of functions that were not possible to do as well as had a lot of risk factors related to the affected person. In this specialized era that has been altered, extremely main businesses can also be completed with a lot of great ease. Increasing the variety of the public has additionally viewed a growth in the selection of individuals who are actually created visually impaired or perhaps drop their visual sight whenever they close to the older age period of theirs. It's always quite difficult for visually impaired individuals to exist in their life with no assistance. With this paper, we suggest a face recognition process which could be utilized by the visually impaired individuals. In order to reduce the quantity of ambiguity, we've suggested a design that is actually meant for utilizing different machine learning strategies as KNN algorithms. An innovative face detection, as well as recognition device, is created which

could operate in a tiny form factor. The suggested effort is noticed working nicely when in contrast with some other existing programs and might be of usage that is very much for the visually impaired persons.

Keywords —Visually Impaired, Face Recognition, Automated System, Motion Control Human-Robot interface.

I. INTRODUCTION

The healthcare area is actually among the most crucial filed that must be taken care of. Although there are many brand-new scientists to update the existing methods in the submitted, currently it might be considerably improved for much better overall performance. As it deals with the lifetime of man enormous care should be provided for the exact same. The progress of Artificial Intelligence has given birth to a lot of brand new systems out of that the famous people are now being Machine Learning Approaches as well as Deep Learning Techniques. Different strategies in Artificial Intelligence are popular in many uses such as for instance healthcare picture evaluation [1], automatic robot course preparing

[2], flood detection in a specific community or maybe region [3] as well as land coverage distinction [4]. Visibility is actually among the most crucial provided presents for any man. An individual created with a visual disability or maybe has lost the perception of his for some other factors such as for instance mishaps or even years element suffers a great deal for his whole lifetime. This will make the individual be determined by many other individuals to do his/her daily actions.

Medical area relates to man life and saving them will be the biggest obstacle. A lot of the brand new systems are utilized for enhancing the exact same. With this newspaper, we've suggested a program wherein the KNN algorithms are actually utilized for detection and face recognition that may be quickly employed for understanding the actual individual. Absolutely no human treatment is actually required and just the instructions provided by the people are actually realized by the devices. This way, the movable methods are manufactured semi-autonomous as well as the effort is completed with great ease. There's absolutely no possibility of every disaster at determining the actual man or women as the picture of the individual is actually shot and it is recognized by comparing the various other pictures kept in the repository. The majority of the area can be stated as follows: Section II consists of the Literature Survey, section III consists of the strategy utilized at the newspaper as well as part III consists of different outcomes received. The newspaper is actually concluded within the last by bringing up the appropriate long term works that can be utilized or even included to the suggested deliver the results.

II. RELATED WORK

Many health-related problems are actually solved for making ease for lots of people in importance. A lot of study job concentrates on

producing new revolutionary products for visually impaired individuals. An alternative for eyes was created by Sachin Bharambe et al. which was considered as extremely effective & affordable. In [5], a novel framework was created to identify the flat abandoned items by making use of goal movies and matching a guide with them. The whole goal of the strategy was identifying the items with GPS info of the items. Shaocheng Qu et al. [6] created a smart automobile using a CCD digital camera which was helpful for path recognition by making use of picture recognition methods. A brand new prototype was created in

[7] which may be utilized as a traveling tool for visually impaired individuals. The prototype was created in such a manner that it detected equally dynamic and static items that were really employed for the navigation.

A sensible white-colored cane suggested in [8] made use of GPS links coupled with ultrasonic receptors to alert the blind individuals while traveling from one place to another. It was additionally termed as Bind Spot. In [9], a wise stick was suggested that made use of Infrared receptors to alert the blind individuals. The was created in such a manner that it might detect just the items in case it was present in the process. Benjamin et al. [10] created an intelligent aid that utilized the stick coupled with laser beam receptors. The alert was awarded to the blind individuals with the mic that is with them. RFID tag was put to use at the intelligent stick for passing the info regarding the hurdles and alerting the blind individuals [11]. It made use of the ultrasonic sensor in determining the items and for alerting the blind individuals through speakers. A vocal sales message was sent to the visually impaired individuals in [12] which additionally mad usage of an ultrasonic sensor for detecting the hurdles. In [13], a haptic sensor utilized to identify the hurdles and alert the individuals about the hurdles.

III. PROPOSED APPROACH

The system proposed in the current research is divided into three phases as follows:

1) Face Image collection and tagging

The face images of known people for the visually impaired user is collected using different modes. More than four face images of the person are collected for better detection and recognition. The images were verified whether it has a face portion in it by running the face detection algorithm. All the images were tagged and stored in a different folder. The folders were named as the user's name. Any image without a face portion is detected and removed from the dataset.

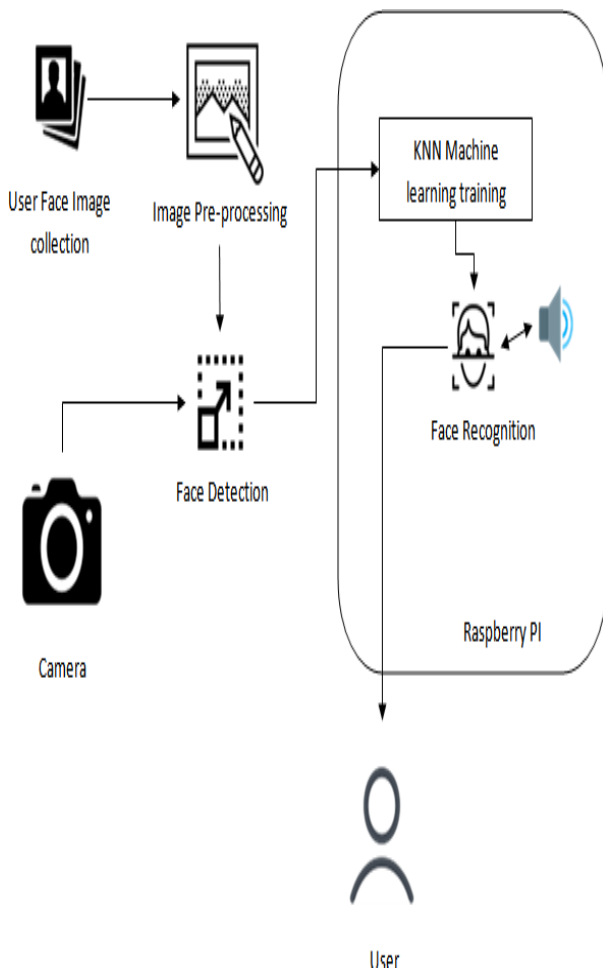


Fig. 1 Block Diagram of the Proposed System

2) Machine Learning using KNN

K-Nearest Neighbors (KNN) is actually among the easiest algorithms employed in Machine Learning for regression as well as classification problems. KNN algorithms make use of information & classify brand new data points depending on similarity methods (e.g. distance function). The distinction is actually accomplished by a vast majority of the vote to the friends of its. The information is assigned to the category that has the maximum nearest friends. We are going to start by importing the required libraries needed to apply the KNN Algorithm in Python. We are going to import the NumPy libraries for scientific computation. Then, we are going to import matplotlib.pyplot library for plotting the graph.

3) Detecting and recognition Face

The KNN model that is trained in the proposed work is actually utilized to identify the facial skin at the video feed. The video clip frame with experience detected will be given to the KNN design for face recognition. The KNN classifies the detected face with the repository. The face with the greatest matching score is actually selected. The selected ID of the largest matching facial skin is then converted to the title. The title received is actually given to the content to the speech module to talk the title to the end- user. In Fig.1, the structure of the suggested design is actually depicted. It consists of a digital camera to record the facial skin of an individual and then undergoes the different modules face recognition of the individual.

IV. EXPERIMENTAL RESULTS

The experimental results were done on various datasets. The experiment was performed in Python and raspberry pi. Where a classifier was



Fig. 2 YTF Dataset

used to train the model using the various face of persons. The face recognition is one of the critical aspects with which the model needs to be trained.

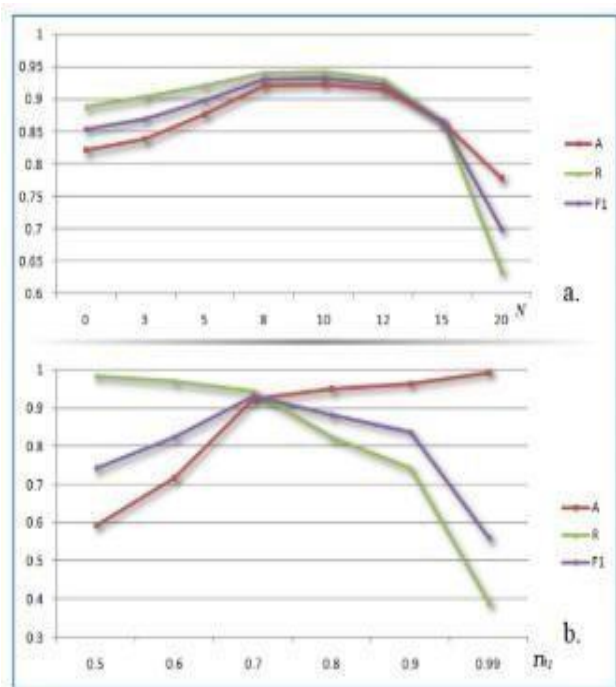


Fig. 3 The Efficiency of the Proposed System

In Fig. 3 it is the YTF dataset is used to train the model for recognizing the faces in the proposed model. The functionality of the device was extremely correct as well as the outcomes are actually revealed in Fig. 3. As is usually noticed, the framework of ours returns the greatest score outstanding to eighty 5% no matter the burning conditions, facial skin pose or may be different kinds of movements existent in the arena. Probably The lowest shows are actually received for blurred facial skin situations, while the top scores are actually obtained for frontal faces. Originating from a user perspective, the battery use of the suggested hardware structure is actually among the most crucial details which have to be taken into consideration. For starters, the video camera embedded on the smartphone is actually utilized as an acquisition unit which continuously records the neighboring arena and transmits the video stream to the processing system.

V. CONCLUSION

The medical field is one such field where though there are numerous research works going, it still needs new projection to make the existing systems perform better. Machine Learning techniques are widely used in many fields to minimize the manpower and use them for better efficiency and less processing time. In this paper, we have proposed a system that is trained with the YTF dataset for face recognition and is able to recognize the face of the humans using the images captured by the camera. It processes the images using the KNN algorithm and pre-processes it to obtain a very accurate identification of the person. The proposed model has efficiently produced the results and various parameters are also used to measure the performance of the system

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