CMR UNIVERSITY

Private University Established in Karnataka State by Act No. 45 of 2013

SCHOOL OF ENGINEERING AND TECHNOLOGY

An Internship Report

On

“VIRTUAL ASSISTANT FOR VISUALLY IMPAIRED”

Bachelor of Technology

in

Computer and Communication Engineering

Of CMR University, Bangalore

Submitted by:

SHESHADRI MO
21BBTCC015

Conducted at
COMPSOFT TECHNOLOGIES

Department of Computer and Communication Engineering
Off Hennur - Bagalur Main Road,
Near Kempegowda International Airport, Chagalahatti,
Bangalore , Karnataka-562149

CMR UNIVERSITY

Private University Established in Karnataka State by Act No. 45 of 2013

SCHOOL OF ENGINEERING AND TECHNOLOGY

CERTIFICATE

This is to certify that the Internship titled **“Virtual Assisant For Visually Impaired”** carried out by **SHESHADRI MO(21BBTCC015),** in partial fulfillment for the award of **Bachelor of Technology**, in **COMPUTER AND COMMUNICATION** in CMR University, Bangalore, during the year 2022-2023. It is certified that all corrections/suggestions indicated have been incorporated in the report.

The project report has been approved as it satisfies the academic requirements in respect of Internship prescribed for the course Internship

Signature of Guide **Signature of HOD** **Signature of Dean**

External Viva:

Name of the Examiner Signature with Date

1)__________________

____

2)__________________

____

DECLARATION

I**, SHESHADRI MO,** Second year student of **Computer and Communication Engineering**, CMR University, School Of Engineering and Technology- 560082, declare that the Internship has been successfully completed, in **COMPSOFT TECHNOLOGY** This report is submitted in partial fulfillment of the requirements for award of Bachelor Degree in Computer And Communication Engineering, during the academic year 2022-2023.

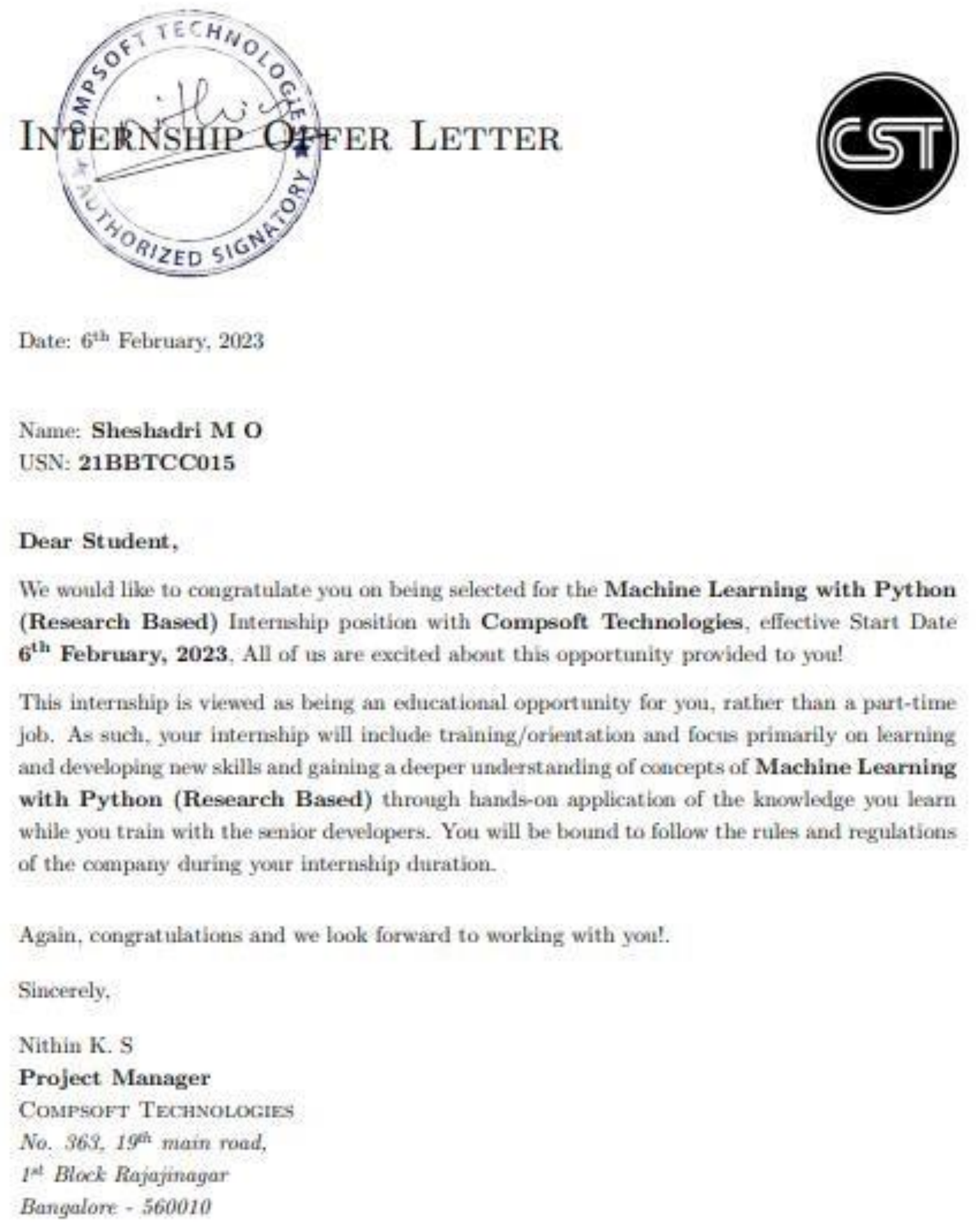
Date: 6-March-2023 :

Place: Bangalore

USN: 21BBTCC015

NAME: SHESHADRI MO

OFFER LETTER



COMPSOFT TECHNOLOGIES ★ AUTHORIZED SIGNATORY

INTERNSHIP OFFER LETTER

CST

Date: 6th February, 2023

Name: **Sheshadri M O**
USN: **21BBTCC015**

Dear Student,

We would like to congratulate you on being selected for the **Machine Learning with Python (Research Based)** Internship position with **Compsoft Technologies**, effective Start Date **6th February, 2023**. All of us are excited about this opportunity provided to you!

This internship is viewed as being an educational opportunity for you, rather than a part-time job. As such, your internship will include training/orientation and focus primarily on learning and developing new skills and gaining a deeper understanding of concepts of **Machine Learning with Python (Research Based)** through hands-on application of the knowledge you learn while you train with the senior developers. You will be bound to follow the rules and regulations of the company during your internship duration.

Again, congratulations and we look forward to working with you!.

Sincerely,

Nithin K. S
Project Manager
COMPSOFT TECHNOLOGIES
No. 363, 19th main road,
1st Block Rajajinagar
Bangalore - 560010

ACKNOWLEDGEMENT

The satisfaction that accompanies the successful completion of this project would be incomplete without the mention of the people who made it possible, without whose constant guidance and encouragement would have made efforts go in vain.

I consider myself privileged to express gratitude and respect towards all those who guided me through the completion of the project. I express my thanks to my Internal Internship Guide, **Department ofComputer and Communication Engineering**, School of Engineering and Technology, CMR University forhis constant support.

I express my sincere gratitude to my internship external guide or Team Certiefy for guiding me throughout this internship and making it successful.

I would like to express my thanks to **Dr. Saravana Kumar**, Associate Professor and Head, Department of Computer and Communication Engineering, School of Engineering and Technology, CMR University, Bangalore, for his encouragement that motivated me for the successful completion of internship work.

I express my heartfelt sincere gratitude to **Dr. V. R. Manjunath**, Dean, School of Engineering and Technology, CMR University for his support. I would like to express my sincere thanks and gratitude to our internship coordinator.

I express my heartfelt sincere gratitude to **Mr. Prajwal Madhav** for his support, invaluable guidance and encouragement throughout the tenureof this internship.

SHESHADRI MO
USN:21BBTCC015

ABSTRACT

The increasing use of digital devices and services has created new challenges for visually impaired individuals who rely on visual cues to navigate the world around them. Virtual assistants have the potential to address many of these challenges by providing a range of features and tools that can help visually impaired users interact with their devices and access information more easily. This abstract explores the key features and benefits of a virtual assistant for visually impaired individuals, including voice recognition, text-to-speech, navigation assistance, calendar and reminder assistance, access to information, and personalized assistance. By providing these tools, virtual assistants can help visually impaired users to navigate the digital world more easily and live more independent and fulfilling lives.

Table of Contents

CHAPTER 1

COMPANY PROFILE

A Brief History of Compsoft Technologies

Compsoft Technologies, was incorporated with a goal ”To provide high quality and optimal Technological Solutions to business requirements of our clients”. Every business is a different and has a unique business model and so are the technological requirements. They understand this and hence the solutions provided to these requirements are different as well. They focus on clients requirements and provide them with tailor made technological solutions. They also understand that Reach of their Product to its targeted market or the automation of the existing process into e-client and simple process are the key features that our clients desire from Technological Solution they are looking for and these are the features that we focus on while designing the solutions for their clients.

Sarvamoola Software Services. is a Technology Organization providing solutions for all web design and development, MYSQL, PYTHON Programming, HTML, CSS, ASP.NET and LINQ. Meeting the ever increasing automation requirements, Sarvamoola Software Services. specialize in ERP, Connectivity, SEO Services, Conference Management, effective web promotion and tailor-made software products, designing solutions best suiting clients requirements.

Compsoft Technologies, strive to be the front runner in creativity and innovation in software development through their well-researched expertise and establish it as an out of the box software development company in Bangalore, India. As a software development company, they translate this software development expertise into value for their customers through their professional solutions.

They understand that the best desired output can be achieved only by understanding the clients demand better. Compsoft Technologies work with their clients and help them todefiine their exact solution requirement. Sometimes even they wonder that they have completely redefined their solution or new application requirement during the brainstormingsession, and here they position themselves as an IT solutions consulting group comprising of high caliber consultants.

They believe that Technology when used properly can help any business to scale and achieve new heights of success. It helps Improve its efficiency, profitability, reliability; to put itin one sentence “Technology helps you to Delight your Customers” and that is what we wantto achieve.

CHAPTER 2

ABOUT THE COMPANY

Compsoft Technologies is a Technology Organization providing solutions for all web design and development, MYSQL, PYTHON Programming, HTML, CSS, ASP.NET and LINQ. Meeting the ever increasing automation requirements, Compsoft Technologies specialize in ERP, Connectivity, SEO Services, Conference Management, effective web promotion and tailor-made software products, designing solutions best suiting clients requirements. The organization where they have a right mix of professionals as a stakeholders to help us serve our clients with best of our capability and with at par industry standards.They have young, enthusiastic, passionate and creative Professionals to develop technologicalinnovations in the field of Mobile technologies, Web applications as well as Business and Enterprise solution. Motto of our organization is to “Collaborate with our clients to provide them with best Technological solution hence creating Good Present and Better Future for our client which will bring a cascading a positive effect in their business shape as well”. Providing a Complete suite of technical solutions is not just our tag line, it is Our Vision for Our Clients and for Us, We strive hard to achieve it.

Products of Compsoft Technologies.

Android Apps

It is the process by which new applications are created for devices running the Android operating system. Applications are usually developed in Java (and/or Kotlin; or other such option) programming language using the Android software development kit (SDK), but other development environments are also available, some such as Kotlin support the exact same Android APIs (and bytecode), while others such as Go have restricted API access.

The Android software development kit includes a comprehensive set of development tools. These include a debugger, libraries, a handset emulator based on QEMU, documentation, sample code, and zutorials. Currently supported development platforms include computers running Linux (any modern desktop Linux distribution), Mac OS X 10.5.8 or later, and

Windows 7 or later. As of March 2015, the SDK is not available on Android itself, but softwaredevelopment is possible by using specialized Android applications.

Web Application

It is a client–server computer program in which the client (including the user interface and client- side logic) runs in a web browser. Common web applications include web mail, online retail sales, online auctions, wikis, instant messaging services and many other functions. web applications use web documents written in a standard format such as HTML and JavaScript,which are supported by a variety of web browsers. Web applications can be considered as a specific variant of client–server software where the client software is downloaded to the client machine when visiting the relevant web page, using standard procedures such as HTTP. The Client web software updates may happen each time the web page is visited. During the session, the web browser interprets and displays the pages, and acts as the universal client for any web application. The use of web application frameworks can often reduce the number of errors in a program, both by making the code simpler, and by allowing one team to concentrate on the framework while another focuses on a specified use case. In applications which are exposed to constant hacking attempts on the Internet, security-related problems can be caused by errors in the program.

Frameworks can also promote the use of best practices such as GET after POST. There are some who view a web application as a two-tier architecture. This can be a “smart” client that performs all the work and queries a “dumb” server, or a “dumb” client that relies on a “smart” server. The client would handle the presentation tier, the server would have the database (storage tier), and the business logic (application tier) would be on one of them or on both. While this increases the scalability of the applications and separates the display and the database, it still doesn’t allow for true specialization of layers, so most applications will outgrow this model. An emerging strategy for application software companies is to provide web access to software previously distributed as local applications. Depending on the type of application, it may require the development of an entirely different browser-based interface, or merely adapting an existing application to use different presentation technology. These programs allow the user to pay a monthly or yearly fee for use of a software application without having to install it on a local hard drive. A company which follows this strategy is known as an application service provider (ASP), and ASPs are currently receiving much attention in the software industry.

Security breaches on these kinds of applications are a major concern because it can involve both enterprise information and private customer data. Protecting these assets is an important part of any web application and there are some key operational areas that must be included in the development process. This includes processes for authentication, authorization, asset handling, input, and logging and auditing. Building security into the applications from the beginning can be more effective and less disruptive in the long run.

Web design

It is encompasses many different skills and disciplines in the production and maintenance of websites. The different areas of web design include web graphic design; interface design; authoring, including standardized code and proprietary software; user experience design; and

search engine optimization. The term web design is normally used to describe the design process relating to the front-end (client side) design of a website including writing mark up. Web design partially overlaps web engineering in the broader scope of web development. Web designers are expected to have an awareness of usability and if their role involves creating mark up then they are also expected to be up to date with web accessibility guidelines. Web design partially overlaps web engineering in the broader scope of web development.

Departments and services offered

Compsoft Technologies plays an essential role as an institute, the level of education, development of student's skills are based on their trainers. If you do not have a good mentor then you may lag in many things from others and that is why we at Compsoft Technologies gives you the facility of skilled employees so that you do not feel unsecured about the academics. Personality development and academic status are some of those things which lie on mentor's hands. If you are trained well then you can do well in your future and knowing its importance of Compsoft Technologies always tries to give you the best.

They have a great team of skilled mentors who are always ready to direct their trainees in the best possible way they can and to ensure the skills of mentors we held many skill development programs as well so that each and every mentor can develop their own skills with the demands of the companies so that they can prepare a complete packaged trainee.

Services provided by Compsoft Technologies.

- Core Java and Advanced Java
- Web services and development
- Dot Net Framework
- Python

- Selenium Testing
- Conference / Event Management Service
- Academic Project Guidance
- On The Job Training
- Software Training

The race for digital transformation is on. In this globally connected on-demand world with rapid advancements in internet technologies, businesses worldwide are under constant pressure to add innovative real-time capabilities to their applications to respond to market opportunities.

We have a proven record of building highly scalable, world-class consulting processes that offer tremendous business advantages to our clients in the form of huge cost-benefits, definitive results and consistent project deliveries across the globe.

We prominently strive to improve your business by delivering the full range of competencies including operational performance, developing and applying business strategies to improve financial reports, defining strategic goals and measure and manage those goals along with measuring and managing them.

Vision

We are committed to going the extra mile to bring success to the clients consistently

We are dedicated to delivering the right people, solutions, and services to the clients that they require to meet their technology challenges and business goals.

Mission

Optimizing client satisfaction with quality services

Delivering the most efficient and the best solution to our clients to every client leveraging leading technologies & industry best practices

CHAPTER 3
INTRODUCTION

Introduction to ML

Machine learning (ML) is a branch of artificial intelligence (AI) that involves the development of algorithms and models that enable computers to learn and improve from experience. The goal of ML is to enable computers to make predictions or take actions based on patterns or relationships that they identify in large datasets, without being explicitly programmed to do so.

In other words, ML algorithms allow computers to automatically identify patterns and relationships in data, and use these insights to make predictions or take actions. This can be used for a wide range of applications, from image and speech recognition to recommendation systems and predictive analytics.

There are three main types of machine learning algorithms: supervised learning, unsupervised learning, and reinforcement learning. Supervised learning involves training a model on labeled data, where the algorithm is provided with examples of inputs and the corresponding outputs. Unsupervised learning involves training a model on unlabeled data, where the algorithm is left to identify patterns and relationships on its own. Reinforcement learning involves training a model through trial and error, where the algorithm receives feedback based on its actions and adjusts its behavior accordingly.

Overall, ML is a powerful tool for analyzing and making predictions based on large datasets, and has the potential to revolutionize a wide range of industries and applications

Problem Statement

A machine learning problem statement typically involves defining a task or objective that can be solved using ML techniques. This task may involve predicting a value or class label based on input data, identifying patterns or anomalies in a dataset, or clustering data into groups based on similarities.

For example, a machine learning problem statement might be to predict the likelihood of a customer purchasing a product based on their past purchase history and demographic information. Another example might be to classify images of animals based on their species.

To create a machine learning problem statement, it is important to define the problem clearly and identify the relevant data sources and features that will be used to train the model. The problem statement should also include any constraints or requirements for the solution, such as accuracy thresholds or real-time processing requirements.

In addition to defining the problem statement, it is also important to select an appropriate ML algorithm and evaluate its performance using relevant metrics. This may involve splitting the data into training and testing sets, tuning model parameters, and comparing the results of different algorithms.

Overall, creating a well-defined machine learning problem statement is a critical first step in developing an effective ML solution, and requires careful consideration of the problem domain, available data, and desired outcomes

CHAPTER 4

SYSTEM ANALYSIS

The system comprises a modular client server distributed architecture. The system consists of the main menu which first runs on the startup of the software and the website modules. The client communicates with the server and back with the use of REST APIs,thus the website modules are not local to the client. Throughout the system, the user communicates with the software via speech-to-text interface. The Google library of speech-to-text (Speech Recognition) for Python is used for this purpose. For communicating the system's output to the user as well as for confirming the user input, the recognized input is played back to the user using the Python text-to-speech library (pytssx3). The modules are written in Python and make use of Selenium for automation of the respective module and Beautiful Soup for scraping the contents of the web page. The "Script" component of each module consists of the customized code that entails the features of the website contained in the module. For instance, the Wikipedia module consists of a

Question and Answer and Summary feature along with the traditional feature of reading out the entire article. The former is implemented by training a BERT model on the Stanford Question Answering Dataset (SQuaD). The APIs that hold the system together are written in Flask. The software is operating system independent to support hassle free application and usage of the system

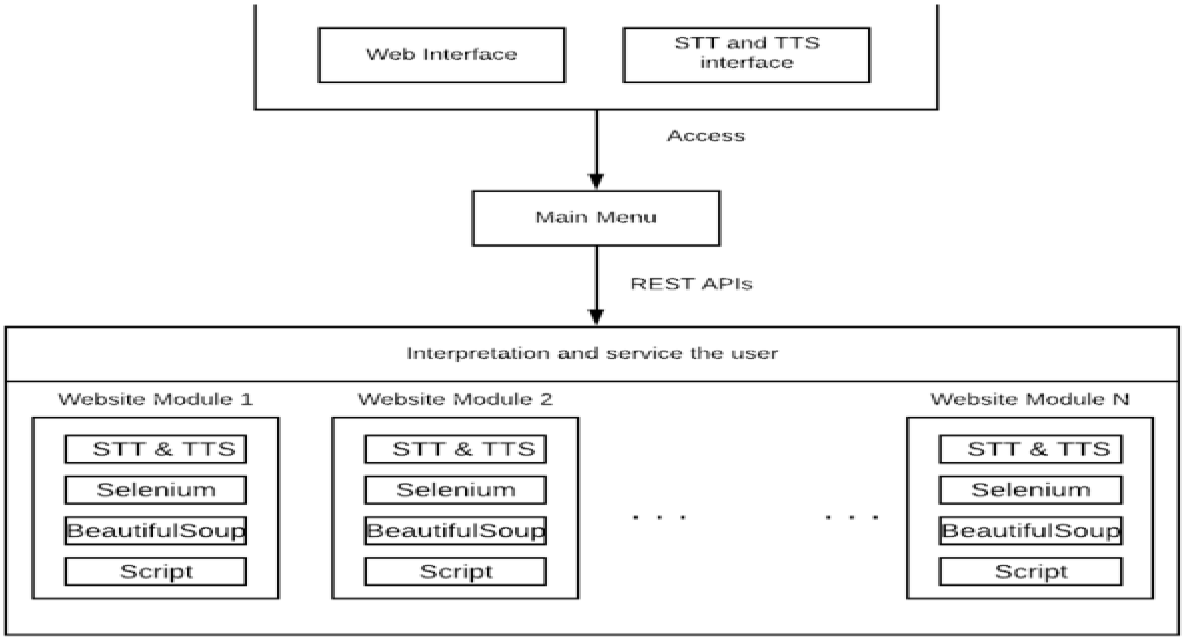


Figure 1: System Architecture

Figure 1 is a representation of the system architecture of our software. The user accesses the software using the web interface where the speech to text (STT) module converts the voice input to text. The user is then presented with the main menu where they have three options to choose from and decide which website they want to browse. Accordingly, the module is invoked with its corresponding speech to text modules, web driver and machine learning module. The output is played to the user using text to speech (TTS) module. This is the overview of the software.

.

CHAPTER 5

REQUIREMENT ANALYSIS

Software Requirement Specification

1. VSCODE
2. Python 3.9
3. Android Device

VSCODE

Visual Studio Code is a source-code editor that can be used with a variety of programming languages, including C, C#, C++, Fortran, Go, Java, JavaScript, Node. js, Python, Rust. It is based on the Electron framework, which is used to develop Node. js web applications that run on the Blink layout engine.

PYTHON 3.9

Python 3.9 is the last version providing those Python 2 backward compatibility layers, to give more time to Python projects maintainers to organize the removal of the Python 2 support and add support for Python 3.9. Aliases to Abstract Base Classes in the collections module, like collections.

ANDROID DEVICE

Android is a mobile operating system based on a modified version of the Linux kernel and other open-source software, designed primarily for touchscreen mobile devices such as smartphones and tablets.

CHAPTER 6

DESIGN & ANALYSIS

Methodology & Survey

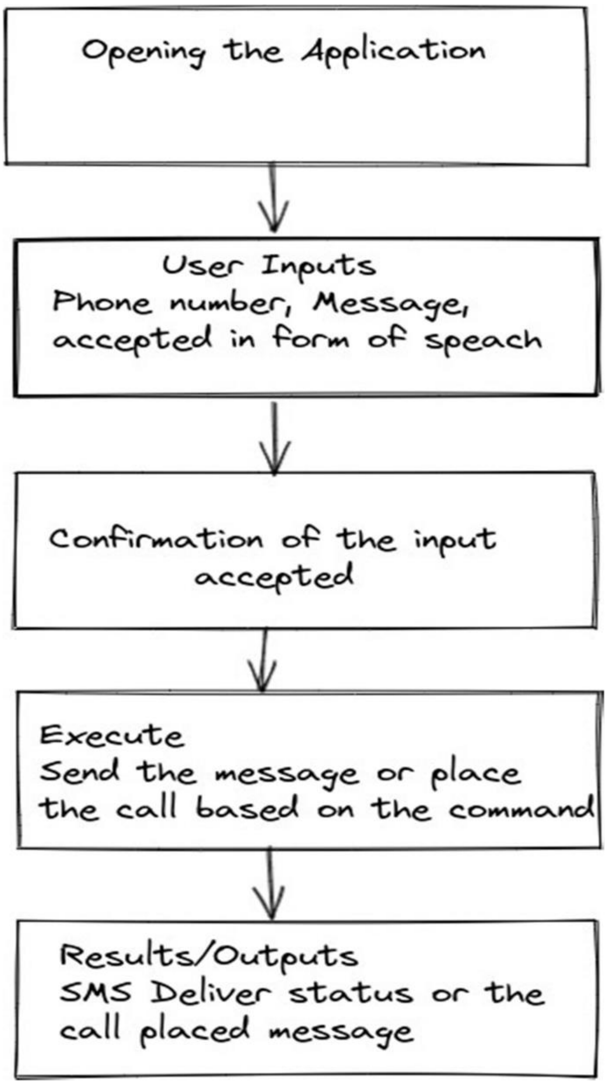
The system comprises a modular client-server distributed architecture. The system consists of the main menu which first runs on the startup of the software and the website modules.

The client communicates with the server and back with the use of REST APIs, thus the website modules are not local to the client. Throughout the system, the user communicates with the software via a speech-to-text interface. The Google library of speech-to-text (Speech Recognition) for Python is used for this purpose. For communicating the system's output to the user as well as for confirming the user input, the recognized input is played back to the user using the Python text-to-speech library (pytssx3). The modules are written in Python and make use of Selenium for automation of the respective module and Beautiful Soup for scraping the contents of the web page. The "Script" component of each module consists of customized code that entails the features of the website contained in the module. For instance, the Wikipedia module consists of a Question and Answer and A summary feature along with the traditional feature of reading out the entire article. The former is implemented by training a BERT model on the Stanford Question Answering Dataset (SQuaD). The APIs that hold the system together are written in Flask. The software is operating system independent to support hassle-free application and usage
of the system.

Many researchers have contributed to this field. Various combinations of existing technologies have been used. Braille systems, screen magnifiers, etc. went through some developments but later faced technical issues.

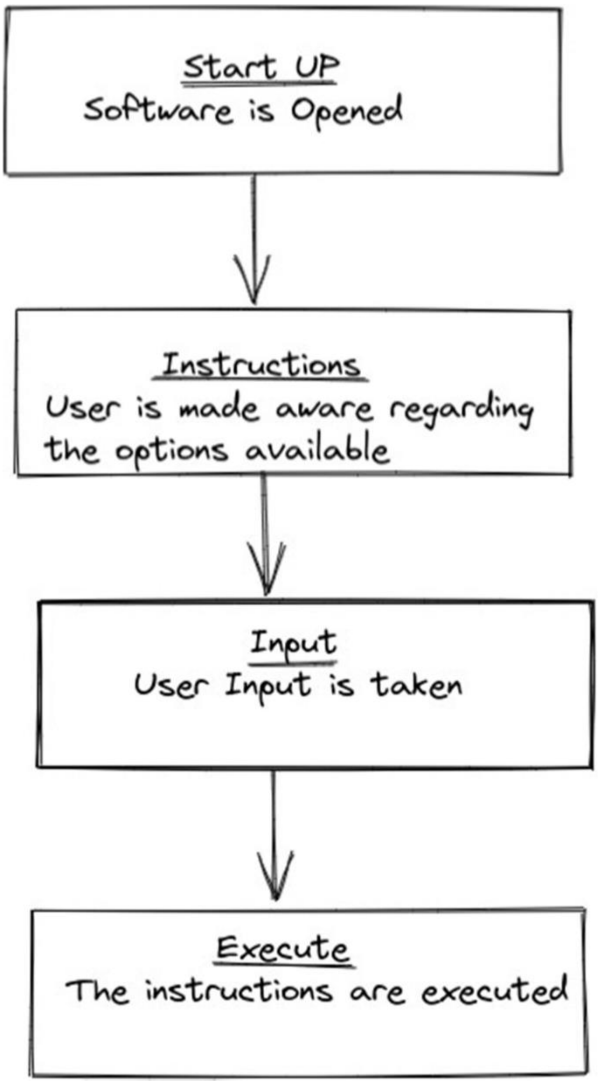
Pilling et al. conducted a study to determine whether the internet provides opportunities for disabled people to carry out activities which they were previously unable to do or whether it leads to greater social exclusion. Sinks and kings et al. state that there is no known research to determine the reasons people with disabilities can't access the internet. Muller et al on the other hand state that the primary barrier to inaccessibility is that of economic and technical capabilities. This thought is seconded by Kirsty et al. who state that bad HTML code and use of pdf causes a hindrance in accessing the internet for the visually impaired Although the W3C mentions a list of guidelines for maintaining a high level of accessibility for the visually impaired, Power et al. [5] state that only 50.4% of the problems encountered by users were covered by Success Criteria in the Web Content Accessibility Guidelines 2.0 (WCAG 2.0) and 16.7% of websites implemented techniques recommended in WCAG 2.0 but the techniques did not solve the problems.

Android phone-controlled voice gesture and touchscreen operated wheelchair where voice and gesture are recognized through android. Developers also created a universal voice control on android which is used to launch android applications via voice commands


Opening the Application
User Inputs
Phone number, Message, accepted in form of speach
Confirmation of the input accepted
Execute
Send the message or place the call based on the command
Results/Outputs
SMS Deliver status or the call placed message

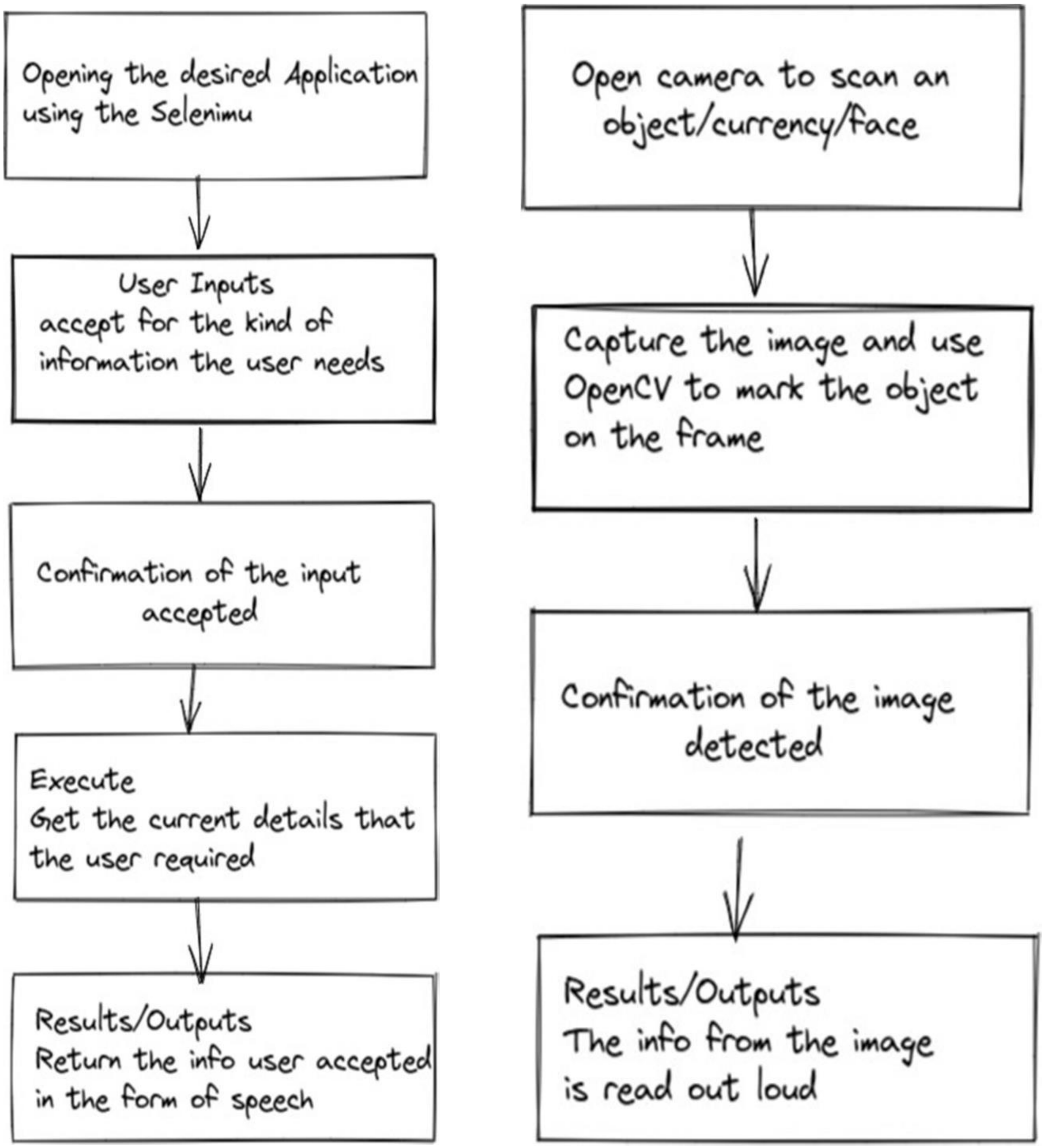
MAIN MANU

Fig 1.2


Start UP
Software is Opened
Instructions
User is made aware regarding the options available
Input
User Input is taken
Execute
The instructions are executed

CALL AND MESSAGE MODULE

Fig 1.3



Opening the desired Application using the Selenimu
User Inputs accept for the kind of information the user needs
Confirmation of the input accepted
Execute Get the current details that the user required
Results/Outputs Return the info user accepted in the form of speech
Open camera to scan an object/currency/face
Capture the image and use OpenCV to mark the object on the frame
Confirmation of the image detected
Results/Outputs The info from the image is read out loud

Time/Date/Location/BatterlyLevel/Weather/News/About/Dictionary/CurrencyDetection

Fig 1.4

Applications:

Virtual Assistant provides the feature of providing answers to a particular question from a given text of data, thus now the user does not have to read the entire text to figure out the answer, he/she has to simply input the question, the software will find out the answer from the text data on itself using machine learning. The software also provides a summary of the text using machine learning, so the user doesn't have to read the entire thing and thus making it easy to access the website. Thus, using machine learning and speech to text techniques we make the task of accessing the website, which was earlier difficult Now super easy, quick and efficient. Thus, we believe that virtual assistants for the visually impaired are the beginning of Web 3.0.

CHAPTER 7
IMPLEMENTATION

Implementation is the stage where the theoretical design is turned into a working system. The most crucial stage in achieving a new successful system and in giving confidence on the new system for the users that it will work efficiently and effectively.

The system can be implemented only after thorough testing is done and if it is found to work according to the specification. It involves careful planning, investigation of the current system and it constraints on implementation, design of methods to achieve the change over and an evaluation of change over methods a part from planning.

Two major tasks of preparing the implementation are education and training of the users and testing of the system. The more complex the system being implemented, the more involved will be the system analysis and design effort required just for implementation.

The implementation phase comprises of several activities. The required hardware and software acquisition is carried out. The system may require some software to be developed. For this, programs are written and tested. The user then changes over to his new fully tested system and the old system is discontinued.

TESTING

The testing phase is an important part of software development. It is the Information zed system will help in automate process of finding errors and missing operations and also a complete verification to determine whether the objectives are met and the user requirements are satisfied. Software testing is carried out in three steps:

1. The first includes unit testing, where in each module is tested to provide its correctness, validity and also determine any missing operations and to verify whether theobjectives have been met. Errors are noted down and corrected immediately.

2. Unit testing is the important and major part of the project. So errors are rectified easily in particular module and program clarity is increased. In this project entire system is dividedinto several modules and is developed individually. So unit testing is conducted to individual modules.

3. The second step includes Integration testing. It need not be the case, the software whose modules when run individually and showing perfect results, will also show perfect results when run as

CODES

CODES FOR IMPORTING LIBRARIES

```
import os
import zipfile
import random
import tensorflow as tf
from tensorflow.keras.optimizers import RMSprop
from tensorflow.keras.preprocessing.image import ImageDataGenerator
from shutil import copyfile
```

CODES FOR EXECUTION:

CODE FOR SGP CURRENCY DETECTION:

```
print('total training images of 10 New: ', len(os.listdir(train_10_New)))
print('total training images of 10 Old: ', len(os.listdir(train_10_Old)))
print('total training images of 100 New:', len(os.listdir(train_100_New)))
print('total training images of 100 Old:', len(os.listdir(train_100_Old)))
print('total training images of 20:     ', len(os.listdir(train_20)))
print('total training images of 200:    ', len(os.listdir(train_200)))
print('total training images of 2000:   ', len(os.listdir(train_2000)))
print('total training images of 50 New: ', len(os.listdir(train_50_New)))
print('total training images of 50 Old: ', len(os.listdir(train_50_Old)))
print('total training images of 500:    ', len(os.listdir(train_500)))
```

OUTPUT

```
total training images of 10 New:  250
total training images of 10 Old:  190
total training images of 100 New: 190
total training images of 100 Old: 190
total training images of 20:      190
total training images of 200:     190
total training images of 2000:    189
total training images of 50 New:  190
total training images of 50 Old:  190
total training images of 500:     190
```

CODE :

```
/tmp/indiancurrency',
    '/tmp/indiancurrency/training',
    '/tmp/indiancurrency/testing',
    '/tmp/indiancurrency/training/10New',
    '/tmp/indiancurrency/testing/10New',
    '/tmp/indiancurrency/training/10Old',
    '/tmp/indiancurrency/testing/10Old',
    '/tmp/indiancurrency/training/100New',
    '/tmp/indiancurrency/testing/100New',
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    '/tmp/indiancurrency/training/2000',
    '/tmp/indiancurrency/testing/2000',
    '/tmp/indiancurrency/training/50New',
    '/tmp/indiancurrency/testing/50New',
    '/tmp/indiancurrency/training/50Old',
    '/tmp/indiancurrency/testing/50Old',
    '/tmp/indiancurrency/training/500',
    '/tmp/indiancurrency/testing/500'
]

for directory in to_create:
    try:
        os.mkdir(directory)
        print(directory, 'created')
    except:
        print(directory, 'failed')
```

OUTPUT

```
/tmp/indiancurrency created
/tmp/indiancurrency/training created
/tmp/indiancurrency/testing created
/tmp/indiancurrency/training/10New created
/tmp/indiancurrency/testing/10New created
/tmp/indiancurrency/training/10Old created
/tmp/indiancurrency/testing/10Old created
/tmp/indiancurrency/training/100New created
/tmp/indiancurrency/testing/100New created
/tmp/indiancurrency/training/100Old created
/tmp/indiancurrency/testing/100Old created
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/tmp/indiancurrency/testing/200 created
/tmp/indiancurrency/training/2000 created
/tmp/indiancurrency/testing/2000 created
/tmp/indiancurrency/training/50New created
/tmp/indiancurrency/testing/50New created
/tmp/indiancurrency/training/50Old created
/tmp/indiancurrency/testing/50Old created
/tmp/indiancurrency/training/500 created
/tmp/indiancurrency/testing/500 created
```

CODE

```
d
rency Dataset256x256/Indian Currencies/200/"
TRAINING_NEW200_DIR = r"/tmp/indiancurrency/training/200/"
TESTING_NEW200_DIR = r"/tmp/indiancurrency/testing/200/"

split_data(NEW200_SOURCE_DIR, TRAINING_NEW200_DIR, TESTING_NEW200_DIR, spl
it_size)

NEW2000_SOURCE_DIR = r"/tmp/Thai and Indian Currency Dataset256x256/Indian
 Currencies/2000/"
TRAINING_NEW2000_DIR = r"/tmp/indiancurrency/training/2000/"
TESTING_NEW2000_DIR = r"/tmp/indiancurrency/testing/2000/"

split_data(NEW2000_SOURCE_DIR, TRAINING_NEW2000_DIR, TESTING_NEW2000_DIR,
split_size)

NEW50_SOURCE_DIR = r"/tmp/Thai and Indian Currency Dataset256x256/Indian C
urrencies/50 New/"
TRAINING_NEW50_DIR = r"/tmp/indiancurrency/training/50New/"
TESTING_NEW50_DIR = r"/tmp/indiancurrency/testing/50New/"

split_data(NEW50_SOURCE_DIR, TRAINING_NEW50_DIR, TESTING_NEW50_DIR, split_
size)

OLD50_SOURCE_DIR = r"/tmp/Thai and Indian Currency Dataset256x256/Indian C
urrencies/50 Old/"
TRAINING_OLD50_DIR = r"/tmp/indiancurrency/training/50Old/"
TESTING_OLD50_DIR = r"/tmp/indiancurrency/testing/50Old/"

split_data(OLD50_SOURCE_DIR, TRAINING_OLD50_DIR, TESTING_OLD50_DIR, split_
size)

NEW500_SOURCE_DIR = r"/tmp/Thai and Indian Currency Dataset256x256/Indian
Currencies/500/"
TRAINING_NEW500_DIR = r"/tmp/indiancurrency/training/500/"
TESTING_NEW500_DIR = r"/tmp/indiancurrency/testing/500/"

split_data(NEW500_SOURCE_DIR, TRAINING_NEW500_DIR, TESTING_NEW500_DIR, spl
it_size)

print(len(os.listdir(TRAINING_NEW10_DIR)))
print(len(os.listdir(TESTING_NEW10_DIR)))

print(len(os.listdir(TRAINING_OLD10_DIR)))
print(len(os.listdir(TESTING_OLD10_DIR)))

print(len(os.listdir(TRAINING_NEW100_DIR)))
print(len(os.listdir(TESTING_NEW100_DIR)))
print(len(os.listdir(TESTING_OLD100_DIR)))

print(len(os.listdir(TRAINING_NEW20_DIR)))
print(len(os.listdir(TESTING_NEW20_DIR)))

print(len(os.listdir(TRAINING_NEW200_DIR)))
print(len(os.listdir(TESTING_NEW200_DIR)))

print(len(os.listdir(TRAINING_NEW2000_DIR)))
print(len(os.listdir(TESTING_NEW2000_DIR)))

print(len(os.listdir(TRAINING_NEW50_DIR)))
print(len(os.listdir(TESTING_NEW50_DIR)))

print(len(os.listdir(TRAINING_OLD50_DIR)))
print(len(os.listdir(TESTING_OLD50_DIR)))

print(len(os.listdir(TRAINING_NEW500_DIR)))
print(len(os.listdir(TESTING_NEW500_DIR)))
```

OUTPUT

```
396
44
396
44
171
19
171
19
171
19
171
19
170
19
171
19
171
19
171
19
```

CODE

```
class myCallback(tf.keras.callbacks.Callback):
  def on_epoch_end(self, epoch, logs={}):
    if(logs.get('accuracy')>0.65):
      print("\nReached 70% accuracy so cancelling training!")
      self.model.stop_trainin
```

OUTPUT

```
Model: "sequential"
_________________________________________________________________
Layer (type)                 Output Shape              Param #
=================================================================
conv2d (Conv2D)              (None, 254, 254, 32)      896
_________________________________________________________________
max_pooling2d (MaxPooling2D) (None, 127, 127, 32)      0
_________________________________________________________________
conv2d_1 (Conv2D)            (None, 125, 125, 32)      9248
_________________________________________________________________
max_pooling2d_1 (MaxPooling2 (None, 62, 62, 32)        0
_________________________________________________________________
conv2d_2 (Conv2D)            (None, 60, 60, 32)        9248
_________________________________________________________________
max_pooling2d_2 (MaxPooling2 (None, 30, 30, 32)        0
_________________________________________________________________
flatten (Flatten)            (None, 28800)             0
_________________________________________________________________
dense (Dense)                (None, 512)               14746112
_________________________________________________________________
dense_1 (Dense)              (None, 10)                5130
=================================================================
Total params: 14,770,634
Trainable params: 14,770,634
Non-trainable params: 0
```

CODE:

```
TRAINING_DIR = '/tmp/indiancurrency/training/'
#train_datagen = ImageDataGenerator(rescale= 1/255)
train_generator = train_datagen.flow_from_directory(
    TRAINING_DIR,
    batch_size=32,
    class_mode='categorical',
    target_size=(256, 256)
)

VALIDATION_DIR = '/tmp/indiancurrency/testing/'
validation_datagen = ImageDataGenerator(rescale= 1/255)
validation_generator = validation_datagen.flow_from_directory(
    VALIDATION_DIR,
    batch_size=32,
    class_mode='categorical',
    target_size=(256, 256)
)
```

OUTPUT:

```
Found 1763 images belonging to 10 classes.
Found 196 images belonging to 10 classes.
```

CODE:

```
 history = model.fit(
      train_generator,
      epochs=15,
      verbose=1,
      validation_data=validation_generator,
      callbacks=[callbacks])
```

OUTPUT

```
Epoch 1/15
56/56 [==============================] - 24s 431ms/step - loss: 2.3721 -
accuracy: 0.1912 - val_loss: 2.0435 - val_accuracy: 0.2500
Epoch 2/15
56/56 [==============================] - 24s 433ms/step - loss: 2.0751 -
accuracy: 0.2490 - val_loss: 1.8873 - val_accuracy: 0.3112
Epoch 3/15
56/56 [==============================] - 24s 431ms/step - loss: 1.9312 -
accuracy: 0.2972 - val_loss: 1.9962 - val_accuracy: 0.2398
Epoch 4/15
56/56 [==============================] - 24s 433ms/step - loss: 1.8163 -
accuracy: 0.3352 - val_loss: 1.5674 - val_accuracy: 0.3878
Epoch 5/15
56/56 [==============================] - 24s 434ms/step - loss: 1.7027 -
accuracy: 0.3800 - val_loss: 1.5216 - val_accuracy: 0.4286
Epoch 6/15
56/56 [==============================] - 24s 432ms/step - loss: 1.5466 -
accuracy: 0.4299 - val_loss: 1.3640 - val_accuracy: 0.5000
Epoch 7/15
56/56 [==============================] - 24s 437ms/step - loss: 1.4185 -
accuracy: 0.4657 - val_loss: 1.0512 - val_accuracy: 0.5969
Epoch 8/15
56/56 [==============================] - 24s 433ms/step - loss: 1.3584 -
accuracy: 0.5116 - val_loss: 1.1150 - val_accuracy: 0.5408
Epoch 9/15
56/56 [==============================] - 24s 434ms/step - loss: 1.3180 -
accuracy: 0.5389 - val_loss: 0.9805 - val_accuracy: 0.6276
Epoch 10/15
56/56 [==============================] - 24s 435ms/step - loss: 1.1212 -
accuracy: 0.5797 - val_loss: 0.7427 - val_accuracy: 0.7347
Epoch 11/15
56/56 [==============================] - 24s 432ms/step - loss: 1.1144 -
accuracy: 0.5961 - val_loss: 0.7406 - val_accuracy: 0.7296
Epoch 12/15
```

```
56/56 [==============================] - 24s 434ms/step - loss: 1.0414 -
accuracy: 0.6461 - val_loss: 0.5972 - val_accuracy: 0.8061
Epoch 13/15
56/56 [==============================] - ETA: 0s - loss: 0.8917 -
accuracy: 0.6682
Reached 70% accuracy so cancelling training!
56/56 [==============================] - 24s 432ms/step - loss: 0.8917 -
accuracy: 0.6682 - val_loss: 0.8262 - val_accuracy: 0.7194
```

CODES

```
import numpy as np

from google.colab import files

from keras.preprocessing import image



uploaded = files.upload()



for fn in uploaded.keys():



  # predicting images

  path = fn

  img = image.load_img(path, target_size=(256, 256))

  x = image.img_to_array(img)

  x = np.expand_dims(x, axis=0)



  images = np.vstack([x])



  #predictions = model.predict(images,batch_size=32)

  #class_names = ['10RsNote', '10RsNote', '100RsNote', '100RsNote','20RsNote','200RsNote', '2000RsNote','50RsNote','50RsNote','500RsNote']

  #print(model.predict_classes())

  print(np.argmax(model.predict(images), axis=-1))
```

OUTPUT

```
Saving IMG20200925125439.jpg to IMG20200925125439.jpg
[0]
```

CODE

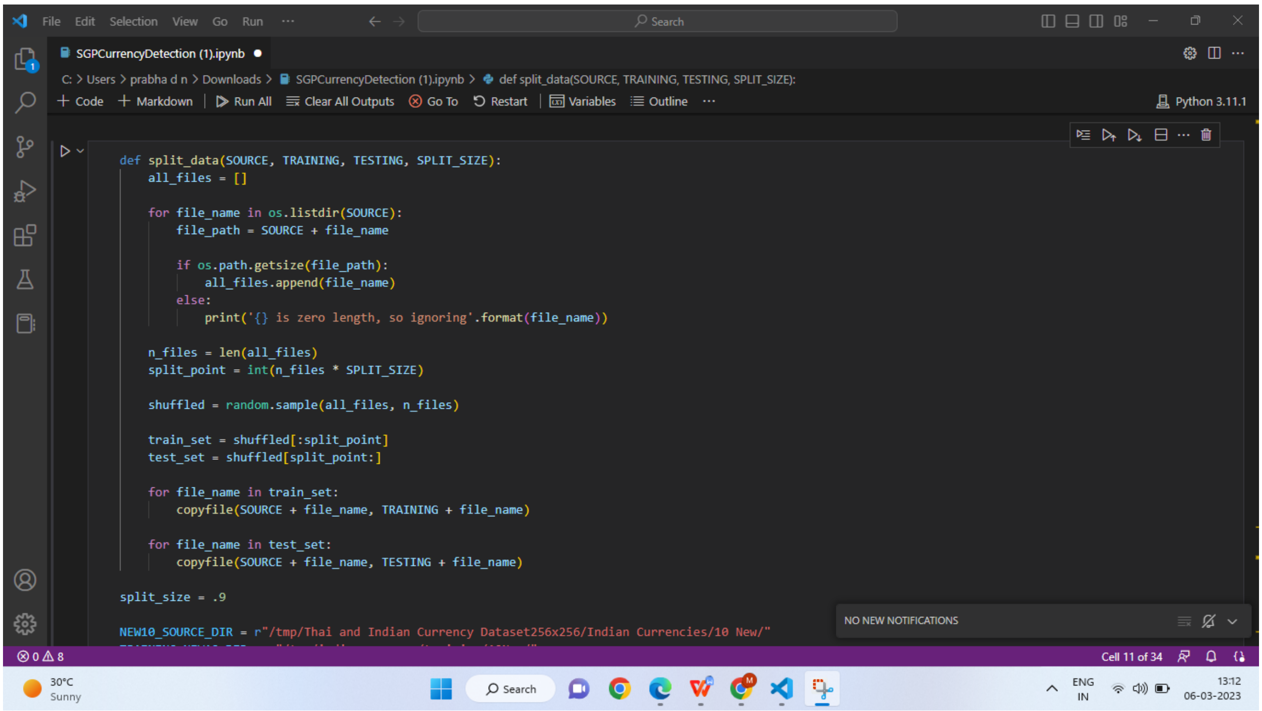
```
converter = tf.lite.TFLiteConverter.from_saved_model(INDIAN_CURRENCY_SAVED
_MODEL)
converter.optimizations = [tf.lite.Optimize.DEFAULT]

tflite_model = converter.convert()
tflite_model_file = 'converted_model.tflite'

with open(tflite_model_file, "wb") as f:
    f.write(tflite_model)
```

OUTPUT

```
labels = ['10 Rupees', 'Rupees 10','100 Rupees','Rupees 100','20 Rupees','
200 Rupees','2000 Rupees','50 Rupees','Rupees 50','500 Rupees']

with open('labels.txt', 'w') as f:
    f.write('\n'.join(labels))
```

CHAPTER 8

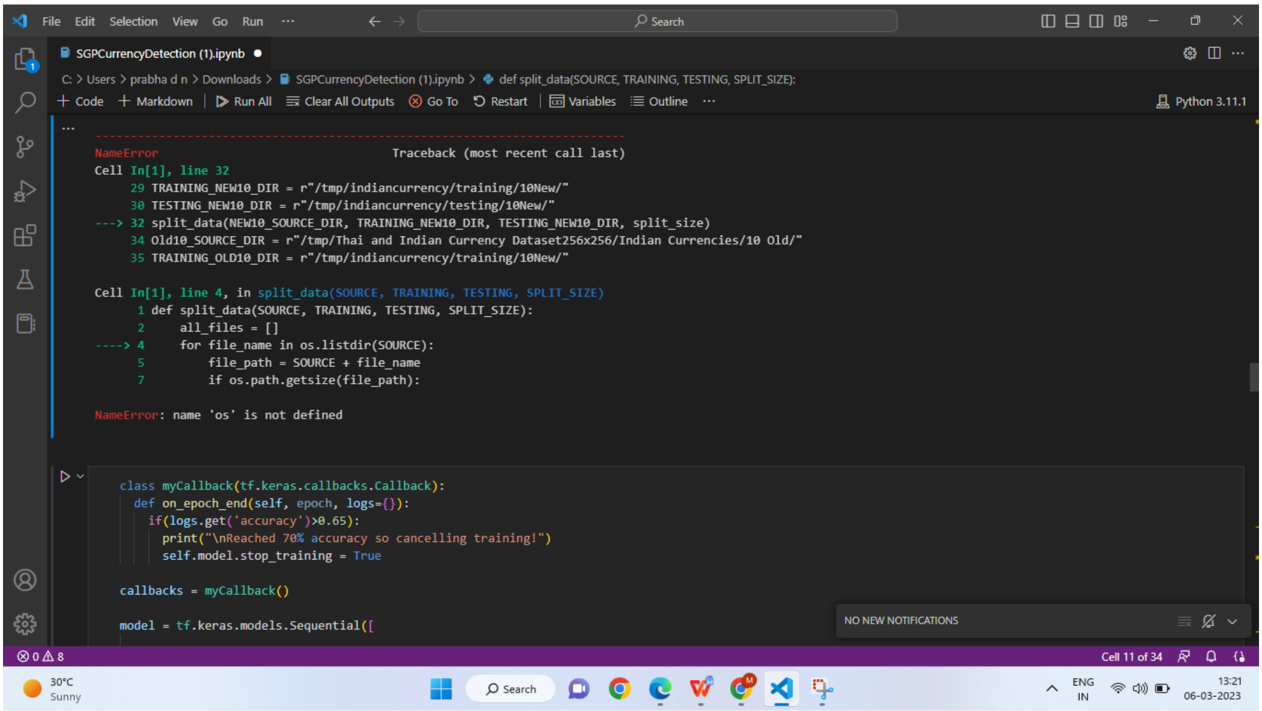
SNAPSHOTS



```
def split_data(SOURCE, TRAINING, TESTING, SPLIT_SIZE):
    all_files = []

    for file_name in os.listdir(SOURCE):
        file_path = SOURCE + file_name

        if os.path.getsize(file_path):
            all_files.append(file_name)
        else:
            print('{} is zero length, so ignoring'.format(file_name))

    n_files = len(all_files)
    split_point = int(n_files * SPLIT_SIZE)

    shuffled = random.sample(all_files, n_files)

    train_set = shuffled[:split_point]
    test_set = shuffled[split_point:]

    for file_name in train_set:
        copyfile(SOURCE + file_name, TRAINING + file_name)

    for file_name in test_set:
        copyfile(SOURCE + file_name, TESTING + file_name)

split_size = .9

NEW10_SOURCE_DIR = r"/tmp/Thai and Indian Currency Dataset256x256/Indian Currencies/10 New/"
```

File Edit Selection View Go Run ···
Search
SGPCurrencyDetection (1).ipynb
C: > Users > prabha d n > Downloads > SGPCurrencyDetection (1).ipynb > def split_data(SOURCE, TRAINING, TESTING, SPLIT_SIZE):
+ Code + Markdown Run All Clear All Outputs Go To Restart Variables Outline ···
Python 3.11.1
NO NEW NOTIFICATIONS
0 8
Cell 11 of 34
30°C Sunny
Search
ENG IN
13:12 06-03-2023

Fig: 1.5



```
---------------------------------------------------------------------------
NameError                                 Traceback (most recent call last)
Cell In[1], line 32
     29 TRAINING_NEW10_DIR = r"/tmp/indiancurrency/training/10New/"
     30 TESTING_NEW10_DIR = r"/tmp/indiancurrency/testing/10New/"
---> 32 split_data(NEW10_SOURCE_DIR, TRAINING_NEW10_DIR, TESTING_NEW10_DIR, split_size)
     34 Old10_SOURCE_DIR = r"/tmp/Thai and Indian Currency Dataset256x256/Indian Currencies/10 Old/"
     35 TRAINING_OLD10_DIR = r"/tmp/indiancurrency/training/10New/"

Cell In[1], line 4, in split_data(SOURCE, TRAINING, TESTING, SPLIT_SIZE)
      1 def split_data(SOURCE, TRAINING, TESTING, SPLIT_SIZE):
      2     all_files = []
----> 4     for file_name in os.listdir(SOURCE):
      5         file_path = SOURCE + file_name
      7         if os.path.getsize(file_path):

NameError: name 'os' is not defined
```

```
class myCallback(tf.keras.callbacks.Callback):
  def on_epoch_end(self, epoch, logs={}):
    if(logs.get('accuracy')>0.65):
      print("\nReached 70% accuracy so cancelling training!")
      self.model.stop_training = True

callbacks = myCallback()

model = tf.keras.models.Sequential([
```

File Edit Selection View Go Run ···
Search
SGPCurrencyDetection (1).ipynb
C: > Users > prabha d n > Downloads > SGPCurrencyDetection (1).ipynb > def split_data(SOURCE, TRAINING, TESTING, SPLIT_SIZE):
+ Code + Markdown Run All Clear All Outputs Go To Restart Variables Outline ···
Python 3.11.1
NO NEW NOTIFICATIONS
0 8
Cell 11 of 34
30°C Sunny
Search
ENG IN
13:21 06-03-2023

Fig: 1.6

8. SNAPSHOTS

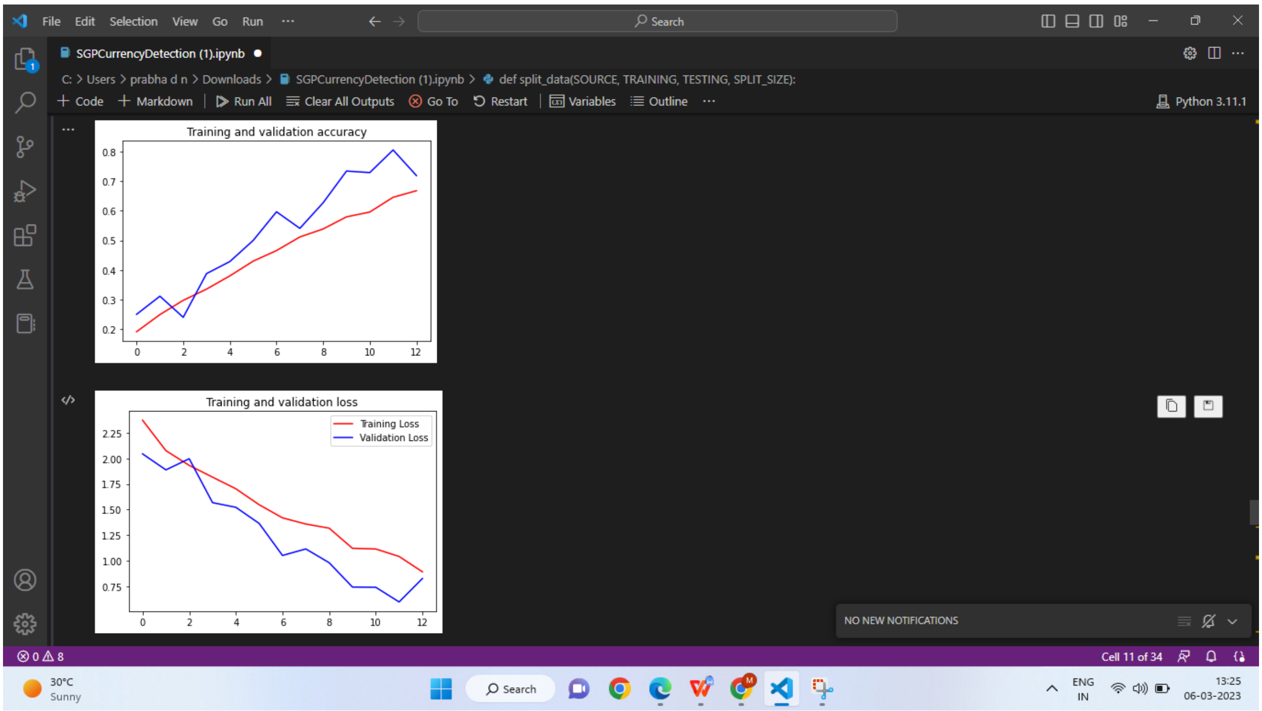
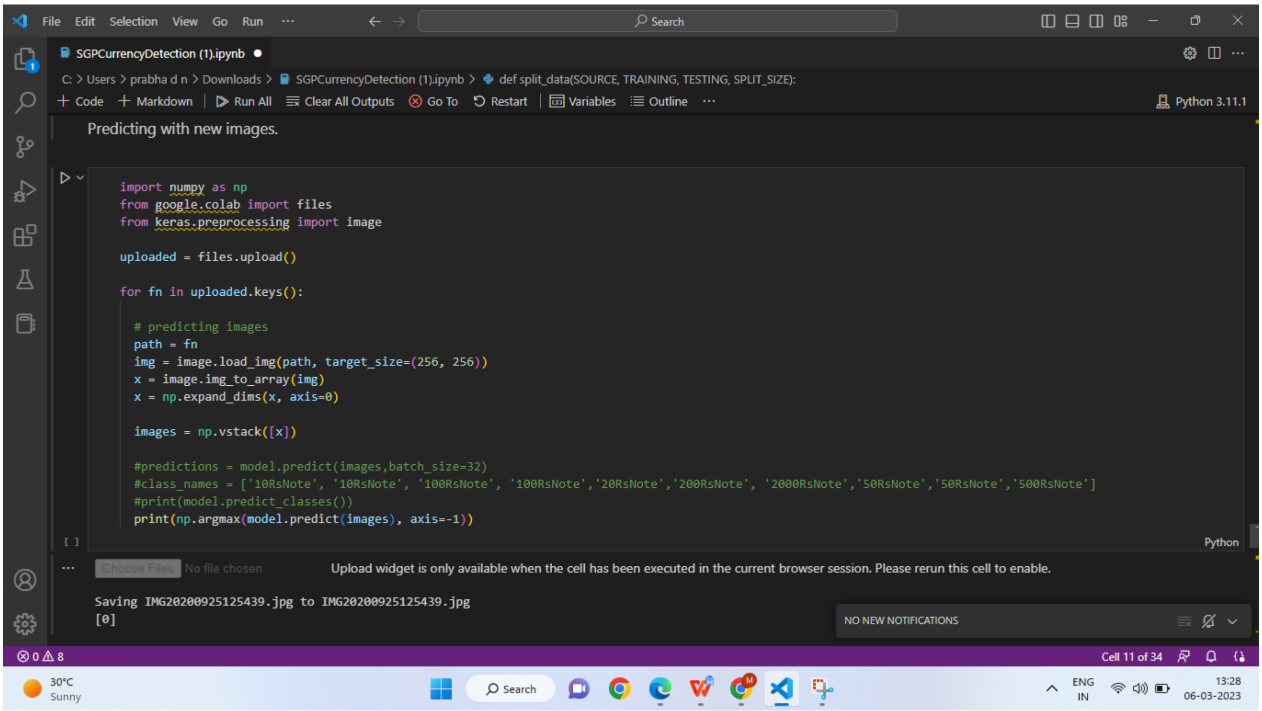

File Edit Selection View Go Run ···
Search
SGPCurrencyDetection (1).ipynb
C: > Users > prabha d n > Downloads > SGPCurrencyDetection (1).ipynb > def split_data(SOURCE, TRAINING, TESTING, SPLIT_SIZE):
+ Code + Markdown | Run All Clear All Outputs Go To Restart | Variables Outline ···
Python 3.11.1
Training and validation accuracy
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0
2
4
6
8
10
12
Training and validation loss
Training Loss
Validation Loss
2.25
2.00
1.75
1.50
1.25
1.00
0.75
0
2
4
6
8
10
12
NO NEW NOTIFICATIONS
⊗ 0 ⚠ 8
Cell 11 of 34
30°C
Sunny
Search
ENG
IN
13:25
06-03-2023

Fig: 1.7


File Edit Selection View Go Run ···
Search
SGPCurrencyDetection (1).ipynb
C: > Users > prabha d n > Downloads > SGPCurrencyDetection (1).ipynb > def split_data(SOURCE, TRAINING, TESTING, SPLIT_SIZE):
+ Code + Markdown | Run All Clear All Outputs Go To Restart | Variables Outline ···
Python 3.11.1

Predicting with new images.

```
import numpy as np
from google.colab import files
from keras.preprocessing import image

uploaded = files.upload()

for fn in uploaded.keys():

  # predicting images
  path = fn
  img = image.load_img(path, target_size=(256, 256))
  x = image.img_to_array(img)
  x = np.expand_dims(x, axis=0)

  images = np.vstack([x])

  #predictions = model.predict(images,batch_size=32)
  #class_names = ['10RsNote', '10RsNote', '100RsNote', '100RsNote','20RsNote','200RsNote', '2000RsNote','50RsNote','50RsNote','500RsNote']
  #print(model.predict_classes())
  print(np.argmax(model.predict(images), axis=-1))
```

Upload widget is only available when the cell has been executed in the current browser session. Please rerun this cell to enable.

```
Saving IMG20200925125439.jpg to IMG20200925125439.jpg
[0]
```

Fig 1.8

9. CONCLUTION

The package was designed in such a way that future modifications can be done easily. The following conclusions can be deduced from the development of the project:

- Automation of the entire system improves the efficiency
- It provides a friendly graphical user interface which proves to be better when compared to the existing system.
- It gives appropriate access to the authorized users depending on their permissions.
- It effectively overcomes the delay in communications.
- Updating of information becomes so easier
- System security, data security and reliability are the striking features.
- The System has adequate scope for modification in future if it is necessary.

10. REFERENCE

1. D. Pilling, P. Barrett and M. Floyd, *Disabled people and the Internet: experiences barriers and opportunities*, 2004.
2. Design and Development of a Virtual Assistant for the Visually Impaired," by Prerana Mukherjee, Prasenjit Dey, and Tushar Kanti Das, published in the Proceedings of the 2nd International Conference on Computing, Communication, Control and Automation, 2016.
3. "Virtual Assistant for the Visually Impaired using IoT," by Poonam Kumari and Prof. Preeti Aggarwal, published in the International Journal of Innovative Research in Computer and Communication Engineering, Volume 6, Issue 6, June 2018.
4. "Virtual Assistant for the Blind: An AI-powered Voice Interface for the Visually Impaired," by Syed Ahmad Chan Bukhari, Muhammad Ahsan Raza, Muhammad Arsalan Siddiqui, and Tariq Mahmood, published in the Proceedings of the 2019 IEEE 5th International Conference on Computer and Communications (ICCC), December 2019.
5. "Design and Implementation of a Virtual Assistant for the Visually Impaired," by Neha Mittal, Rahul Bhatia, and Ruchi Gupta, published in the Proceedings of the 2019 5th International Conference on Computing Sciences (ICCS), August 2019.
6. "Virtual Assistant for the Visually Impaired," by Neha Madan and Dr. Rakesh Kumar, published in the International Journal of Computer Science and Mobile Computing, Volume 9, Issue 3, March 2020.
7. These references can provide insights and ideas on the design and development of virtual assistants for visually impaired individuals