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Submitted by:

SAGAR V 1RN17CS079

SATHYA M 1RN17CS082

Under the Guidance of:

Prof. Chethana H R

Assistant Professor

Dept. of CSE



Department of Computer Science and Engineering

(NBA Accredited for academic years 2018-19, 2019-20, 2020-22)

RNS Institute of Technology

Channasandra, Dr.Vishnuvardhan Road, Bengaluru-560 098

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RNS Institute of Technology

Channasandra, Dr. Vishnuvardhan Road, Bengaluru-560098

DEPARTMENT OF COMPUTER SCIENCE ENGINEERING

(NBA Accredited for academic years 2018-19, 2019-20, 2020-22)



CERTIFICATE

Certified that the mini project work entitled “**TITLE**” has been successfully carried out by “**NAME1** bearing USN “**1RN15CS.....**” and “**NAME2** bearing USN “**1RN15CS....**”, bonafide students of “**RNS Institute of Technology**” in partial fulfillment of the requirements for the 6th semester of “**Bachelor of Engineering in Computer Science and Engineering of Visvesvaraya Technological University**”, Belagavi, during academic year 2021-2022. It is certified that all corrections/suggestions indicated for Internal Assessment have been incorporated in the report deposited in the departmental library. The project report has been approved as it satisfies the Mobile Application Development Laboratory requirements.

Signature of the Guide
Prof. Chethana H R
Assistant Professor
Dept. of CSE

Signature of the HoD
Dr. Kiran
Professor
Dept. of CSE

Signature of the Principal
Dr. M K Venkatesha
Principal

External Viva:

Name of the Examiners

Signature with Date

- 1.
- 2.

Acknowledgement

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Abstract

Insight is an application that would detect the objects in the user's surroundings. It can alert the user of the obstacles in his pathway and this way helps the user to navigate from one place to another saving him from tripping anywhere. It will also solve the problem of keeping a special device or a walking stick. This makes the use of smartphone, a common device available to anyone and used technology to make an application which can help the blind user detect objects in his surroundings and help him in navigating from one place to another. The output of the system is in audio form that can be easily understandable for a blind user. This application provides voice assistance to visually impaired people. It is convenient to use as pictures can be clicked by just pressing volume keys. Since there is no contact required for facial recognition like there is with fingerprinting or other security measures, facial recognition offers a quick, automatic, and seamless verification experience.

The idea behind this project is to create an application that would assist people with visual impairment in analyzing their surroundings. To analyze their surroundings all they have to do is to take a picture with their mobile phone and application will automatically learn the contents/objects in the picture and will provide voice assistance, about the types of objects nearby. But there might be one catch that how visually impaired people will operate this application. Well, all they have to do is to open this application with the help of any virtual assistance on their mobile device and after that, for taking the picture they can use any one of the volume keys or the camera button. Then that captured picture will be made available to a pre-trained Convolutional Neural Network (CNN) and all the detected objects in that picture will get labeled. Those labels will then be passed onto a Text to Speech engine which by analyzing and processing the text using Natural Language Processing (NLP) converts the text into speech.

This is a cross platform mobile application which makes use of device's camera to perform various operations that help in day to day activities for the visually impaired. The idea is not just restricted to a simple mobile application as a system can be integrated with various other devices that can work on a live image capturing pictures manually cars) technique rather than taking pictures manually again and again

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Chapter 1

Introduction

1.1 About the Project

The idea behind this project is to create an application that would assist people with visual impairment in analyzing their surroundings. To analyze their surroundings all they have to do is to take a picture with their mobile phone and application will automatically learn the contents/objects in the picture and will provide voice assistance, about the types of objects nearby. But there might be one catch that how visually impaired people will operate this application. Well, all they have to do is to open this application with the help of any virtual assistance on their mobile device and after that, for taking the picture they can use any one of the volume keys or the camera button. Then that captured picture will be made available to a pre-trained Convolutional Neural Network (CNN) and all the detected objects in that picture will get labeled. Those labels will then be passed onto a Text to Speech engine which by analyzing and processing the text using Natural Language Processing (NLP) converts the text into speech.

1.2 Existing System

According to the study related to blind user employment, if blind users are provided with appropriate system, environment, service support, and assistive technology, they will perform tasks well. Compared to people in general, the blind people have low levels of space judgment, shape perception, and physical intelligence. On the other hand, they possess similar or higher level of learning ability, linguistic skills, numeracy, and work perceptivity. In other words, blind users have advantage on task based knowledge such as learning ability, linguistic skills, numeracy, and work perceptivity. Blind people have no or only very limited access to visual communication modes. Therefore, technical

support is required to present information which was originally intended to be received by the visual mode in to other mode

1.2.1 Limitation of Existing System

It is difficult for people who are blind or have low vision to recognize people in a variety of social interactions. Sole reliance on voice recognition may be difficult in some circumstances, and impossible in other circumstances, e.g., people within a group who do not speak. The inability to identify people during group meetings is a disadvantage for blind people in many professional and educational situations. The societal benefit of the proposed device is that, if successful, it will improve the access, integration, and independence of the blind or severely visually impaired individuals in workplace or educational settings. Some of the major limitations that persons with visual impairments face are:

- To access written information
- To operate devices with complex user interfaces
- To get orientation and mobility support

Chapter 2

Requirement Analysis

2.1 Hardware Requirements

The hardware requirements are very minimal and the program can be run on most of the machines

Processor : Qualcomm Snapdragon processor

Processor Speed : 1.4 GHz

RAM : 2 GB

Storage Space : 10 GB

Display Resolution : 1024*768

I/O Elements : Camera, Speaker, Microphone, GPS

Network : 5 Mbps

2.2 Software Requirement

Operating System : Android / iOS

2.3 Functional Requirements

2.3.1 Major Entities

- i The System should assist people with visual impairment in analyzing their surroundings by providing voice assistance
- ii The System should detect objects in the user's surroundings. It can inform the user about the

obstacles in his pathway which helps him/her to navigate from one place to another saving him from accidents

2.3.2 Flutter Framework architecture

Dart is a client-optimized programming language for apps on multiple platforms. It is developed by Google and is used to build mobile, desktop, server, and web applications. Dart is an object-oriented, class-based, garbage-collected language with C-style syntax. Dart can compile to either native code or JavaScript. It supports interfaces, mixins, abstract classes, reified generics, and type inference. Whether you're creating a mobile app, web app, command-line script, or server-side app, there's a Dart solution for that. Flexible compiler technology lets you run Dart code in different ways, depending on your target platform and goals: $x = a + b$

Dart Native

For programs targeting devices (mobile, desktop, server, and more), Dart Native includes both a Dart VM with JIT (Just-In-Time) compilation and an AOT (Ahead-Of-Time) compiler for producing machine code.

Dart Web

For programs targeting the web, Dart Web includes both a development time compiler (dartdevc) and a production time compiler (dart2js).

Chapter 3

System Design

3.1 System Architecture

The project consists of the following parts as shown in figure 3.1

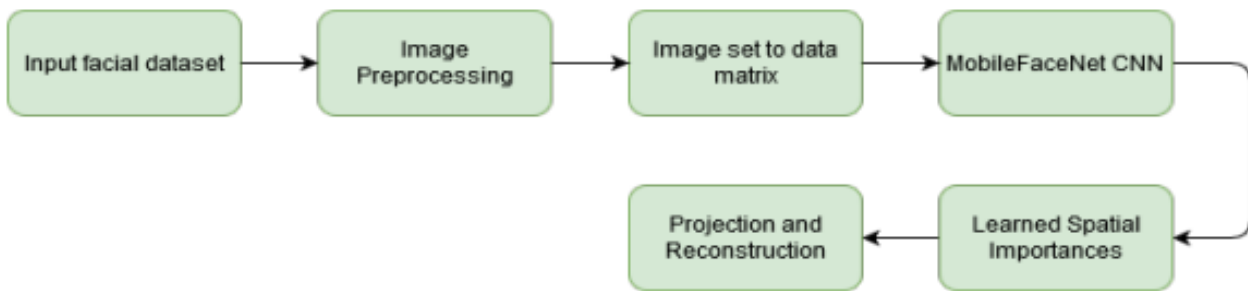


Figure 3.1: Face Recognition

3.1.1 Face Recognition

is done by extracting the facial features of a person and comparing it with the given database. MobileFaceNet CNN Model algorithm and MS1M-refine-v2 and VGGFace2 datasets by Insightface are used for Face Recognition it is shown in

3.1.2 Text-to-Speech

The Text-To-Speech (TTS) synthesis procedure consists of two main phases. The first is text analysis, where the input text is transcribed into a phonetic or some other linguistic representation, and the second one is the generation of speech waveforms, where the output is produced from this phonetic and prosody information. this is shown in figure 3.2 All speech-to-text systems rely on at least two models: an acoustic model and a language model. In addition, large vocabulary systems use

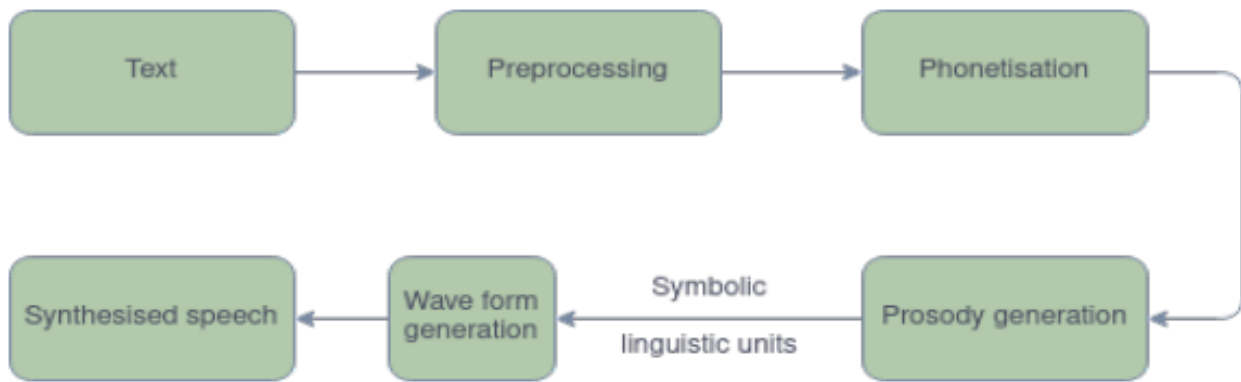


Figure 3.2: Text-to-Speech

a pronunciation model. Speech-to-Text is implemented with Microsoft Cognitive Services Text-to-Speech API T

In physics, the mass-energy equivalence is stated by the equation $E = mc^2$, discovered in 1905 by Albert Einstein.

the other form of representing the same equation is, by using equation as a separate line. The equation 3.1 states mass equivalence relationship.

$$E = mc^2 \quad (3.1)$$

Below mentioned algorithm 1 will help us to understand the concepts.

Algorithm 1 An algorithm with caption

Require: $n \geq 0$

Ensure: $y = x^n$

$y \leftarrow 1$

$X \leftarrow x$

$N \leftarrow n$

while $N \neq 0$ **do**

if N is even **then**

$X \leftarrow X \times X$

$N \leftarrow \frac{N}{2}$

else if N is odd **then**

$y \leftarrow y \times X$

$N \leftarrow N - 1$

end if

end while

► This is a comment

Chapter 4

Result Analysis

4.1 Testing

Table 4.1 gives details of validation.

Table 4.1: Test Case Validation

Test Case No.	Input	Expected Output	Actual Output
1	User enters fingerprint authentication	User gets verified and app outputs welcome message	User gets access to the app only if his/her fingerprint matches with the one stored in system
2	User gives an invalid command	The app outputs invalid command	The app outputs invalid command and asks user to re-enter commands
3	User gives a valid command	The app performs desired functionality	The app performs desired function as per user's request

to include multiple figures 4.1

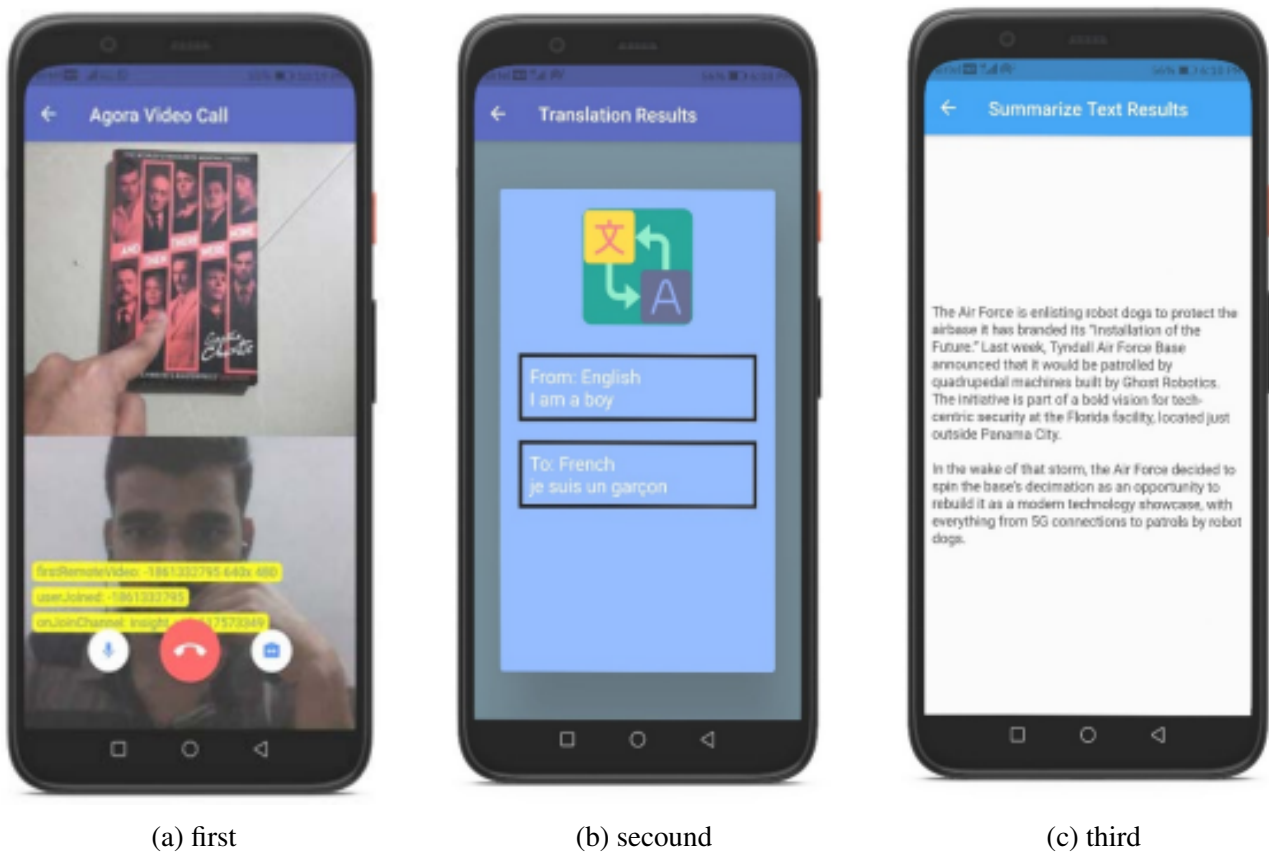


Figure 4.1: Video Call using Agora SDK

Chapter 5

Conclusion

Insight – An application to help the visually impaired plays a vital role in improving the difficulties faced by providing various functionalities that are a part of their day-to-day activities by acting as a third eye to the individual. It will improve access, integration, and independence of the blind in workplace or educational setting. There is no need for extra hardware as it utilizes the mobile device camera. The application is easier to use because of voice assistant capabilities provided by TTS and STT. This project makes use of smartphone, a common device available to anyone. Facial recognition offers a quick, automatic, and seamless verification experience. TTS gives access to content for those with learning difficulties, physical disabilities. Automatic summary software summarizes texts of 500-5000 words in a split second. This allows the user to read less data but still receive the most important information and make solid conclusions. OCR can be used to automate data-entry tasks such as processing credit cards, receipts, and business cards, and also extract text from pictures of documents, which can be used to increase accessibility or translate documents. Translate API instantly translates texts into more than one hundred languages for websites and apps. Agora Video Call enables easy and convenient one-to-one or one-to-many calls and supports voice-only and video modes with the Agora RTC SDK. There is always room for improvement in any application, however good and efficient it may be. But the improvement thing is that the system should be flexible enough for further modifications. Considering this important factor, the system is designed in such a way that provisions can be given for further enhancement without affecting the system presently developed. Some of the future works include training the model and increasing the accuracy of text summarization, add more user-friendly voice commands and replies. These can also involve designing blind user compatible buttons (in case of emergencies) and increase the accuracy of face recognition and object detection

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