

VISVESVARAYA TECHNOLOGICAL UNIVERSITY

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A Project Report on

**A NOVEL SIMPLIFIED ANDROID BASED
VIRTUAL ASSISTANT FOR WINDOWS USERS**

Submitted by

RAJESH

4SN16CS073

SHRAVYA

4SN16CS089

SHREYASHREE

4SN16CS090

VIMALESH N

4SN16CS104

In partial fulfillment of the requirements for the degree of

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IN

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Under the Guidance of

Dr. SHIVAKUMAR G. S

Head of Department



Department of Computer Science & Engineering

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SRINIVAS INSTITUTE OF TECHNOLOGY
(NAAC ACCREDITED)

MANGALURU - 574143, KARNATAKA.

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

CERTIFICATE

Certified that the project work entitled “A NOVEL SIMPLIFIED ANDROID BASED VIRTUAL ASSISTANT FOR WINDOWS USERS” is a bona fide work carried out by

RAJESH

4SN16CS073

SHRAVYA

4SN16CS089

SHREYASHREE

4SN16CS090

VIMALESH N

4SN16CS104

*in partial fulfillment for the award of **BACHELOR OF ENGINEERING** in **COMPUTER SCIENCE & ENGINEERING** of the **VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI** during the year 2019 – 2020. 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 academic requirements in respect of Project work prescribed for the Bachelor of Engineering Degree.*

Dr. Shivakumar G. S.
Project Guide

Dr. Shivakumar G. S.
Head of the Department

Dr. Shrinivasa Mayya D.
Principal

Name of the Examiners

Signature with Date

1.

2.

ABSTRACT

This project focuses on designing and developing a virtual assistant that can interact with the end user to get things done on PC with the help of desktop app. Developing such a desktop app is also a part of this project.

There are many virtual assistants like Google assistant, Apple Siri, Microsoft Cortana etc. But the problem is that they can only control the device on which they are installed. For instance, Google assistant on android can't control Microsoft Windows. It will be great if we have a virtual assistant on one operating system that can control another operating system.

Although Microsoft Cortana can do many things, we are primarily concentrating on creating an assistant that can do what Cortana can't do, along with basic things that every virtual assistant can do, like opening apps, playing music etc. The main difference is that Cortana is built into the Windows OS while our assistant is built for Android OS which can efficiently control Windows based on user commands.

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- Rajesh
- Shravya
- Shreyashree
- Vimalesh N

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Chapter 1

INTRODUCTION

CHAPTER 1

INTRODUCTION

Nowadays, Personal computers, laptops and other electronic devices are very important part of our daily life. This also holds good for the mobile phones, which are turned into multifunctional gadgets with almost identical features that computer's have. This project proposes application which is suitable and convenient in both the areas. This project focuses on designing a virtual assistant that can interact with the end user to get things done on PC with the help of desktop app.

1.1 Problem Statement

There are many personal assistants like Google assistant, Apple Siri, Microsoft Cortana etc. But the problem is that they can only control the device on which they are installed. For instance, Google assistant on android can't control Microsoft Windows. It will be useful if we have a virtual assistant on one operating system that can control another operating system.

1.2 Existing System

Cortana is designed to help users to get things done. It provides answers and completes the basic task. While it can understand most of the commands, there are cases where it can't understand what user says. Cortana uses Microsoft's search engine called Bing to show the search results. Cortana learns over time to become more useful every day. The more one uses Cortana the more they will learn.

1.3 Proposed System

Although Microsoft Cortana can do many things, it primarily focuses on creating an assistant that can do what Cortana can't do, along with basic things that every virtual assistant can do, like opening apps, playing music etc. The main difference is that Cortana is built into the Windows OS while the assistant is built for Android OS which can efficiently control Windows based on user commands.

1.4 Objective

To build assistant that supports following features:

- Screen Share (See what's going on in PC)
- Protect Important Documents
- Change Desktop Wallpaper
- Check Who is Using PC
- Record Audio
- Record Video
- Power Control
- Take Picture
- Take Screenshot
- Open and Close apps
- Brightness & Volume Control
- Battery Status
- Browser Control
- Chat with the assistant
- Log Data of Failure(to improve assistant later)

This helps users

- to ease their general tasks
- to track or monitor PC from android
- in protecting their important data by means of remote encryption

Chapter 2

LITERATURE SURVEY

CHAPTER 2

LITERATURE SURVEY

[1] Monitoring PCs using Android

This paper focuses on a user who can connect to computer using an application. It is essentially a mobile application based on Android used to keep an eye on a target PC or multiple PCs by knowing its MAC address. The Mobile will monitor all the applications running on the computer. Through WCF services provided by .NET Android phone sends a server request and then the request is delivered to the client computers, where the request is processed before delivering. For easier retrieval for the android user the data is stored in an XML file. A framework called WCF is used to build service-oriented applications. Client processes the request sent by the server and responds to it. The dedicated connection i.e TCP/IP is used to connect the server and the clients. It provides end-to-end connectivity. A black list is created which contains all the applications which the user wants to restrict. If any restricted application is opened then the user has the right to terminate it. If any unauthorized user opens any application that is kept in the black list, then the android user gets a notification from the computer. The user can then terminate this restricted application. This application best suited for IT Administrators to have control over computers in the network. It is also useful in colleges to monitor and restrict the use of any forbidden sites or applications.

[2] Controlling PC/Laptop via Android Phone (Android Remote Control)

This paper shows how a Personal Computer and Laptop can be regulated from remote place with cellphone using internet. It essentially turns a cellphone into wireless keyboard and mouse with touchscreen. This application can be carried out with few wireless connection between the Personal Computer or Laptop and the cellphone with Android OS. By pervading the IP address of Personal Computer, it is feasible to build a connection between them by utilizing Wi-Fi connection. This application along with converting a smartphone into wireless keyboard and mouse, also gives whole bunch of other features such as voice to text conversion. The realized application consists of two parts, one is an application built for Android and the second is the server application that processes the command sent by the user. This application provides several other features which involves controlling mouse with touch

screen having two onscreen mouse buttons, support for both landscape and portrait mode, works with any Wi-Fi network, capability of typing, computer functions and capability to handle and modify, compatible with Windows, Linux and Mac Operating Systems, voice typing mechanism, all the typing is accomplished in desktop or laptop on voice commands. The result of this is convenient, easy-to-use application.

[3] Android Controlling Remote PC

This paper focuses on an android application where user can connect to any of the computers. It is essentially a mobile application based on Android for communicating with a Personal Computer. This mobile application can be used in file sharing between target Personal Computer and Android smartphone, start and shutdown the Personal Computer, allows accessing of installed applications in PC. This application is best suited for IT Administrators to remotely get data from their own PC's database, is used by performing operations on PC like sending important documents and other files or data if required. By connecting to the web server the smartphone can access the data in certain amount of time interval. Several operations can be controlled by the smartphone device of PC. The entire process is based on VNC server of our computer which is connected to the Wi-Fi network. The several features this application provides includes PC power control, Screen Capture, OTP, Remote FTP, Keyboard emulation, Mouse emulation, Remote email.

[4] Intelligent Voice Assistant Using Android Platform

This project concentrates on implementing very few basic features but yet complicated at the time of development. It is capable of sending SMS, opening applications that are inbuilt like gallery, settings, camera, messaging, etc. which uses speech recognition engine of Google. The main aim is to use the voice commands given by users to access smartphone instead of using it physically. By voice command user can send a message easily to the recipient accessible in their contact list as well as to the mobile number. Also users will be able to send the e-mail to the recipient with mail address in the contacts. By providing appropriate command which contains the mail request keyword along with email-id of the target recipient. Google search option will help users in searching anything on the web. The search will give list of result back and that will be displayed on the web browser. The camera function will invoke the camera on the smart phone to click a picture of the present view, the

same will be stored for future viewing and operation. Speech Recognition is carried out through Google Server, using Hidden Markov Model (HMM) algorithm. This process includes conversion of audile speech into a set of words and is performed by software component. Precision of speech recognition systems will be different in vocabulary size and confusability, speaker dependence versus independence, modality of speech, task and language constraints.

[5] Voice Controlled Personal Assistant

This will use the NLP and can be unified with AI techniques to accomplish a smart assistant that can manage Internet of Things applications and also solve queries of user by searching it in web. It can be devised to decrease the work which would otherwise have to be performed manually like the human efforts to interact with many other subsystems. By attaining this, the system will make life of human convenient. More precisely, this system is created to communicate with other subsystems brilliantly and control these devices. This involves Internet of Things devices or getting news from Internet, providing other data, getting personalized information saved already on the system, etc. The mobile application should allow the user add information such as calendar entries, setting alarm, or reminders. The software will facilitate ease of access to several other devices and platforms. The hardware device apprehends the audio request through microphone and processes the request so that the device can acknowledge to the one using in-built speaker module.

[6] A Computer Remote Control System Based on Speech Recognition Technologies of Mobile Devices and Wireless Communication Technologies

This paper represents the composition of the system that consists of a mobile device such as a android phone, a Personal Computer server, and a Google server which are connected to each other. Users can give command to a smart phone to do something through voice; such as email writing, to check the weather forecast, or to manage schedule. These commands are then executed immediately. If a user wants to obtain contents of a document which is stored in a PC then the proposed system provides a function via Text To Speech (TTS) of the Google Server. Google uses AI algorithms to identify sentences spoken, for analysis purposes it stores voice information anonymously and cross checks spoken info with written queries on the server. Key problems of computational power, availability of data and managing such

huge amounts of data are easily done with the help of android speech. Then the server performs Natural Language Processing (NLP). Several steps involved in NLP such as Lexical Analysis, Morphological Analysis, Syntactic Analysis, Semantic Analysis. The major intention was to provide a system for the blind and physically disabled community so that they can easily control various functions of computer through voice. This system is very helpful for the general people as well. Users give commands to a smart phone to do something through voice such as controlling computers directly, writing mails and documents, number calculation, weather forecast checking, or schedule management. These commands are then immediately done. For the blind people, the system helps with a function via TTS (Text To Speech) of the Google server to obtain document's contents saved in a computer if required.

[7] Personal Assistant with Voice Recognition Intelligence

This project concentrates on the most renowned application of iPhone called "SIRI" that helps the user to communicate with the end user mobile through voice and it also responds to the voice commands of the user. Google has also developed a similar application that is "Google Voice Search" which is used in Android Phones. But this application requires an active Internet Connection to work as intended. This projected system has efficiency to work with and without Internet Connections. It takes the input in the form of voice or text, processes it and then it sends the output in several forms like action to be carried out or the result after search is guided to the user. In addition, this projected system can reform the way of communications between end user and the mobile devices. The system is built in such a way that end user can avail all the services provided by the mobile devices.

Summary of Literature Survey:*Table 2.1: Summary of literature survey*

Features	Intelligent Voice Assistant Using Android Platform	Android Remote Control	Monitoring PC's using android	Computer Remote Control System	Android Controlling Remote PC	Voice Controlled Personal Assistant	Personal Assistant with Voice Recognition Intelligence	A Secure Android based Virtual Assistant to Control Windows System (Proposal)
Trending Technology	None	None	None	AI	AI	None	None	ML
Security	None	None	Blacklist	None	OTP	None	Remote Lock and Erase	Encryption/Decryption, Security Code
Feature - Rich	No	No	No	No	No	No	No	Yes
Speech Recognition	Yes	Only for voice typing	No	Yes	No	Yes	Yes	Yes

Chapter 3

SOFTWARE

REQUIREMENT ANALYSIS

CHAPTER 3

SOFTWARE REQUIREMENT ANALYSIS

Software Requirement Analysis in the field of system engineering and software engineering, comprises those tasks that are used for determining the needs or conditions to meet for a new or alternative product or project, taking account of the possibly conflicting requirements of the several stakeholders, analyzing, documenting, validating and managing system or software requirements.

3.1 Feasibility Study

The main purpose of the feasibility study is to handle the technical, operational and economic feasibility of evolving the application. Feasibility is the decision of whether or not the project is worth doing. The process followed in doing this decision is called feasibility study. Given unlimited resources and infinite time, all systems are feasible. The feasibility study for this project are:

- Operational Feasibility
- Technical Feasibility
- Economic Feasibility

3.1.1 Technical Feasibility

It is the method of the particular technical solution and the technical resources that are available and expertise. This is one of the first feasibility study that should be conducted after a project has been recognized. A technical feasibility study is an evaluation of the logistical condition of business operation. This is advised with specified equipment and software that will successfully satisfy the requirements of the user. The technical needs of the system may differ considerably but must involve the facility to provide outputs in a time given, response time under valid conditions and the capability to process a certain amount of transaction at a certain speed.

The projected system is developed by using PyCharm, Android Studio and IntelliJ software. PyCharm is an IDE for computer programming, specifically for the Python language. It provides code analysis, debugger and an integrated unit tester. PyCharm has all the features that makes the programmer to write code in the most efficient manner. Android Studio is an official IDE for Google's Android operating system, built on JetBrains IntelliJ

IDEA software and designed specifically for Android development. IntelliJ is an IDE written in Java for developing computer software. It provides features like code completion by analyzing the context, code refactoring etc. It can also be used for commercial development.

3.1.2 Operational Feasibility

Operational feasibility is primarily anxious with problems like whether the system will be used if it is developed and implemented, whether there will be refusal from the users which will affect the achievable application benefits. It is the ability to use, support and execute the required tasks of a system or program. It involves everyone who designs, operates or uses the system. It is the method of how well a projected system solves the problem and takes benefits of the opportunities recognized during the scope definition and problem analysis stages. This system helps in various ways. It avoids use of text, which in turn makes it easy by using voice. Maintenance of the project is also easy and understandable and no major training and new skills are required.

3.1.3 Economic Feasibility

Economic feasibility is the most commonly used process for assessing the effect of the new system. This feasibility study is the measure of the cost efficiency of an information system solution. Without any confusion, this method is most frequently used and very important one of the remaining three. Information systems are usually viewed as capital investments for the business, and as such, should be lead to the same type of investment analyses as other capital investments.

Economic analysis is used for assessing the effect of the projected system. In economic feasibility, the most important is cost effectiveness analysis. This project is economical as it mainly depends on the software components which are freely available.

Chapter 4

SYSTEM REQUIREMENT SPECIFICATION

CHAPTER 4

SYSTEM REQUIREMENT SPECIFICATION

The main objective of System Requirement Specification is to interpret the ideas in the minds of a client into a formal document. Through System Requirement Specification the client distinctly illustrates what it awaits from the projected system and the developer certainly understands what abilities are needed to build the system. It involves a collection of elements that tries to describe the expected functionality needed by the customer to please their different users as shown below. The objective of this document is to serve as a guide to developers and testers who are responsible for the development of the system.

The project mainly concentrates on designing and developing a virtual assistant that can interact with the end user to get things done on personal computer (PC) with the help of desktop application. The problem in current system is that there are many virtual assistants like Google assistant, Apple Siri, Microsoft Cortana, etc., but they can only control the device on which they are installed. For example, Google assistant on android can't control Microsoft Windows. In the proposed system, there is a virtual assistant in which one operating system can control another operating system.

4.1 Functional Overview

- User needs to give an input in the form of voice.
- The voice is then transformed into text and sent to PC for processing.
- An algorithm is used to train the PC application so that it can process received commands efficiently.

4.2 Operating Environment

Operating environment involves minimum software and hardware requirements required by the system.

4.2.1 Software Requirements

- Operating System :
 - Android : Version 6.0 Marshmallow or above
 - PC : Windows 7 or above
- Tools used : Android Studio, PyCharm, IntelliJ
- Programming Language : Java, Kotlin, Python

4.2.2 Hardware Requirements

- Processor : 1.6GHz Quad Core or above(for both Android and PC)
- RAM :
 - Android : 2GB or above
 - PC : 4GB or above
- Storage :
 - Android : Atleast 100MB of free space
 - PC : 250 MB or more free space
- Output device : High Resolution Monitor, Mobile phone

4.3 Functional Requirements

- The connection between PC and Android must be secured by means of encryption.
- The assistant must be able to predict and perform the task when user asks.
- It should provide an interface to monitor the PC live from android.
- It should help users in protecting their important documents.

4.4 Non-Functional Requirements

- The developed system is user friendly. It comes with the guide to help users get the working of the system.
- By using this assistant, it will be ease for users with their basic daily tasks.
- The developed system will provide an option to log the data if the requested task is failed to complete. This data can later be used to improve the overall system.
- Attractive user interface.

4.5 Performance Requirements

This application system will avoid use of typing of text and thereby we use voice-driven digital assistants which saves time by giving repeated tasks to personal voice assistants which frees up the human time and resources. It is also possible to send user commands to PC via Wi-fi, Hotspot or Bluetooth. Application calculates the result automatically and displays it to the user. Interface is created in such a way that user can understand very easily. Maintenance of the project is easy and understandable.

Chapter 5

SYSTEM DESIGN

CHAPTER 5

SYSTEM DESIGN

To plan a solution for the problem described in the requirement section is the purpose of the design phase. The most critical factor affecting the quality of the software is the design of the system, and has a major impact on the later phases, particularly testing and maintenance. The design document is the output of this phase. The design activity is often divided into two separate phases. They are system design and detailed design.

5.1 High Level Design

High-level design consists of the modules that needs to be in the system, the specifications of these modules, and most importantly how they can interact with each other to provide the desired results. At the end of the design, all major data structures, output formats, file formats and major modules in the system and their specifications are decided.

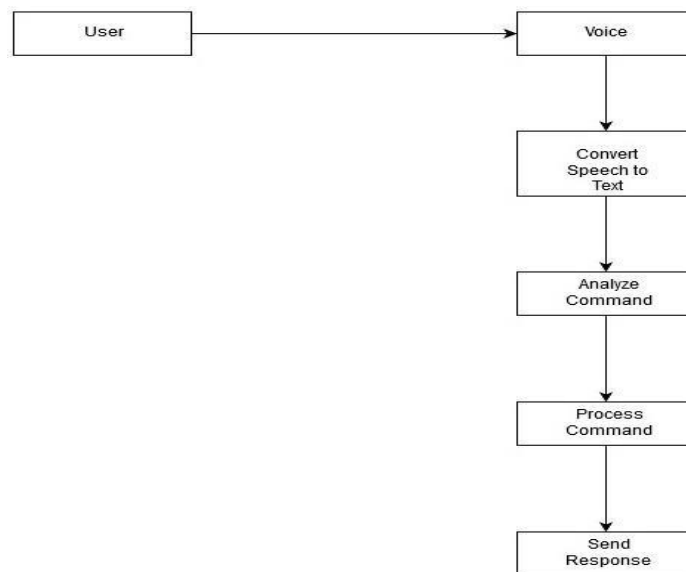


Figure 5.1: *System Architecture of a novel simplified android based virtual assistant for windows users*

Figure 5.1 shows the system architecture of a novel simplified android based virtual assistant for windows users. The user gives command using voice. The voice is then converted into text. The converted text that is the given command is then analyzed. After analyzing the command is processed and a proper response is sent back.

5.2 Detailed Design

In this design phase, the internal logic of every module listed in system design is decided. Also further details of the data structures and algorithmic design of every module is described. The logic of module is usually specified in a high-level design description language, which is independent of target language in which the software will be implemented.

5.2.1 Use Case Diagram of a novel simplified android based virtual assistant for windows users

A use case diagram is basically a representation of a user's interaction with the system and depicting the specifications of a use case. A use case diagram consists of the different kinds of users of a particular system and the numerous ways that they can have an interaction with the system. A use case diagram is a dynamic or behaviour diagram in UML. The use cases are represented by either circles or ellipses. These diagrams model the functionality of a system with the help of actors and use cases. Use cases are a set of actions, services, and functions that must be performed by the system. Use case diagrams are nothing but valuables for visualizing the functional requirements of a system which will translate into development priorities and design choices. They also help in identifying any external or internal factors which may influence the system and must be considered to improve the overall system.

Figure 5.2 shows the use case diagram. There are three kinds of actors that is Data Set Creator, Developer and User. Data set creator will collect all the data required to create the machine learning model. Developer will use these data to train and create a model. User can use the end product in their day to day life.

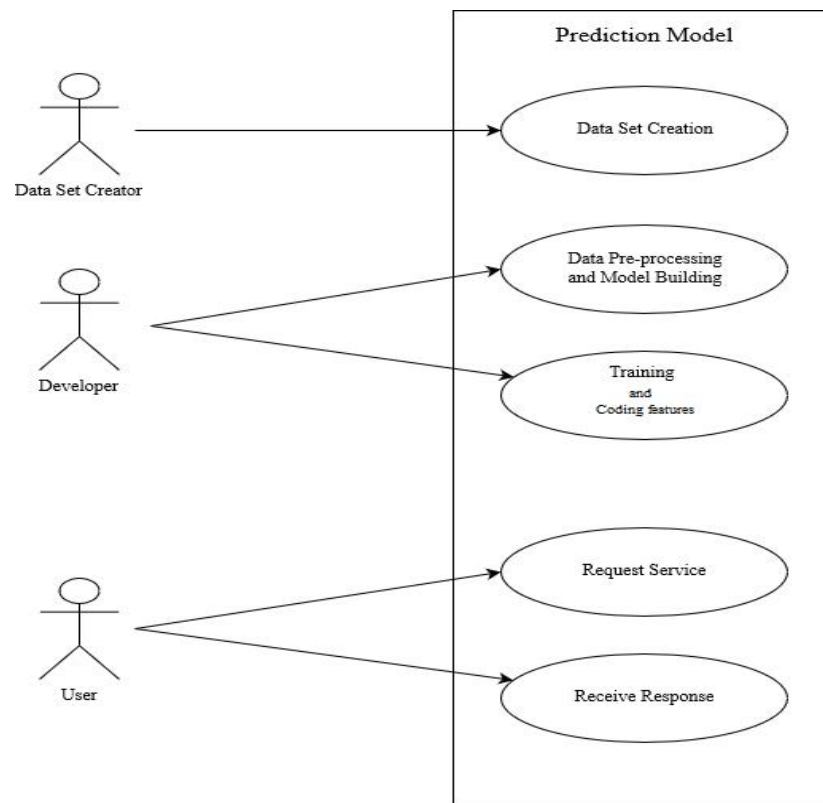


Figure 5.2: Use Case diagram for a novel simplified android based virtual assistant for windows users

5.2.2 Data Flow Diagram of a novel simplified android based virtual assistant for windows users

A Data Flow Diagram (DFD) is nothing but a graph that shows the flow of data from its sources in objects through processes that transform them into destination. It is also known as “bubble chart” and has the purpose of clarifying the system requirements and identifying major transformations that becomes programs in system design. So it is the initial point of the design phase which functionally decomposes the requirements specifications down to the lowest level of detail. The lines represents data flow in the system and the bubbles represents data transformations. A DFD is used as a preliminary step to build an overview of the system without going through greater level of detail, which can later be elaborated.

Figure 5.3 shows the data flow diagram for a novel simplified android based virtual assistant for windows users. Initially connection is established using IP address. Once the connection is established, the user is supposed to give an input in the form of voice commands. The input voice generates an equivalent text which is encrypted and sent to the windows. The window system receives the command and processes the request and then sends the requested operation as a response which will be shown back in the android.

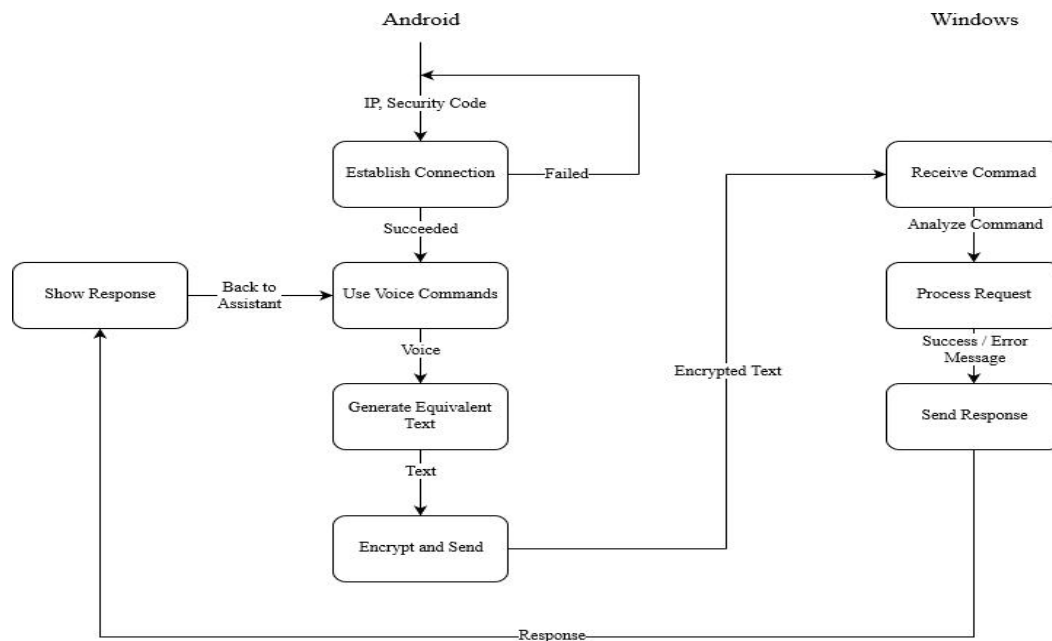


Figure 5.3: Data Flow Diagram for a novel simplified android based virtual assistant for windows users

5.2.3 Sequence Diagram of a novel simplified android based virtual assistant for windows users

Figure 5.4 shows the sequence diagram of a novel simplified android based virtual assistant for windows users. The user is supposed to give an input in the form of voice commands. The input voice generates an equivalent text which is encrypted and sent to the windows. The window system receives the command and processes the request and then sends the requested operation as a response which will be shown back in the android.

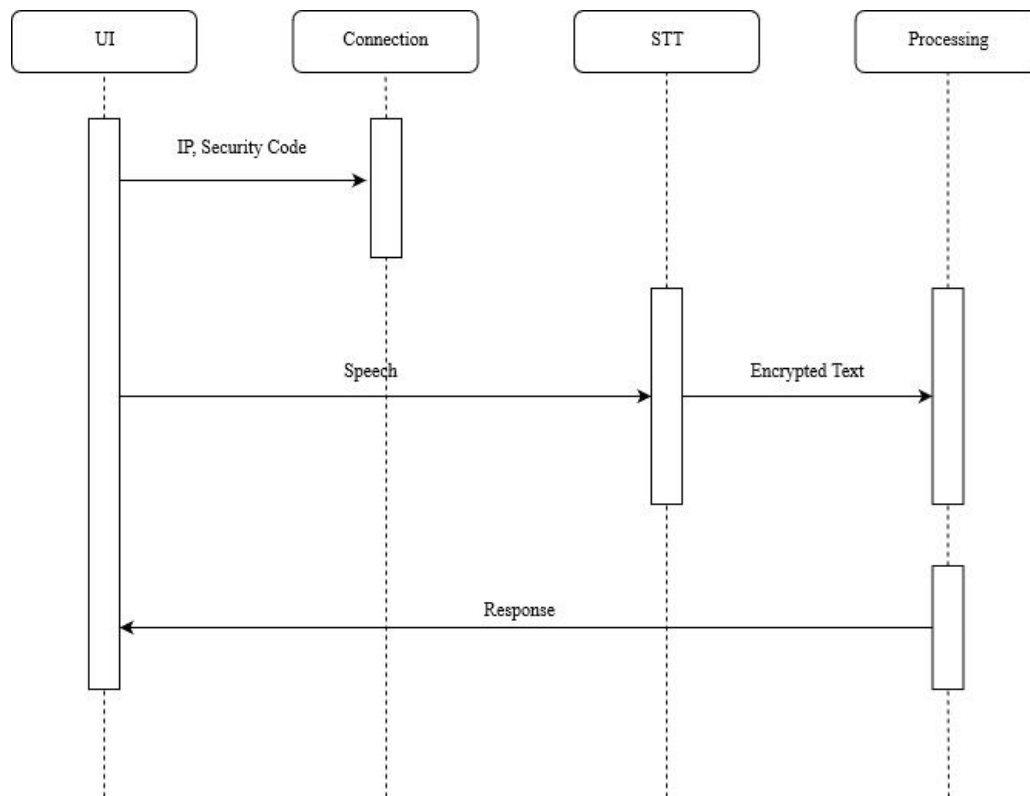


Figure 5.4: Sequence Diagram of a novel simplified android based virtual assistant for windows users

Chapter 6

**SYSTEM
IMPLEMENTATION**

CHAPTER 6

SYSTEM IMPLEMENTATION

The phase where the hypothetical idea is transformed into a working system is called as system implementation. The resulting system might be totally new, replacing automated system, or an existing manual, or it might be a huge modification to an existing system. The system is implemented using Java, Kotlin and Python.

Java

Java is class-based and object-oriented programming language that is formed to have as little implementation dependencies as feasible. It is expected to allow developers to write once, run anywhere (WORA), which means compiled Java code can run on all platforms that has Java Virtual Machine(JVM) installed without the requirement of compiling it again. Java applications are compiled into intermediate code called bytecode that can run on any JVM regardless of the underlying operating system.

Kotlin

Kotlin is statically typed cross-platform programming language with type inference. Kotlin is devised to interoperate completely with Java, and the JVM version of its standard library relies on the Java Class Library, but type inference will make its syntax more pithy. Kotlin mainly aims the JVM, but also compiles to JavaScript or native code (via LLVM). Since the release of Android Studio version 3.0, Kotlin has been included as an alternative to the standard Java compiler. The Android Kotlin compiler by default targets Java 6, but it lets the programmer choose between Java 8 to 13, for optimization.

Python

Python is high-level, interpreted programming language. It is garbage-collected and dynamically typed. It supports multiple programming paradigms, involving structured (particularly, procedural), object-oriented, and functional programming. Due to its comprehensive standard library Python is often described as a "batteries included" language.

6.1 Methods to train Assistant

Natural Language Processing (NLP)

NLP is a method used to make system understand human interpreted language (for example English). It is difficult to apply and train a model to recognize and understand an English sentence. This is because different sentences may vary in length, may contain unwanted data (to be specific, unwanted words like the, they, to etc. and special characters that are not necessary for processing). So, it is recommended to clean up the texts before further processing. NLP technique involves cleaning the texts and creating a bag of words model such that this model can be used in other machine learning techniques for training.

Random Forest Classifier

Random forest classifier consists of a several individual decision trees where each tree helps in predicting the final value. Several trees are trained with different subsets of the entire dataset. In this way, each tree can predict based on its training. The value predicted by the highest number of trees becomes the final prediction. Due to this reason, Random forest classifier is more accurate when compared to decision tree classifier.

6.2 Procedure for the entire system

Step 1: If Android and PC are not connected, then

Establish connection using credentials displayed in the PC app.

Step 2: Input voice in Android

Step 3: Get the corresponding text, encrypt it and send to the target PC

Step 4: At PC, receive the text and decrypt it.

Step 5: Apply NLP

Step 6: Apply Random Forest Classifier

Step 7: Perform Task

Step 8: Encrypt and send response back to Android

Step 9: At Android, receive response, decrypt it and convey it to the user

6.2.1 Procedure for Natural Language Processing

Step 1: Load required training data

Step 2: For each sentence in training data,

1. Remove unnecessary words and special characters
2. Convert all remaining words to lowercase
3. Convert each word to its basic form

Step 3: Create Bag of Words model

Step 4: Replace training data with this Bag of Words model

6.2.2 Procedure for Random Forest Classifier

Step 1: Load required training data

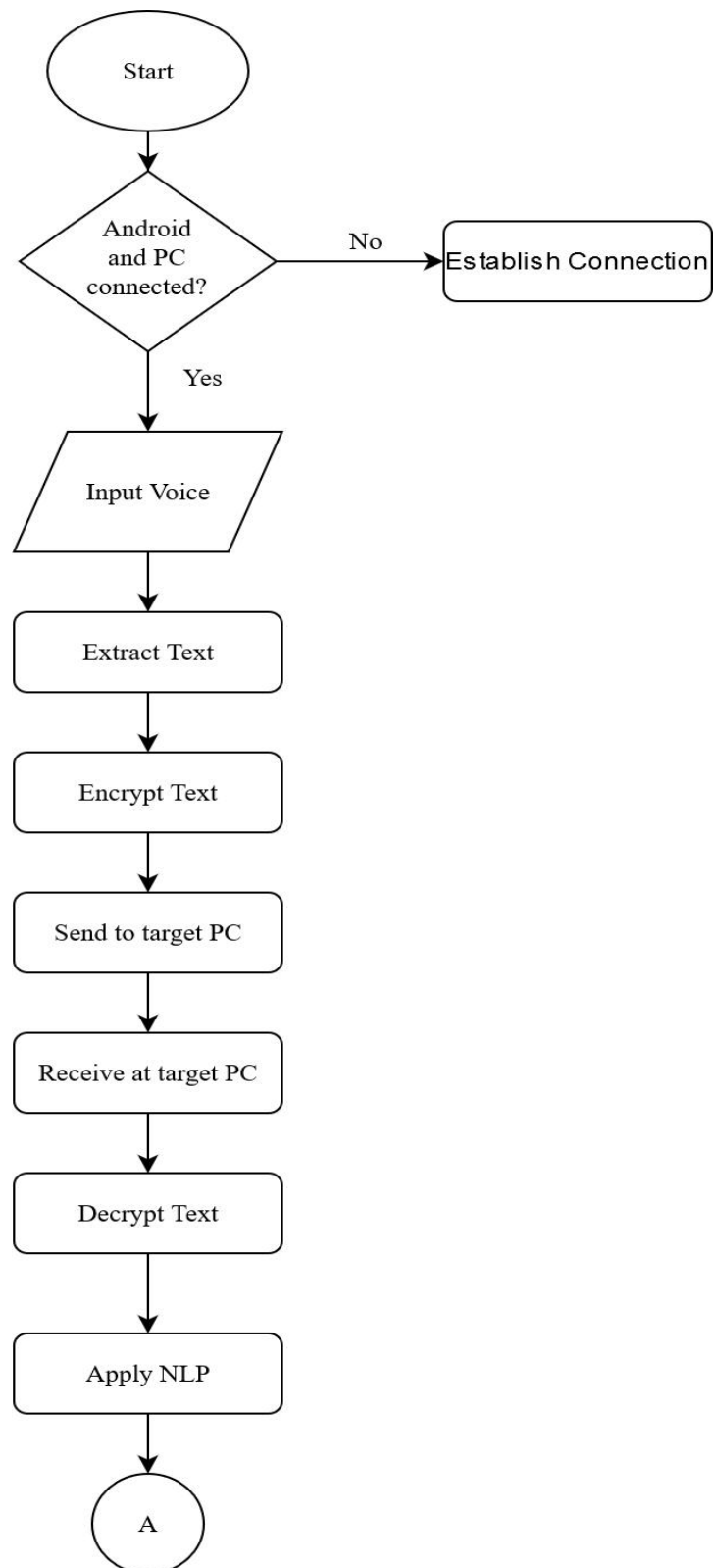
Step 2: Split the loaded data into several random samples

Step 3: Train and make a decision tree for every sample

Step 4: Collect the prediction value from every decision tree

Step 5: Select the most voted value as the final prediction

6.3 Flowchart for the system



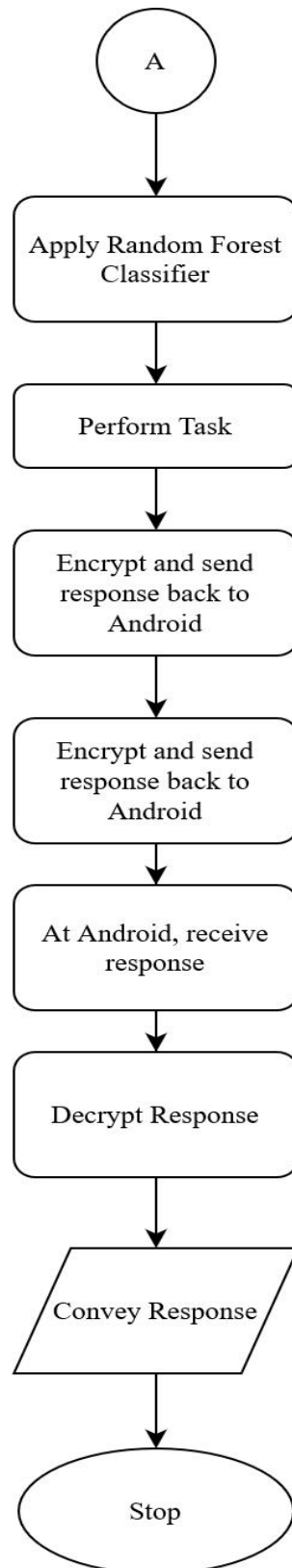


Figure 6.3: Flowchart for the system

Chapter 7

TESTING

CHAPTER 7

TESTING

Software testing is the process which is helpful in security, identifying correctness, completeness and aspect of advanced computer software. This consists of the process of assassinating the application or program with the firm to find errors. Quality is not an complete; it is value to some user. Keeping that in thought testing can never fully authorize the exactness of capricious computer software; testing provides assessment or similarity that correlates the behaviour and state of the product across a specification.

Testing designs the first step in deciding whether the program has errors. Certainly the benefit of testing in confessing errors in programs depends severely on the test cases. As code is an alone product that can be accomplished and whose absolute behaviour can be noticed. Testing is the stage where the errors remaining from all the previous stages must be discovered.

The program that needs to be tested is accomplished with a set of test cases and the output produced by the program for the test cases are checked to resolve if the programming is fulfilling a function as predicted or not.

7.1 Testing Methodologies

The testing methodologies are as follows:

- **Unit Testing:** This is the first phase of testing; the various modules or components are tested individually, often performed by coder himself.
- **Integration Testing:** In integration testing many unit tested modules are combined into subsystems, which are then tested. The aim here is to see if the modules can be integrated accordingly.
- **System Testing:** The whole software system is tested here. The requirement specification is the reference document for this process and the goal is to see if the software meets the requirements. This form of testing is popularly known as black box testing.
- **Acceptance Testing:** It is accomplished with sensible information of the client to exhibit that the software is working convincingly. It is the test conducted to decide if the requirements of a specification are met.

7.2 Testing Criteria

Table 7.1: Test cases for the system

Sl. No	Test Procedure	Pre-Condition	Expected Result	Passed/ failed
1	In android, click on connect button without entering IP	---	Error showing mandatory field is missing	Passed
2	Ask assistant to show whats going on in pc	Android and PC must be connected	Should stream PC's screen	Passed
3	Ask assistant to show who is using the pc	Android and PC must be connected	Should use PC's webcam to take a picture and the same should be displayed in Android	Passed
4	Ask assistant to encrypt important documents	Android and PC must be connected	All the files in the protected folder should be encrypted.	Passed
5	Ask assistant to change desktop wallpaper	Android and PC must be connected	Should change desktop wallpaper to one randomly selected from the user collection	Passed
6	Ask assistant to retrieve PC location	Android and PC must be connected	Should retrieve location information in terms of city, state and country	Passed

7	Chat with assistant	Android and PC must be connected	Should reply back or should perform a search in case reply can't be given	Passed
8	Ask assistant to take a picture	Android and PC must be connected	It should take the picture and should be saved to the disk.	Passed
9	Ask assistant to change the brightness level	Android and PC must be connected	Brightness should change to the specified amount.	Passed
10	Ask assistant to shutdown	Android and PC must be connected	System should shutdown	Passed

Chapter 8

SCREENSHOTS

CHAPTER 8

SCREENSHOTS

8.1 Connect Screen : PC

The Figure 8.1 shows the connection screen of the pc app. User need to use the information displayed in this screen to make a connection.

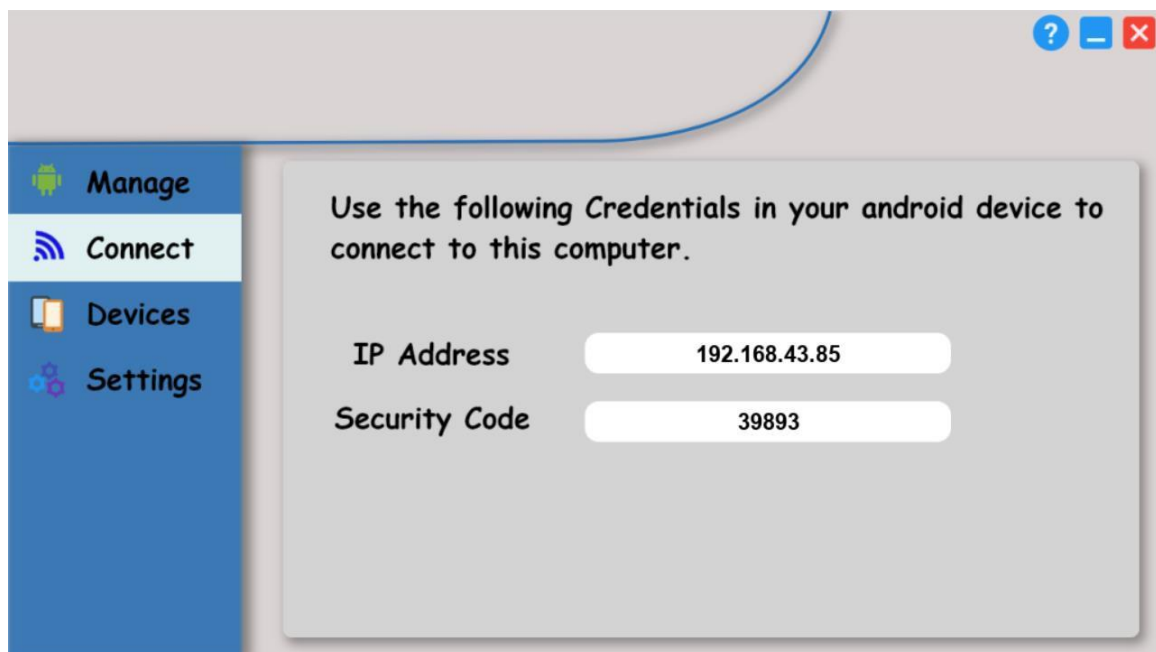


Figure 8.1: Connect Screen : PC

8.2 Connect Screen : Android

The Figure 8.2 shows the connection screen of the android app. User can enter IP and Security code to make a connection. If the device has the permission to auto connect, user can leave Security Code field empty.

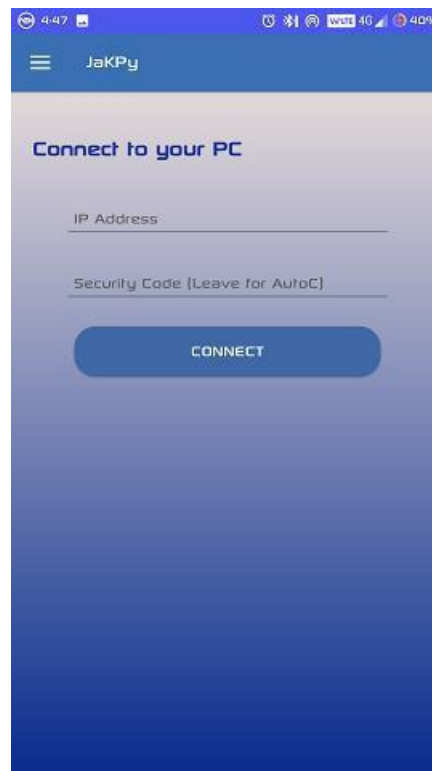


Figure 8.2: Connect Screen : Android

8.3 Manage Screen : PC

The Figure 8.3 shows manage screen offered by PC app. Here, the information of currently connected android device will be available. Clicking on Disconnect button will break the active connection

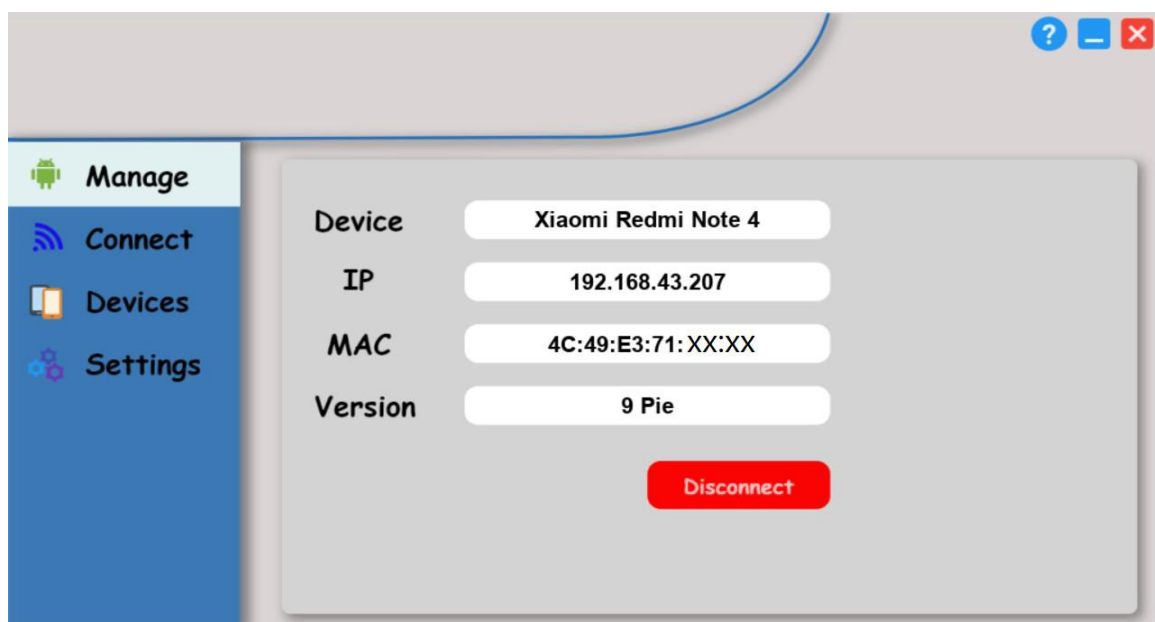


Figure 8.3: Manage Screen : PC

8.4 Settings Screen : Android

The Figure 8.4 shows the settings available in android app. User can tweak some settings in this screen.



Figure 8.4: Settings Screen : Android

8.5 Assistant : Android

The Figure 8.5 shows the actual assistant. Here, user can click on mic icon and assistant will start listening to user command.

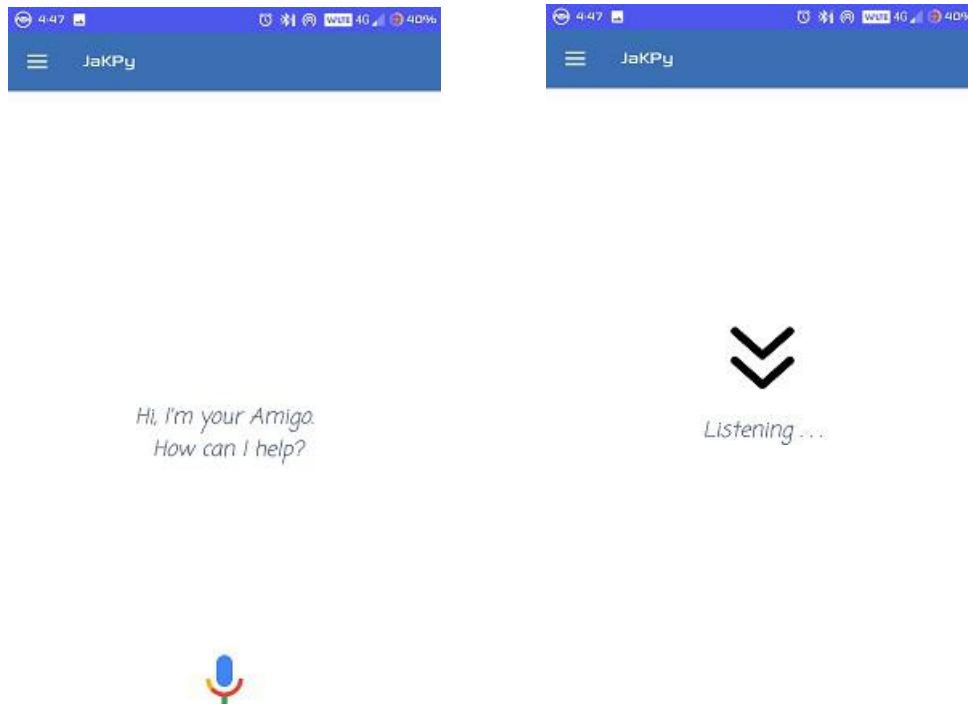


Figure 8.5: Assistant : Android

Chapter 9

RESULT ANALYSIS

CHAPTER 9

RESULT ANALYSIS

Capacity: The adaptability of a model is that, the variety of functions it can fit.

- **Representational capacity** – The variety of functions which the model can enroll.
- **Effective capacity** - In study, a learning algorithm is not apt to find the best function out of the available functions it can enroll, though it can learn one that executes unusually well - those functions that the learning algorithm is efficient of finding describes the model's productive ability.

Hypothesis space: The set of functions the model is restricted to learning.

Hyperparameter: A framework of a model that is not studied.

Underfitting: When the model could attain preferred generalization with more training or ability. Identified by a high training error.

Overfitting: When the model could attain preferred generalization with more training or ability; in specific, the model is too tuned to the idiosyncrasies of the training information. Too much ability can drive to over fitting in that the model may be able to study functions too specific to the data. Portrayed by a large gap between the training error and the test error.

Model selection: The process of selecting the finest hyper parameters on a validation set.

Multiclass classification: Classification task with more than two classes (Training set contains more than two possible values for dependent variable).

Accuracy is one metric for evaluating classification models. In other words, accuracy is the fraction of predictions the trained model guessed correctly.

Accuracy = No. of correct predictions / Total no. of predictions

The training dataset consist of over 500 entries to predict tasks and over 1000 entries to enable chatting / question answering.

No. of Testing Samples	No. of correct predictions	Total no. of predictions	Result
500	437	500	0.874

Table 9.1: Prediction analysis

Accuracy = $0.874 = 87.40\%$

A similar work was done by a group of people at Sinhgad Academy of Engineering, Pune. Their project does handle some of the basic tasks. They used intelligent recognition system to convert voice into text but they used series of condition checking to recognize the tasks. When it comes to efficiency, this is quite inefficient and they had very limited features that are implemented. Our project uses the latest machine learning technique for predicting tasks and has bunch of features implemented. This might be more efficient in terms of prediction and several checks were made for efficient use of resources.

Chapter 10

USER MANUAL

CHAPTER 10

USER MANUAL

Inorder to use the assistant to perform specific task, the user first needs to establish connection between android and PC. This can be done by entering the credentials displayed on the PC app in android. Android has an option to save recent connection information which can be turned on / off in settings. This enables user to automatically connect to the recently targeted PC if PC allows the same. When the user connects to PC for the first time, PC asks user whether to accept auto connection from the connected device, next time onwards. If allowed and auto connection is turned on in android settings too, then whenever user opens the android app, it attempts to establish connection automatically in background.

Once the connection is succeeded, the user can ask assistant to do specific task like opening apps, playing music, retrieving location and other system information, etc. The assistant can also be used to monitor the system constantly by watching what is happening in the connected PC right from the android. This allows user to remotely take further decisions especially when PC is given to someone for some work. In this case, the assistant can help users in protecting their PC from suspicious activities or to protect important documents by remotely encrypting these documents or by remotely locking the PC. If user is bored, he/she can chat with assistant as well.

CONCLUSION AND FUTURE WORK

CONCLUSION AND FUTURE WORK

An intelligent virtual assistant or personal assistant is a software that is designed to perform tasks or services for an individual based on commands or questions. The developed virtual assistant can get things done in the platform(Windows) other than the platform(Android) where the assistant is installed. Users can keep track of the activities when they are not directly in touch with their PC and make certain decisions based on the observed activity. Apart from this, users can also use this assistant to make their life easier by asking the assistant to do most of the tasks. The assistant is trained on question answering which enables the users to chat with the assistant.

Future work might be adding several more useful tasks that can be done by the assistant. It might be good if the assistant improve over time in terms of accuracy. So, making the assistant to learn from the experience will be a good idea.

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APPENDIX

APPENDIX

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