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Decision Support System by Means of Virtual Assistant

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KEYWORD

Voice Assistant;
Intelligent Personal Assistant;
Automated Personal Assistant:
NLP;
Visual Studio code IDE;

ABSTRACT

Virtual assistants are very useful to humans these days. It makes people's lives easier, just like operating a PC or laptop with just voice commands. The use of a virtual assistant is basically to save time. We can also perform other tasks and save time by using virtual assistants. Most popular of the time, virtual assistants are cloud-based application which needs an internet- connected device. Virtual assistants have freedom to pay for the services provided which they can actually require. By speaking, users may ask their assistant questions, manage all the basic activities like emails and to-do lists, open or dismiss any app, message anyone on WhatsApp, and more. Voice commands are now the sole way to operate home automation devices and media playing. Intelligent personal assistants, automated personal assistants, virtual digital assistants, and chatbots are some other varieties of voice assistants. In this paper, we have created a voice assistant that can successfully accomplish out other task, including changing user commands. There some features added in the support which is helpful to it, the fact that it just listens to the user's voice and isn't get triggered by the noise of background. This project is more adaptable in nature and easy to grasp because of its modular structure. Without affecting functionality, we can increase functionality of the programs. This code is written using the VS Code integrated development environment (IDE), which has all the necessary loaded packages which are used for the Python programming language. The project's Python version is 3.x, and the data for several noises are attained from the virtual environment.

1. Introduction

Virtual assistants are used to run machines like laptops or PCs at your own command. Users can ask their virtual assistant questions, manage other important tasks like emails, to-do lists, open or close any app, send texts to other user on WhatsApp, and more. It works when the user passes command only by speaking to the virtual assistant. Virtual assistants are applications that understand natural language processing and users-voice command to perform tasks with their voice (Behera, R. K., Bala, P. K., & Ray, A. et. al., 2021). Different types of voice assistants are listed below:

These days, humans can benefit greatly from virtual helpers. It simplifies people's lives, much as using voice commands to control a PC or laptop. The use of virtual assistant basically saves time. We can contribute to other tasks and save time by using virtual assistants. Virtual assistants are typically internet-connected devices that run cloud-based software (Chen, J. V., Le, H. T., & Tran, S. T. T., et al., 2021). Virtual assistants have freedom for the services they actually require to pay. We can start with the library of Python to build your computer's virtual assistant. Task-oriented virtual assistants are available. The capacity of virtual assistant to know and carry out commands.

According to Bart, Gouther, and Lenker et al. (2013), a virtual assistant is a software that can perform various tasks given to it by users and can comprehend oral and written orders. According to Diederich, Brendel, Morana,

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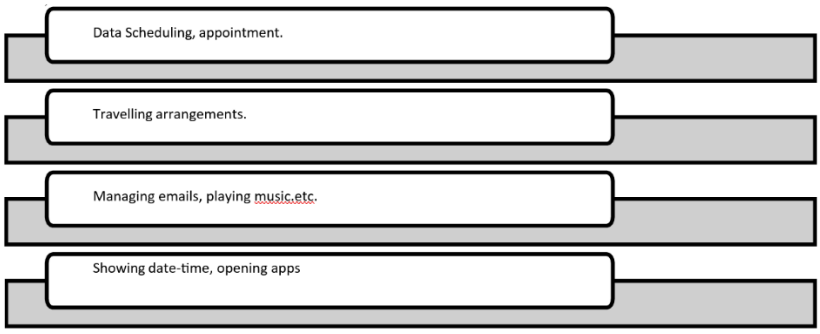
Kolbe, et al. (2022) virtual assistants can understand human speech and respond by synthesizing voice. There are many voice assistants available, including Siri for the Apple TV remote, Google Assistant for the Pixel XL smartphone, Alexa for the Raspberry Pi-powered smart speaker, and Microsoft Cortana for Windows 10. We also developed virtual assistant for Windows, just as all similar virtual assistants (Cheng, X., Bao, Y., Zarifis, A., Gong, W., & Mou, J., et al., 2021). In this project, we have used artificial intelligence technology, as well as we have also used python as a programming language as well because it contains a decent primary library. The speaker serves as the software's output device while the microphone serves as the input device for the user's voice requests.



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This approach combines a number of distinct techniques, including speech recognition, speech analysis, and language processing (Cho, E., Molina, M. D., & Wang, J., et al., 2019). It used to translate user text or voice input into workable guidelines using natural language processing. The natural language transforms the auditory signal into a digital signal when the user commands the personal virtual assistant to carry out a task (Reddy, T., et al., 2017ab). The virtual assistant scans to provide a variety of services are shown below:

2. Related Work

The table 1. is showing the Summary of the Decision-support Generations basis on variouscharacteristics parameters (Shevat, A. et al., 2017), (Watson, H. J., et. al., 2017).

Table 1. Comparative summary of the Decision support Generations

Characteristics	**DSS**	**Real-time Data Ware-housing**	**Enterprise Data Ware-housing**	**Cognitive**	**Big Data Analytic**
Scope	Individual /Depart-mental	Enterprise	Enterprise	Enterprise and be-yond	Enterprise and beyond
Focus	Models	Applications /Data	Data	Models /Applications/ Da-ta	Models/ Applications/ Data
Data Management	Independent data marts	Real-time data warehouse	Enterprise data warehouse	Cloud/On -premises	High volume ,variety and velocity
BI/Analytics	Point solutions	Descriptive	Descriptive	Descriptive/ Predictive/ Prescriptive/AI	Descriptive/ Predictive/ Prescriptive
Architectural Complexity	Low	Medium	Medium	High, Cloud dominates	High
Users	Few	Enterpri se-wide	Growing userbase	Internal/External	Internal/External

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Governance	Low	Medium	Medium	High	High
Decision Supported	Tactical /Strategic	Operational/ Tactical /Strategic	Tactical /Strategic	Operational/Tactical/ Strategic/Knowledge-based	Operational/ Tactical /Strategic
Strategic Importance	Low	Medium	Medium	High, Basis for competing	High
Value	Low	Medium	Medium	Very high	High

3. Methodology

Virtual assistants employ NLP to translate human text or voice input into orders that may be carried out. The natural language is used to translate the voice signal into workable commands or virtual data that can be analyzed by software, when a user instructs the personal assistant to transfer the task (Enholm, I. M., Papagiannidis, E., Mikalef, P., & Krogstie, et al., 2021). The software's data is then contrasted with this data to determine the proper response (Foley, Casiez, Vogel, et al., 2020). In order to operate the computer independently, you can use Virtual Assistant (Fig. 1). To process the virtual assistant, we use to install some python packages (mentioned in fig. 2) like -

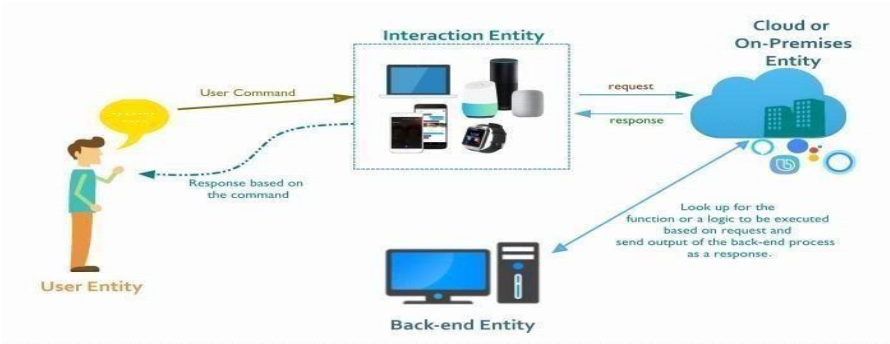

Figure 1. Pipeline of a voice assistant for decision making

3.1. Speech recognition

For the purpose of converting spoken input into written text, it is an advantage of Google's online speech recognition which makes system more useful. In this approach, the user will speak and receive text in the replacement of speech input from a particular amount systematized on a computer server. The system has temporarily saved the information center from a little phone, which is then delivered to Google Cloud for speech recognition. The same text is then received and transferred to the voice assistant program. All authors are requested to disclose any actual or potential conflict of interest including any financial, personal or other relationships with other people or organizations within three years of beginning the submitted work that could inappropriately influence, or be perceived to influence, their work.

3.2. Python backend

This project is written on Python Backend. The python backend gets the output through the speech recognition module to exchange user-supplied speech input, and then recognizes whether the given knowledge is a context extraction, API call, and system call. Responses is then sent back to provide the desired output.

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3.3. API call

An application programming interface is a software intermediary, and the role of an API is to allow two other applications to communicate with each other. In other words, the API is the messenger that passes the users request to the provider and sends the response back to the user.

3.4. Content extraction

Context extraction is used to automatically extract arranged information from semi-structured machine-readable documents. This task practices natural language processing (NLP) to process human language text. Activities such as automatic annotation and extraction of content from different images/videos/audio can be considered as content extraction.

3.5. System call

A system call is a programming technique whereby a computer program asks the kernel of the operating system that runs it for services. These services could include hardware-related operations like accessing hard drives, starting and pausing new process and coordinating with processes' schedules. The interaction provides between the process and the operating system is crucial.

3.6. Google text-to-speech

The main purpose of text-to-speech technology is used in translating the text into speech. In other words, TTS engine changes the written text into a phonemic representation, which is afterward changed into a waveform that generates sound. With the help of third-party publishers, TTS has advanced significantly in a variety of languages.

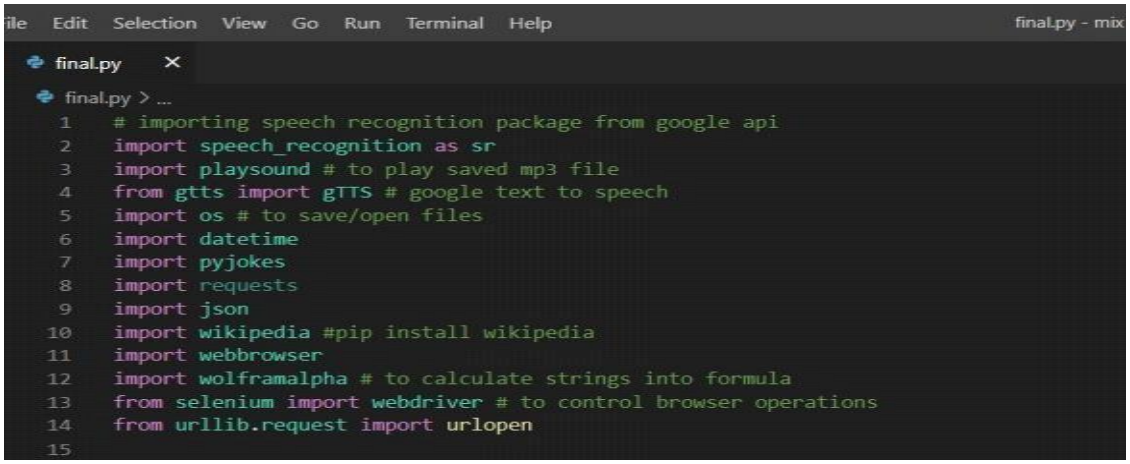

Figure 2. Importing speech recognition package from Google API

3.7. Wolfram alpha

It's used to figure out an expert-level responses to any knowledge using Wolfram's algorithms, knowledge base, and AI technology.

3.8. JSON

JavaScript Object Notation (JSON) is a trivial format of loading and transmitting data. JSON is used when data is directed from the server to the web pages. JSON is "self- describing library" and easy to comprehend.

3.9. Speech recognition

Speech recognition refers to the facility of a machine to understand human voice. In our project, we create software that commands a computer using the Python Google Speech API. To recognize voice commands, the pyaudio Python module must be installed.

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3.10. GTTS

Google's text-to-speech package converts your audio question commands to text. The response of a lookup function that is written to get the response to the question or command which is converted to voice form by GTTS. This package interfaces with the Google Translate API.

3.11. The datetime

Datetime package is used to display dates and times. The datetime module comes with built- in Python.

3.12. Wikipedia

The Wikipedia module is used in our project only to gather more information or conduct a search in Wikipedia because we are all aware that Wikipedia is a fantastic and huge source of information and knowledge. We can use pip install for the installation of Wikipedia module.

3.13. Web browser

Perform web searches. This module is built into Python.

3.14. Operating system

Python operating system module offers features for interacting with the operating system. The operating system is a common utility module for Python. This module offers a method for utilizing operating system-related features.

3.15. Pyjokes

Pyjokes is a means of gathering jokes from the internet. It is involved in our project since it creates a joke that are relevant to it. It's fascinating. are one-liners that add humour to our work.

3.16. Pyaudio

PyAudio is a set of python bindings intended in port audio, a cross-platform C++ library for interfacing with audio drivers.

3.17. SMTPLIB

Using Simple Mail Transfer Protocol (SMTP), this module is a python module for sending emails. Python's built-in SMTPLIB module does not require installation. It abstracts away all SMTP's complexities. It bids SMTP client execution for the simple mail transfer protocol.

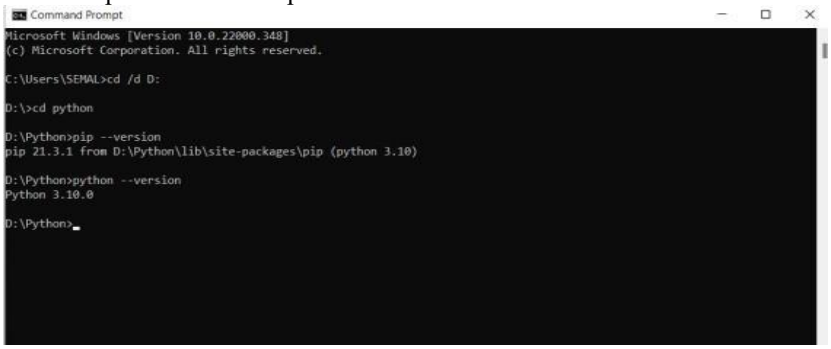

Figure 3. Send http request using python

3.18. Requests

Python's requests component enables you to send http requests. Both GET and POST queries are made using it. It hides the difficulty of making requests behind a lovely, straightforward API. (mention in Fig. 3).

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4. Result

Virtual assistants are quicker. Virtual assistants are pieces of software that can follow commands and carry out activities that are given to them by clients. NLP is used by virtual assistants to decode verbal or textual user input into the output or an action (as seen in Fig. 4,5). You can control the operation of a computer, such as a laptop or PC, with the aid of a virtual assistant. It saves time because this procedure moves quickly. Virtual assistants are always at your disposal and are quick to adjust changing needs because it works during pre-determined hours. If their workload permits (Dubiel, M., Halvey, M., Azzopardi, L., Anderson, D., & Daronnat, S., et al., 2020), you can utilize virtual assistants to support other people, such as family members and coworkers.

In this study, we created an error-free voice assistant that can handle any task, even changing user commands. Most of the structures has been added, such as the fact that it will just pay attention to the user and will not be activated by circumstantial noise. Because of its integrated structure this project is easy to compliant and hold. Lacking affecting the functionality, we can increase the programs functionality. The code is written using the visual studio code integrated environment, which has all packages necessary and used for the Python programming language installed. Python 3.x was used in this project, and data on various noises were also collected from the outside environment (Dubiel, M., Halvey, M.,Azzopardi, L., & Daronnat, S., et. al., 2018).

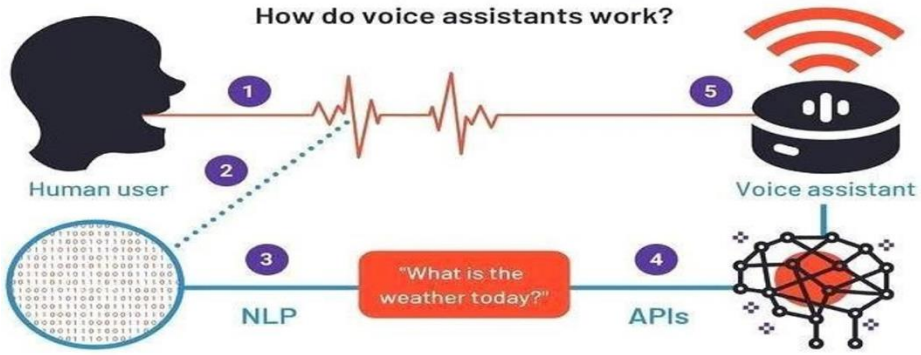

Figure 4. Working of voice assistant

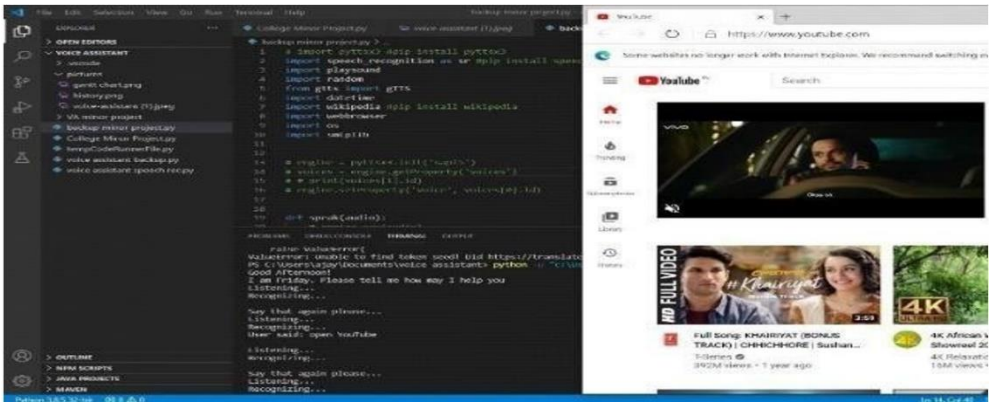

Figure 5. Output as instructed to search YouTube related content like song, movie etc.

5. Conclusion

In this paper, we only have covered python-based personal virtual intelligent assistant for windows. Humans' lives are made easier by virtual assistants. Virtual assistants have the independence to only pay for the services they actually require. We have also created virtual assistant in python for all windows versions, similar to Alexa, Cortana, Siri, and Google Assistant (as seen in Fig. 5). In this project, AI technology is being used. The most effective way to achieve your plan is with a virtual assistant. Due to their greater portability, loyalty, and readiness for use, also the virtual assistants are more dependable than human personal assistant. You can question to the

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virtual assistant for assistance, have her follow your commands, and she will acquire more about you. This device will possible always be everlasting.

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