VIRTUAL ASSISTANT

A Project Work

Submitted in the partial fulfillment for the award of the degree of

BACHELOR OF ENGINEERING
IN

ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

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DECLARATION

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ABSTRACT

This project is implemented in a waythrough which new technology could be harnessed to create an intelligent Virtual Personal Assistant with a focus on user-based data. It will look at examples of intelligent programs with natural language processing that are currently available, with different categories of support, and examine the potential usefulness of one specific piece of software as a virtual personal assistant.
Virtual assistants are the software programs which are capable of listening to the user and responding it accordingly.

They are being used to perform various tasks of our day-to-day life which will ultimately lead to make life easy. This engages the ability to communicate socially through natural language processing, holding and analyzing data within the context of the user. It is predicted that new technologies may soon make the idea of virtual personal assistants a common usage assistant for everyone.

Experiments conducted on this system, combined with user testing, have provided evidence that a basic program with natural language processing algorithms in the form of a VPA, with basic natural language processing and the ability to function without the need for other type of human input (or programming) may already be viable.
It could be useful for getting a more convenient life and it will be helpful for the people who have disabilities for manual operations.It has been designed to provide a user-friendly interface for carrying out a variety of tasks by employing certain well-defined commands. Users can interact with the assistant through voice commands.

The mass adoption of artificial intelligence in every industry and in user's everyday lives is fueling the shift towards these type of softwareand in the coming times it would become a day-to-day life assistant for managing work for almost everyone.

ACKNOWLEDGEMENT

We had a great experience working on this project and we got to learn a plethora of new skills through this project. However, it would not have been possible without the kind support and help of many individuals. We would like to extend our sincere thanks to all of them. We are highly indebted to the teachers and especially Mr. Mohammad Nadeem Uddin for their guidance and constant supervision as well as providing necessary information regarding the project and also for their support in completing the project.

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INTRODUCTION

Virtual assistants are the software programs that are being capable of voice interaction, making to-do lists, setting alarms, book movie and show tickets, setting reminders, open any site on the browser, play music and providing weather reports and real time information such as news, location etc.

They improve user's productivity and provides assistance in routine tasks. It enables users to speak natural language voice commands in order to operate.
This system is designed to be used efficiently on desktops. Virtual assistants are turning out to be smarter than ever. Allow your intelligent system to make e-mail for you. Detect intent, pick out important information, automate processes, and deliver personalized responses.

This project was started on the premise that there is sufficient amount of information and data available on the web that can be utilized to build a virtual assistant that has access to making intelligent decisions for routine user activities.

1.1 PROBLEM DEFINITION

Usually, user needs to manually manage multiple sets of applications to complete one task. We have a number of virtual assistants currently available to us in our mobile phones and desktops. For example- Siri in Apple, Bixby in Samsung, google Assistant in most of the android devices. Howsoever, people avoid using these virtual assistants because of the following reasons: -

- Rate of accuracy is low.
- Issues in voice recognition.
- Terms recognition due to accent issues.
- Doesn't understand the intent of the question.
- Require large amount of information to be fed for fine working.
- Virtual assistant should be able to model complex task dependencies and use these models to recommend optimized plans for the user.
- It lacks the proper context.
- As machine learning is being used in the application, so, continuously ensuring solid quality control strategies will also help manage the risk of the virtual assistant learning undesired bad behaviors.
- Its ability to answer questions relevantly only happens with rigorous optimization, involving both humans and machine learning.
- When a virtual assistant is not able to provide the answer correctly, it is because it lacks the proper context or doesn't understand the intent of the question.
- They require large amount of data and information to be fed in order for it to work efficiently.

1.2 PROJECT OVERVIEW/SPECIFICATIONS

Personal assistant is required to act as an interface into the digital world by understanding user requests or commands and then translating into actions based on its understanding. Project design is an early phase of the project where a project's key features, structure, criteria for success, and major deliverables are all planned out. The aim is to develop one or more designs that can be used to achieve the desired project goals.In this project we are going to make a virtual assistant that will help you in accessing your laptop or pc through voice commands. The project design that we would be taking forward is with the help of various libraries which would serve as the basic and the most crucial part of this project. This application is developed in python using following libraries.

- OpenCV
- Numpy
- Tkinter
- Speech_Recognition
- Time
- Requests
- Json
- Pyaudio
- Pyttsx3
- Datetime
- Warnings
- Random
- Calender

Task like setting up reminders, searching content over the web, playing musiccan be assessed without even touching your device.
The virtual assistant relieves the user of inputting the text and rather focuses on using voice as the input. It then applies voice recognition algorithms to the input and records the input.

It then uses this input to open various personal task management applications such as notes, alarm clock or reminder or it searches the particular input on the search engines like google to provide user the desired output/result. It takes the input in natural language, and so makes it easier for the user to input what he or she desires to be done.

1.3 HARDWARE SPECIFICATION

Thisdesktop based application is designed in such a way that it does not become a burden on the machine running it, so it a light weighted application.
It is being built keeping in mind the generally available hardware and software compatibility.

Here are the minimum hardware requirements for this application:

- Pentium-pro processor or later.
- RAM: 2GB or more.
- Graphic Card 1GB or above.
- Laptop or Pc with mic.
- Headphones with mic.
- Storage: 100GB

1.4 SOFTWARE SPECIFICATION

- Windows (32/64 bit)
- Python latest version
- Chrome driver

Some of the basic libraries used in this application are:

Speech recognition:

Speech recognition helps us to save time by speaking instead of typing. It also gives us the power to communicate with our devices without even writing one line of code. This makes technological devices more accessible and easier to use.

Pyttsx3:

pyttsx3 is a text-to-speech conversion library in Python. An application invokes the pyttsx3.init() factory function to get a reference to a pyttsx3. Engine instance. It is a very easy to use tool which converts the entered text into speech.

OpenCV:

OpenCV (Open Source Computer Vision Library) is released under a BSD license and hence it is free for both academic and commercial use. It has C++, C, Python and Java inter faces and supports Windows, Linux, Mac OS, iOS and Android. OpenCV was designed for computational efficiency and with a strong focus on real-time applications.

2 LITERATURE SURVEY

2.1 Existing System

Virtual assistants are typically the programs that require internet-connected devices and/or applications to work. In our existing system, we have to manually do each and everything. For example, if we want to search something or do something on the internet we have to manually do all those things.

Howsoever, there already exists some virtual assistants but there are some disadvantages and problems in them like-

1. They require very large amount of information to be fed for their working to be fine.
2. Virtual assistants should be able to model complex task dependencies and usethese models to recommend optimized plans for the user.
3. These virtual assistants require large amounts of personal data and are always "listening" in order to respond to voice commands. Virtual assistants then retain voice interactions and personal information to improve the user experience which arises somewhat privacy concerns for users.
4. As machine learning has been used in the application, so, continuously ensuring solid quality control strategies will also help manage the risk of the virtual assistant learning undesired bad behaviors.
5. Its ability to answer questions relevantly only happens with rigorousoptimization, involving both human and machine learning.
6. Most of the existing projects have only used speech recognition using neural networks. Though their systems have a moderate accuracy, they are not for practical usage nor efficient to be of any real use. There are a few rudimentary techniques used by them:

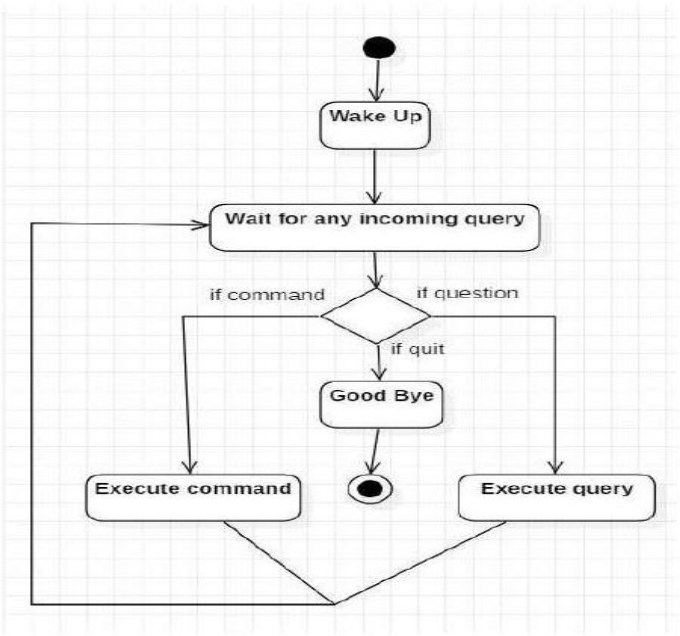
- Context-aware computing
- MFCC
- NLP

2.2 Proposed System

The major milestone that this project tries to achieve is that it tries to increase the accuracy of the speech to text software which means that the software will theoretically be able to convert any speech with slight modulations or different accents into text with high level of accuracy and precision that is needed for day-to-day usability of the VPA. The software essentially combines voice recognition using neural networks and lip movement detection using machine learning to increase the precision of the word spoken. As for people with different accents, just voice recognition will be useless because the words they speak will be very different from the actual word according to the computer's point of view because the vectors or the values stored for that particular word would have been gotten only based on the word being spoken in a particular accent.

So here is where lip movement recognition comes into play. For most words, though in a different accent, the movement of the lips remains similar enough to deduce the word. Thus, lip movement recognition helps cutting down the various other words which would have had the same likeliness as per the voice recognition software.

As artificial intelligence and machine learning progress at pace, digital assistants are set to become our gateway to the internet and know more about us than we do ourselves. Siri and Google now are just the beginning. The device accepts voice input processes it through various machine learning algorithms to provide desired output to user.



2.3 Feasibility Study

Feasibility study can help you determine whether or not you should proceed with your
project. It is essential to evaluate cost and benefit of the proposed system.
Here, four feasibility studies that are taken into consideration which are:

1. **Technical Feasibility:**
   It includes the hardware and software requirements
   for the project. For virtual assistant one must have microphone and speaker
   in their computer. Besides, system also needs steady internet connection
   which is not an issue.

2. **Operational Feasibility:**
   It refers to the ease and simplicity of operation
   of our proposed system. Users need not to have any specific system
   requirements to operate it as it is designed so that everyone can use it easily.

3. **Economical Feasibility:**
   In this, we find the total cost and benefit of
   our proposed system. This is designed so that everyone can use it easily
   so it has lot of benefits. One just need is a stable internet connection and
   a device which has speaker and microphone so this project will be a lot
   beneficial and will not cost much.

4. **Organizational Feasibility:**
   It refers to the management and organizational
   structure of the project. This project is built by a team of 4 members so
   tasks are all divided among the team members which won't create any issue
   and will increase the feasibility of the project.

3 PROBLEM FORMULATION

This Software aims at developing a personal assistant for Window-based systems. The mainpurpose of the software is to perform the tasks of the user at certain commands, provided ineither of the ways, speech or text. It will ease most of the work of the user as a complete taskcanbe done on a single command.

The project draws its inspiration from Virtual assistants like Cortana for Windows and Siri for iOS. Users can interact with the assistant either through voice commands or keyboard input. The assistants receive external data via the hardware's sensors for further processing and take it from there to function accordingly.

Not too long ago, building an AI assistant was a small component of developers' capacities; however, nowadays, it is quite a realistic objective even for novice programmers. To create a simple personal AI assistant, one simply needs dedicated software and some dedicated hours of working time.

So as a developer, why do we use foreign virtual assistant and why not we use our own developed virtual assistant. It's our responsibility as developers to create this virtualassistant for providing people a cool user experience so that they can operate their device easily by using their voice only.

4 RESEARCH OBJECTIVES

The proposed research is aimed to carry out work leading to the development of an approach for virtual assistant. Presently, it is being developed as an automation tool. Among theVarious roles played by it are:

- Search Engine with voice interactions.
- Medical diagnosis with Medicine aid.
- Reminder and To-Do application.
- Vocabulary App to show meanings and correct spelling errors.
- Weather Forecasting Application.
- Listening music.

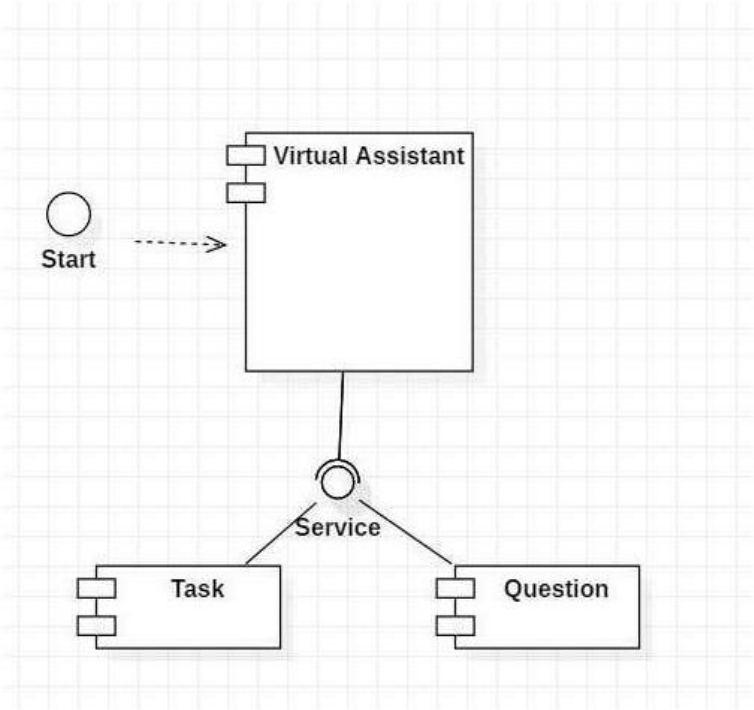
The project is very useful and owns a large potential use in different industries. Though the program primarily concerns more about how to use the personal assistant on window devices using the voice. The concept of voice recognition can be applied in different industries as in many situations it will be more convenient, save a lot of time and helpful especially for those who have difficulty in working with manual operations. Thus, the concept is only for programming the assistant.

In addition, the program which works using the voice is helpful for those who prefer voice operation and those who have any disability and faced difficulty in doing manual operations. Therefore the main objective of this assistant is to provide services using the voice, and which makes it available for more people who can enjoy this.

5 METHODOLOGY

The following methodology will be followed to achieve the objectives defined for proposedresearch work:

a. Detailed study of voice to text conversion will be done.
b. We must install python 3 and on that we will be implementing different libraries like Numpy, Json, Tkinter, Pyttsx3, OpenCV and Speech recognition.Hands on experience will be done with the help of these libraries. Relative pros and cons will be identified
c. Various parameters will be identified to evaluate the proposed system.
d. The prospect of the program can be more applications or products developed using the voice control, and it could in some sense change the working forms that is totally different from the traditional form. As people can easily operate and havea lot of fun from it, it owns an enlightened prospect as SIRI succeed in attracting people in the market.
e. Comparison of new implemented approach with exiting approaches will be done.



Component-diagram

6 RESULTS AND DISCUSSIONS

As we know, Artificial intelligence is at a boom nowadays and will eventually increase in the coming times. So, keeping in mind all these things, this project will be a small step towards the next AI generation.

Through this voice assistant, we have automated various services using a single line command. It will help the users to improve their productivity by managing their routine tasks and providing them information from the online resources.

It is being capable of voice interaction, making to-do lists, setting alarms, book movie and show tickets, setting reminders and providing weather reports and real time information such as news, etc.

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