A Project Based Learning Report

on

DESKTOP VIRTUAL ASSISTANT

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By

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ABSTRACT

The advancement in technology over time has been unmeasurable. From the first digital computer built by Eniac having a clock speed of 100KHz to Summit developed by the US Department of Energy has a performance of 148.6 petaFlops, we have come a long way in technological advancement.

In such an era of advancement if people are still struggling to interact with their machine using various input devices then its not worth it. For this reason, many voice assistants were developed and are still being improved for better performance and efficiency. The main task of a voice assistant is to minimize the use of input devices like keyboard, mouse, touch pens, etc. This will reduce both the hardware cost and space taken by it.

KEYWORDS –

Desktop Assistant, Python, Machine Learning, Text to Speech, Speech to Text, Language Processing, Voice Recognition, Artificial Intelligence, Internet of Things (IOT), Virtual Assistant.

Introduction

In the 21st century, human interaction is being replaced by automation very quickly. One of the main reasons for this change is performance. There's a drastic change in technology rather than advancement. In today's world, we train our machine's to do their tasks by themselves or to think like humans using technologies like Machine Learning, Neural Networks, etc. Now in the current era, we can talk to our machines with the help of virtual assistants. There are companies like Google, Apple, Microsoft, etc with virtual assistants like Google Now, Siri, Cortana, etc. which helps their users to control their machine by just giving input in the form of voice.

These types of virtual assistants are very useful for old age, blind & physically challenged people, children, etc. by making sure that the interaction with the machine is not a challenge anymore for people. Even blind people who couldn't see the machine can interact with it using their voice only[1].

Some of the basic tasks that are supported by most of the virtual assistants are:

- Checking weather updates
- Sending and checking mails
- Search on Wikipedia
- Make and receive calls
- Stream music
- Open applications
- Text messages etc.

The voice assistant we have developed is a desktop-based built using python modules and libraries. This assistant is just a basic version that could perform all the basic tasks which have been mentioned above but current technology is although good in it is still to be merged with Machine Learning and Internet Of Things (IOT) for better enhancements.

The understanding and executing commands are still to reach a new level like the virtual assistant of the iron man named Jarvis. This is although fictional yet this is what that can be achieved using virtual assistants. All you need to do is give a command to the assistant and the rest will be performed by the assistant.

With the help of voice-activated virtual assistants, there will be no need to write long codes to perform a task, the system will do so for us. The machine will work in three mode supervised, unsupervised or reinforcement learning depending upon the usage for which the assistant is developed. This is all possible with the help of machine learning.

Now what the IOT does is it will help the assistant to interact with the neighboring smart devices and will act as a single interface that will control everything in the surrounding. With the involvement of IOT, it will be possible to control other smart devices that will in-turn interact among themselves over the internet.

So with a capable virtual assistant, we will be able to control many things around us single handedly with only one platform.

Timeline of Mainstream Voice Assistants

Apple Siri
OCTOBER 2011

Google Now
MAY 2012

Microsoft Cortana
APRIL 2014

Amazon Alexa
NOVEMBER 2014

Google Assistant
NOVEMBER 2016

1.1 Motivation

Voice assistants are easy to handle the things. As now a days we are engaged in our daily schedule so Assistants are useful in this case as they work on voice, we only need to give some command and it will execute our commands. They can make calls, send text messages, look things up online, Provide directions, open applications, and so many things can be done using Voice Assistant. With the addition of separate applications our voice can be a type of remote control. The Commands we give to the Voice Assistant it follows them correctly .It provides 24 * 7 support to its user's .It Eradicates Language Barrier, It is integrated with automatic translation to help the language barrier .This Technology is consistently advancing and changing, and the things are getting easy to use and Operate Hence we all Team has decided to work on Assistant and get more information about it.

1.2 Objective

We have forever had to learn the language of technology, be it keyboard, mouse or touchscreen. Voice assistants have turned this all into more easy way. Today voice assistants are not limited to smart speakers but are also available in cars, household devices, smart phones, and several applications. It is a virtual voice assistant that uses speech recognition, natural language processing to help users.

This assistant currently works online and performs basic tasks like
- weather
- updates of News
- stream music,
- search Wikipedia,
- open desktop applications, etc.

The functionality of the current system is limited to working online only. The upcoming updates of this assistant will have machine learning incorporated in the system which will result in better suggestions with IOT to control the nearby devices similar to what Amazon's Alexa does.

1.3 Introduction

❖ Well , We had the similar thought before we started making our the DESKTOP VOICE ASSISTANT. Though it is not as capable and high as like Amazon's Alexa or Google Assistant ,Home or Apple's Siri or JARIVS from Iron Man. Nowadays, People are troubled by typing commands into the computer. Be it procrastination or a busy schedule. Typing is a big obsolete process.

❖ The solution to this is that we switch over to an assistant which understands us and do the initial work for us. An assistant is the best replacement for typing commands.

❖ Its named as DESKTOP VOICE ASSISTANT with voice recognition intelligence, which takes the user input in form of user's voice and processes it and return the output in various ways like an action to be performed or the search result is speaked out to the end user.

❖ Keywords : Voice Assistant ,Python's Speech Recognition, Python text-to – speech library pyttsx3,Python3.8

2. Literature Survey

This field of virtual assistants having speech recognition has seen some major advancements or innovations. This is mainly because of its demand in devices like smartwatches or fitness bands, speakers, bluetooth earphones, mobile phones, laptop or desktop, television, etc. Almost all the digital devices which are coming nowadays are coming with voice assistants which help to control the device with speech recognition only. A new set of techniques is being developed constantly to improve the performance of voice automated search[2].

As the amount of data is increasing exponentially now known as Big Data the best way to improve the results of virtual assistants is to incorporate our assistants with machine learning and train our devices according to their uses. Other major techniques that are equally important are Artificial Intelligence, Internet of Things, Big Data access and management, etc.

With the use of voice assistants, we can automate the task easily, just give the input to the machine in the speech form and all the tasks will be done by it from converting your speech into text form to taking out keywords from that text and execute the query to give results to the user.

Machine Learning is just a subset of Artificial Intelligence. This has been one of the most helpful advancements in technology. Before Al we were the ones who were upgrading technology to do a task but now the machine is itself able to counter new tasks and solve it without need to involve the humans to evolve it.

This has been helpful in day-to-day lifestyle. From mobile phones to personal desktops to mechanical industries these assistants are in very much demand for automating tasks and increasing efficiency[3].

VIRTUAL ASSISTANT - WORKING

III. SYSTEM ARCHITECTURE

```
import speech_recognition as sr
import os
import sys
import re
import webbrowser
import smtplib
import requests
```

Fig.3: Modules Imported

● **SPEECH RECOGNITION**

The speech recognition module used the program is Google's Speech Recognition API which is imported in python using the command "import speech recognition as sr".This module is used to recognize the voice which is given as input by the user.

This is a free API that is provided and supported by Google. This is a very light API that helps in reducing the size of our application[4].

The voice which is given as input is first converted to text using the speech recognition module. The text is then processed to give the result of the query given by the user. The final step is the conversion of the result of the processed query to speech which is the final output. The most time consuming among the two is STT because the system first has to listen to the user and different users have different, some are easy to understand while some are not easily audible.

This is the step upon which our total execution time depends. Once the speech is converted to text executing commands and giving the results back to the user is not a time-consuming step[5].

❖ Virtual assistants are available on most smart phones and tablets, traditional computers, and now, standalone devices like the Amazon Echo and Google Home.

❖ They combine specialized computers chips, microphones ,and software that listen for specific spoken commands from you and usually answers back with a voice that select.

3. Problem Specification

3.1 Problem Statement

❖ We are well aware about Cortana , Siri, Google Assistant and many other virtual assistants which are designed to aid the tasks of users in Windows ,Android and iOS platforms.

❖ But how cool it would be if we develop our personal Desktop Assistant ourselves using Python by taking inspiration from above mentioned big giants ?

3.2Problem Solution

➢ PURPOSE:

❖ This Software aims at developing a personal assistant for our Desktop.

❖ The main purpose of the software is to perform the tasks of the user at certain commands, provided in either of the ways, speech or text . It will ease most of the work of the user as a complete task can be done on a single command.

❖ Users can interact with the assistant either through voice commands or keyboard input.

4. Proposed System

The proposed system will have the following functionality:

      (a) The system will keep listening for commands and the time for listening is variable which can be changed according to user requirements.

      (b) If the system is not able to gather information from the user input it will keep asking again to repeat till the desired no. of times.

      (c) The system can have both male and female voices according to user requirements.

      (d) Features supported in the current version include playing music, emails, texts, search on Wikipedia, or opening system installed applications, opening anything on the web browser, etc.

      (e)The system will keep listening for commands and the time for listening is variable which can be changed according to user requirements.

      (f) If the system is not able to gather information from the user input it will keep asking again to repeat till the desired no. of times.

      (g) The system can have both male and female voices according to user requirements[7]

IMPORTED MODULES

      1) PYTTSX3

      The pyttsx3 is an offline module that is used for text to speech conversion in Python and it is supported by both Python 2 & 3. The run and wait functionality is also in this module only. It determines how much time the system will wait for another input or in other words the time interval between inputs. This is a free module available in the python community which can be installed using the pip command just like other modules.

2) DATETIME

   The Date Time module is imported to support the functionality of the date and time. For example, the user wants to know the current date and time or the user wants to schedule a task at a certain time. In short this module supports classes to manipulate date and time and perform operations according to it only. This is an essential module, especially in tasks where we want to keep a track of time. This module is very small in size and helps to control the size of our program. If the modules are too large or heavy then the system will lag and give slow responses.

3) WEBBROWSER

   This module allows the system to display web-based information to users. For example, the user wants to open any website and he gives input as "Open Google". The input is processed using the web browser module and the user gets a browser with google opened in it. The browser which will be used is the default set web browser.

4) WIKIPEDIA

   Wikipedia is a library in python which it possible for the virtual assistant to process the queries regarding Wikipedia and display the results to users. This is an online library and needs an internet connection to fetch the results. The no. of lines that the user wants to get as a result can be set manually.

5) OS MODULE

   OS Module provides an operating system dependent functionalities.

   If we want to perform operations on files like reading, writing, or manipulate paths, all these types of functionalities are available in an OS module. All the operations available raise an error "OSError" in case of any error like invalid names, paths, or arguments which may be incorrect or correct but just no accepted by the operating system.

6) SMTPLIB

Python has this module for in the standard library for working with emails & email servers. The SMTPLIB defines an object known as "SMTP client session object" which is used to send mails by the user. There are 3 steps involved initialize, sendmail(), quit. When the optional parameters which are host and port, are provided connect method is called with these arguments during the first step which is initialization[6].

7) DESIGN

The overall design of our system consists of the following phases:

(a) Taking input from the user in the form of voice.

(b) Converting the speech into text to be processed by the assistant.

(c) The converted text is now processed to get the required results.

(d) The text contains one or two keywords that determine what query is to be executed. If the keyword doesn't match any of the querries in the code then the assistant asks the user to speak again.

(e) The result which is in the form of text is converted to speech again to give results.
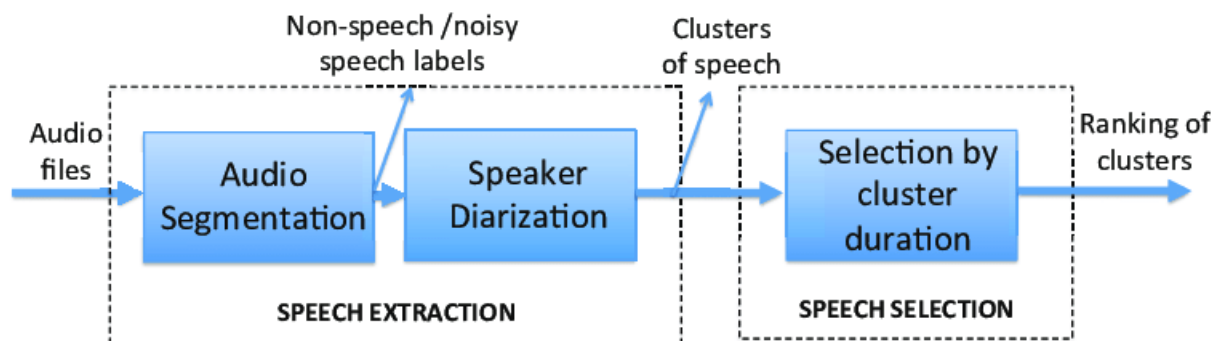
8) FUTURE SCOPE

The virtual assistants which are currently available are fast and responsive but we still have to go a long way. The understanding and reliability of the current systems need to be improved a lot. The assistants available nowadays are still not reliable in critical scenarios.

The future of these assistants will have the virtual assistants incorporated with Artificial Intelligence which includes Machine Learning, Neural Networks, etc. and IoT. With the incorporation of these technologies, we will be able to achieve new heights. What the virtual assistants can achieve is much beyond what we have achieved till now. Most of us have seen Jarvis, that is a virtual assistant developed by iron man which is although fictional but this has set new standards of what we can achieve using voice-activated virtual assistants.
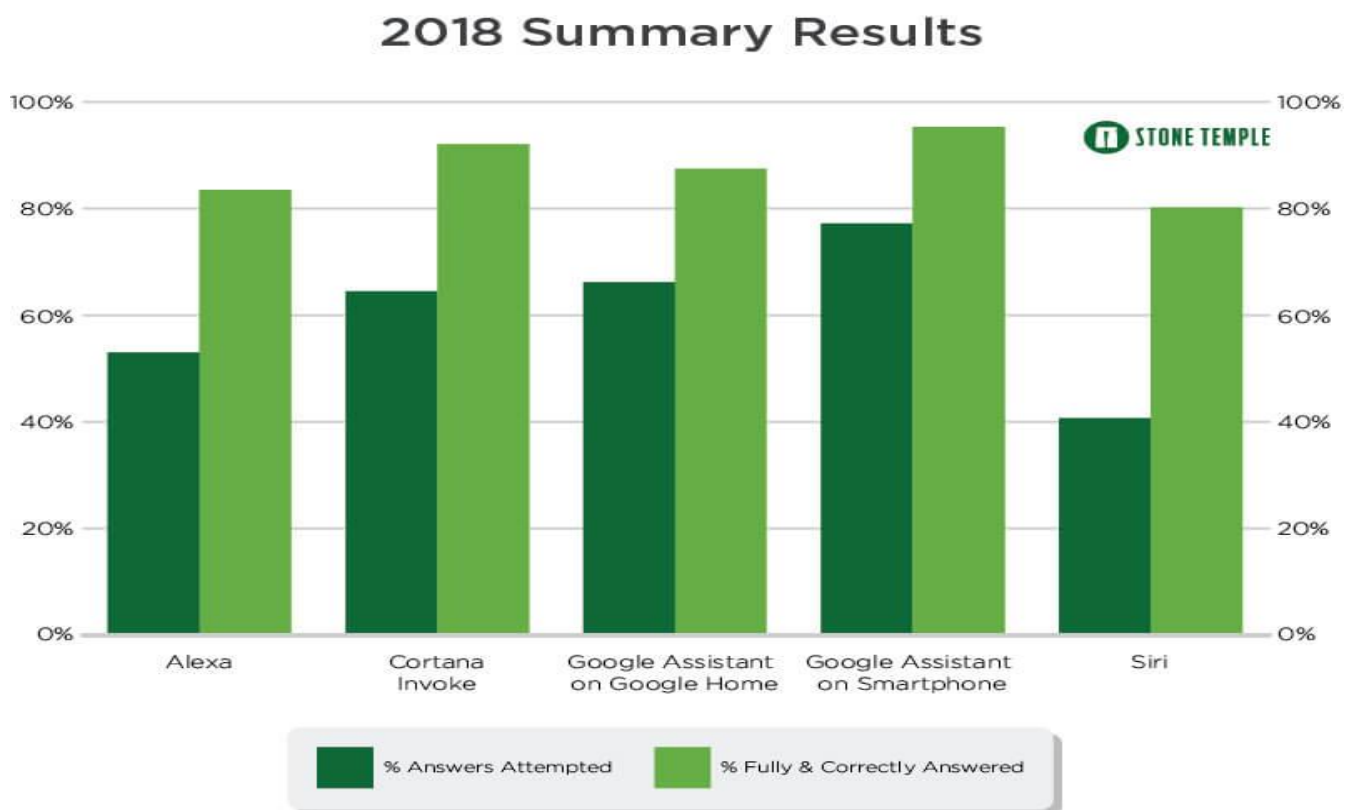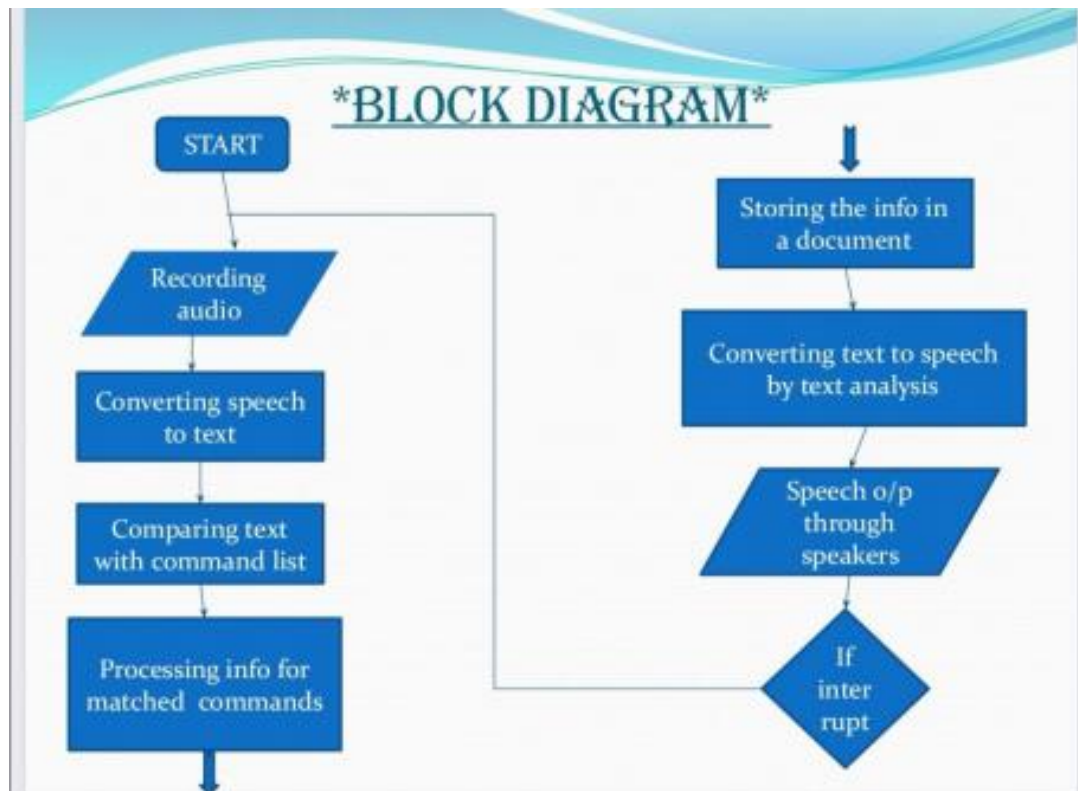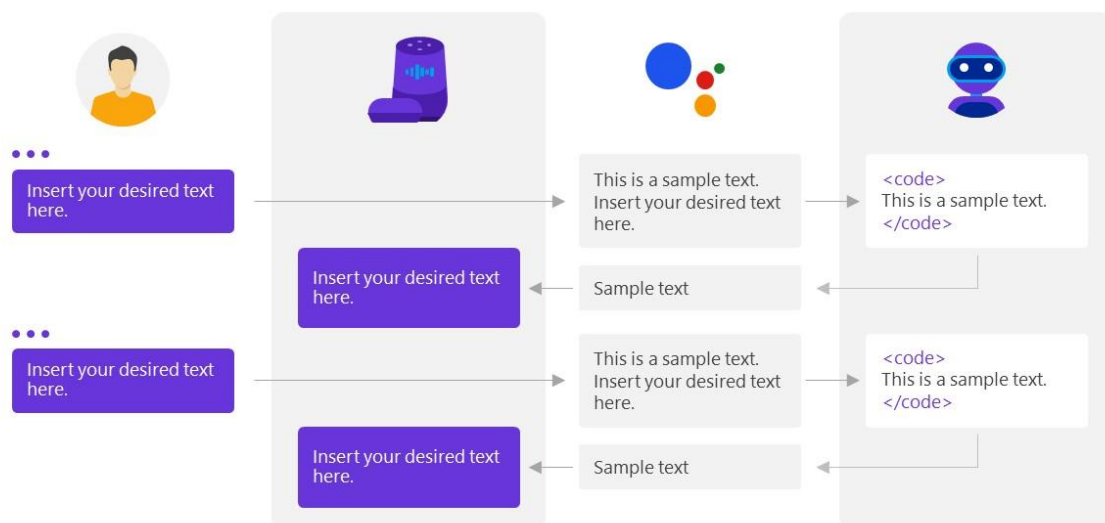

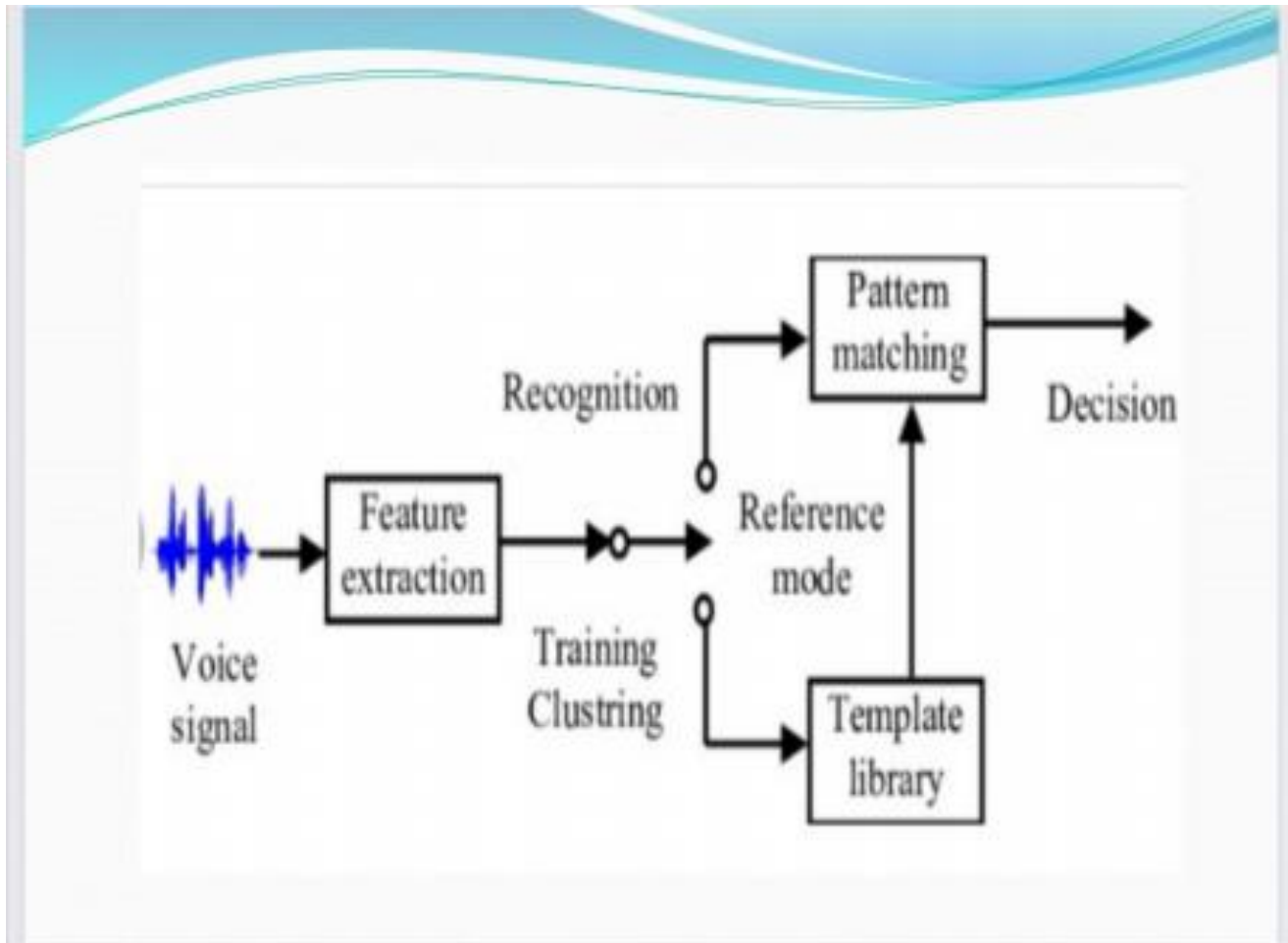**Figure 4 : Accuracy of results over Time**

5. System Block Diagram

6. Data Flow Diagram :

7. Implementation/Execution

Input :


```python
elif 'temperature' in query:
    r = sr.Recognizer()
    with sr.Microphone() as source:
        speak('You wish to know temperature of which place')
        audio=r.listen(source)
    voice_data=r.recognize_google(audio)
    search=(f'temperature of {voice_data} is')
    url = f"https://www.google.com/search?q={search}"
    r=requests.get(url)
    data=BeautifulSoup(r.text,"html.parser")
    temp=data.find("div",class_="BNeawe").text
    speak(f'current {search} is {temp}')
    aa=(f'current {search} is {temp}')
    print(aa)
```

Output :


```
PS S:\python\images> python -u "s:\python\prgrm.py"
Listening...
Recognizing...
User said: I wish to know the temperature

current temperature of Pune is is 28°C
Listening...
```

Input :

```
elif 'joke' in query:
    joke=pyjokes.get_joke('en','neutral')
    speak(f'Todays joke is {joke}')
    print(joke)
```

Output :

```
PS S:\python\images> python -u "s:\python\prgrm.py"
Listening...
Recognizing...
User said: I want to listen joke

My friend's in a band called '1023 Megabytes'... They haven't got a gig yet!
Listening...
```

Input :

```
elif 'translate' in query:
    r = sr.Recognizer()
    with sr.Microphone() as source:
        speak('What do you want to translate')
        audio=r.listen(source)
        voice_data=r.recognize_google(audio)
        t1=Translator(to_lang="es")
        t2=t1.translate(voice_data)
        speak(f'In spanish {voice_data} means {t2}')
        print(f'In spanish: {voice_data} means- {t2}')
```

Output :

8. Conclusion

In this paper we have discussed a Voice Activated Personal Assistant developed using python. This assistant currently works online and performs basic tasks like weather updates, stream music, search Wikipedia, open desktop applications, etc. The functionality of the current system is limited to working online only. The upcoming updates of this assistant will have machine learning incorporated in the system which will result in better suggestions with IoT to control the nearby devices similar to what Amazon's Alexa does.

The usage of the assistant will get offline also for features that don't require an internet connection.

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