Sir Syed University of Engineering & Technology (SSUET)
Software Engineering Department

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Section: "C"

PROJECT REPORT

Project Title: Virtual Assistant with Python

Submitted To:
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TABLE OF CONTENTS

TEAM PROFILE

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   (Documentation + Debugging + Requirement Gathering)

1. PROBLEM DOMAIN

1.1 Description

The main goal of Artificial intelligence (AI) is the understanding of natural dialogue between humans and machines. In this modern era, day to day life became smarter and connected with technology. We already know some voice assistance like google, Siri. etc.

Virtual Assistants are software programs that help you ease your day-to-day tasks, such as showing weather report, creating reminders, making shopping lists etc. They can take commands via text or by voice. This system is designed to be used efficiently on desktops. Personal assistant software improves user productivity by managing routine tasks of the user and by providing information from online sources to the user.

Now, in our Virtual assistant, it can act as a daily schedule reminder, note writer, weather predicter and a search tool. This project works on voice input and give output through voice. The main agenda of our Virtual assistant makes people smart and give instant and computed results. The Virtual assistant takes the voice input through our microphone (wired microphone) and it converts our voice into computer understandable language gives the required solutions and answers which are asked by the user. This assistance connects with the world wide web to provide results that the user has questioned.

We use Artificial Intelligence technology for this project. Also use python as a programming language because python offers a good major library. For this software we use microphone as input device to receive voice requests from user and speaker as output device to give the output voice. This process is the combination of several different technologies like voice recognition and language processing. Virtual assistants use Natural Processing language to match user text or voice input to executable commands. When a user gives a command to personal virtual assistant to perform a task, the natural language is converted the audio signals into digital signals.

Our Virtual assistants can provide several services which includes:

- Showing weather condition.
- Scheduling appointment.
- Play music, movies, etc.
- Showing datetime.
- Managing files.
- Open apps.

Some of the Imported modules for our virtual assistant are as follows:

1. **pyttsx3: -** pyttsx3 is a text-to-speech conversion library in Python. It works offline and is compatible with python like Python 2 and 3 works without internet connection or delay. The text-to-speech features for this pyttsx3 module are based on python languages installed in your operating system. It is a very easy to use tool which converts the entered text into speech.

2. **Speech recognition: -** Speech recognition means that when humans are speaking, a machine understands it. In our project we are using Google Speech API in Python to make software which is used to run machines on command. We need to install the Pyaudio python package for recognize the voice commands. Pyaudio can be installed by using pip install Pyaudio command.

3. **gTTS:** -Google's text-to-speech packages, gTTS converts your audio questions command to text. The response from the look-up function that you write for fetching answer to the question or command is converted in an audio form by gTTS. This package interface with Google Translates API.

4. **Datetime: -** Datetime package is used to showing Date and Time. This datetime module comes built-in with Python.

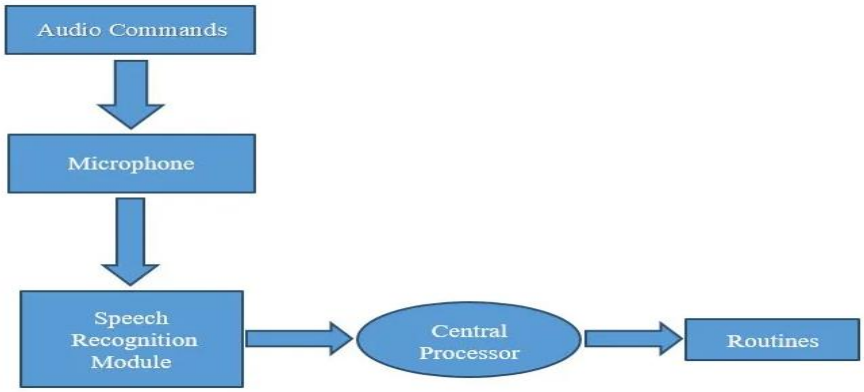
5. **Wikipedia: -** We all know Wikipedia is a great and huge source of knowledge just like GeeksforGeeks or any other sources we have used the Wikipedia module in our project to get more information from Wikipedia or to perform a Wikipedia search. To install this Wikipedia module, use pip install Wikipedia.

6. **webbrowser: -** To perform Web Search. This module comes built-in with Python.

7. **OS: -** The OS module in Python provides functions for interacting with the operating system. OS comes under Python's standard utility modules. This module provides a portable way of using operating system dependent functionality.

8. **Pyjokes: -** Pyjokes is used for collection Python Jokes over the Internet. Pyjokes is add in our project because it adds jokes in our project. It is very interesting. Pyjokes is the one-line joke which makes our project interesting.

9. **Pyaudio: -** PyAudio is a set of Python bindings for PortAudio, a cross-platform C++ library interfacing with audio drivers.



1.2 Problem Definition

Usually, user needs to manually manage multiple sets of applications to complete one task. For example, a user trying to make a trip plan needs to check for nearby airports and then check travel sites for tickets to reach the destination. There is need of a system that can manage tasks effortlessly.

We already have multiple virtual assistants. But we hardly use it. There are number of people who have issues in voice recognition. These systems can understand English phrases, but they fail to recognize in our accent. Our way of pronunciation is way distinct from theirs. Also, they are easy to use on mobile devices than desktop systems. There is need of a virtual assistant that can understand English and work on desktop system.

When a virtual assistant is not able to answer questions accurately, it's because it lacks the proper context or doesn't understand the intent of the question. Its ability to answer questions relevantly only happens with precise optimization, involving both humans and machine learning. Continuously ensuring solid quality control strategies will also help manage the risk of the virtual assistant learning undesired bad behaviors. They require large amount of information to be fed in order for it to work efficiently.

Virtual assistant should be able to model complex task dependencies and use these models to recommend optimized plans for the user such as predicting weather. It needs to be tested for finding optimum paths when a task has multiple sub-tasks, and each sub-task can have its own sub-tasks. In such a case there can be multiple solutions to paths, and it should be able to consider user preferences, other active tasks, priorities in order to recommend a particular plan.

1.3 Objectives

Main objective of building personal assistant software (a virtual assistant) is using semantic data sources available on the web, user generated content and providing knowledge from knowledge databases. The main purpose of an intelligent virtual assistant is to answer questions that users may have. This may be done in a business environment, for example, on the business website, with a chat interface. On the mobile platform, the intelligent virtual assistant is available as a call-button operated service where a voice asks the user "What can I do for you?" and then responds to verbal input.

Virtual assistants can tremendously save you time. We spend hours in online research and then making the report in our terms of understanding. Our assistant can do that for you. Provide a topic for research and continue with your tasks while assistant does the research. Another difficult task is to remember test dates, birthdates, or anniversaries.

One of the main advantages of voice searches is their rapidity. In fact, voice is reputed to be four times faster than a written search: whereas we can write about 40 words per minute, we are capable of speaking around 150 during the same period of time15. In this respect, the ability of personal assistants to accurately recognize spoken words is a prerequisite for them to be adopted by consumers.

2. PROPOSED TREATMENT

2.1 Meeting Requirements

Personal assistant software is required to act as an interface into the digital world by understanding user requests or commands and then translating into actions or recommendations based on assistant understanding in the world of AI.

Our Virtual Assistant focuses on helping the user of entering text input and using voice as primary means of user input. Assistant then applies voice recognition algorithms to this input and records the input. It then uses this input to call one of the personal information management applications such as task list or calendar to record a new entry or to search about it on search engines like Google. Focus is on capturing the user input through voice, recognizing the input, and then executing the tasks if the agent understands the task. Software takes this input in natural language, and so makes it easier for the user to input what he or she desires to be done.

Voice recognition software enables hands free use of the applications, lets users to query or command the Assistant through voice interface. This helps users to have access to the Assistant while performing other tasks and thus enhances value of the system itself. It also has universal connectivity through Wi-Fi or

LAN connection, enabling distributed applications that can leverage other APIs exposed on the web without a need to store them locally.

The most Highlighting feature of our Assistant is the weather prediction it gives prediction for the weather through the machine learning algorithm. We have used Knn Algorithm to achieve this requirement which results in predicting the weather with the provided dataset.

Virtual assistants must provide a wide variety of services. Some of these include:

- Providing information such as facts from e.g., Wikipedia etc.
- Predicting information for weather forecast.
- Set an alarm or make to-do lists.
- Remind you of birthdays and meetings.
- Play music from streaming services such as YouTube.
- Play videos, TV shows or movies on televisions, streaming from e.g. Netflix or YouTube.
- Search tickets for shows, travel, and movies.

3. PLAN OF WORK

The project work is organized based on the actual task for the Planning, Analysis, designing, Coding, testing, implementation, and optimization. As it has been primary planned, each of us team members worked 5 days a week; 3 days for implementation, and 2 days for testing and summarizing the work, totally it is 6 weeks' work. Apart from the designing, implementation, and testing, we also defined the work plan every time before the implementation and improve the project after the accomplishment of each individual section or task.

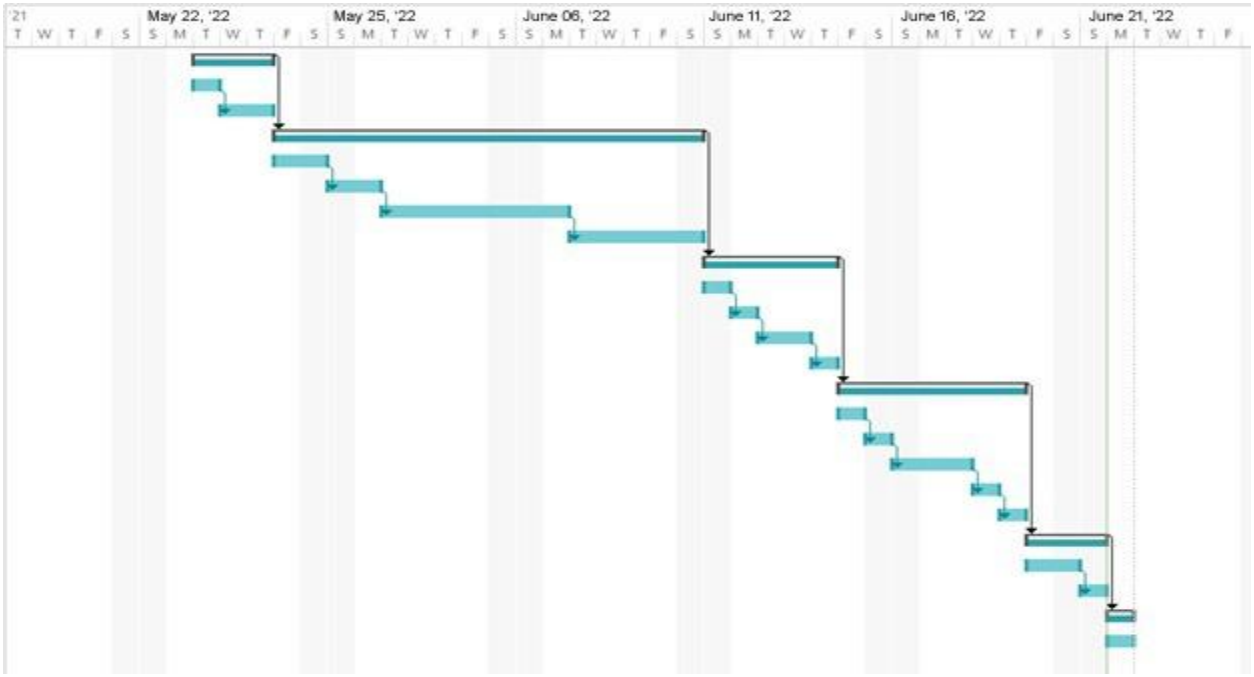
Team members communicate though discord server for sharing the ideas and discuss the project. Data facts and relative materials is collected and shared through discord. Mostly the work was done by pairing team members efficiently, that is, every time we schedule a meeting and set together for designing, figure out a valid solution and doing the implementation together.

The high-level designing and the coding, lining up the modules was done in programming phase, and the individual implementation of functions was assigned to team members, but as team members we were not only caring our own part, but also considering the whole project helping each other out.

5. PROJECT SCHEDULING

Task Mode	Task Name	Duration	Start	Finish	Predecessors
	Management/Planning	**3 days**	**Sun 5/22/22**	**Tue 5/24/22**	
	Selecting Team Member	1 day	Sun 5/22/22	Sun 5/22/22	
	Discuss The Project	2 days	Mon 5/23/22	Tue 5/24/22	2
	Analysis	**12 days**	**Wed 5/25/22**	**Sun 6/5/22**	**1**
	Meetings	2 days	Wed 5/25/22	Thu 5/26/22	
	Project Discussion	2 days	Fri 5/27/22	Sat 5/28/22	5
	Vision Scope Document	4 days	Sun 5/29/22	Wed 6/1/22	6
	Software Requirements Specification Document	4 days	Thu 6/2/22	Sun 6/5/22	7
	Design	**5 days**	**Mon 6/6/22**	**Fri 6/10/22**	**4**
	Review Specification	1 day	Mon 6/6/22	Mon 6/6/22	
	Develop Specification	1 day	Tue 6/7/22	Tue 6/7/22	10
	Design GUI Interface	2 days	Wed 6/8/22	Thu 6/9/22	11
	Reviewing The Design	1 day	Fri 6/10/22	Fri 6/10/22	12
	Coding	**5 days**	**Sat 6/11/22**	**Wed 6/15/22**	**9**
	Reviewing Modules in Pycharm	1 day	Sat 6/11/22	Sat 6/11/22	
	Build Interface	1 day	Sun 6/12/22	Sun 6/12/22	15
	Complete Coding	3 days	Mon 6/13/22	Wed 6/15/22	16
	Testing	**3 days**	**Thu 6/16/22**	**Sat 6/18/22**	**14**
	Testing The Code	2 days	Thu 6/16/22	Fri 6/17/22	
	Testing the Bugs and Fix it	1 day	Sat 6/18/22	Sat 6/18/22	21
	Submission	**1 day**	**Tue 6/21/22**	**Tue 6/21/22**	**20**
	Project Demonstration & Project Report Submission	1 day	Tue 6/21/22	Tue 6/21/22	

Figure 4.1: Gantt Chart



5. SOFTWARE AND HARDWARE SPECIFICATIONS

This project describes the following requirements:

- **Hardware Requirements:**
    - Processor: Minimum 2 GHz; Recommended 2.2GHz or more.
    - Ethernet connection (**LAN**) OR a wireless adapter (**Wi-Fi**).
    - Hard Drive: Minimum 500 GB; Recommended 1TB or more.
    - Memory (**RAM**): Minimum 4 GB; Recommended 6 GB or above.
    - Sound card with speakers and Microphone.

- **Software Requirements:**
    - Windows 7 or Above.
    - Python version 3.9 or above.
    - PyCharm IDE.
    - Krisp or any other noise cancellation software.
    - Required Modules.

6. BLOCK DIAGRAM

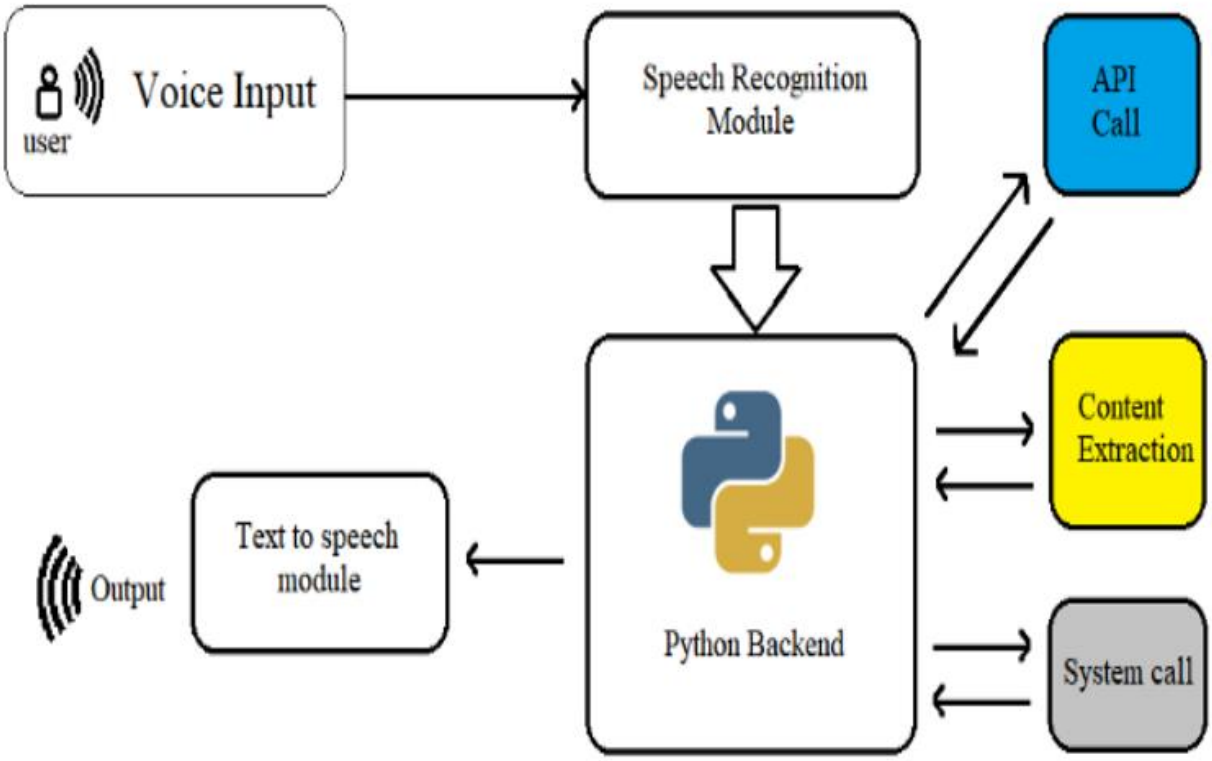


Figure 6.1: Block Diagram

7. SYSTEM FLOW DIAGRAM

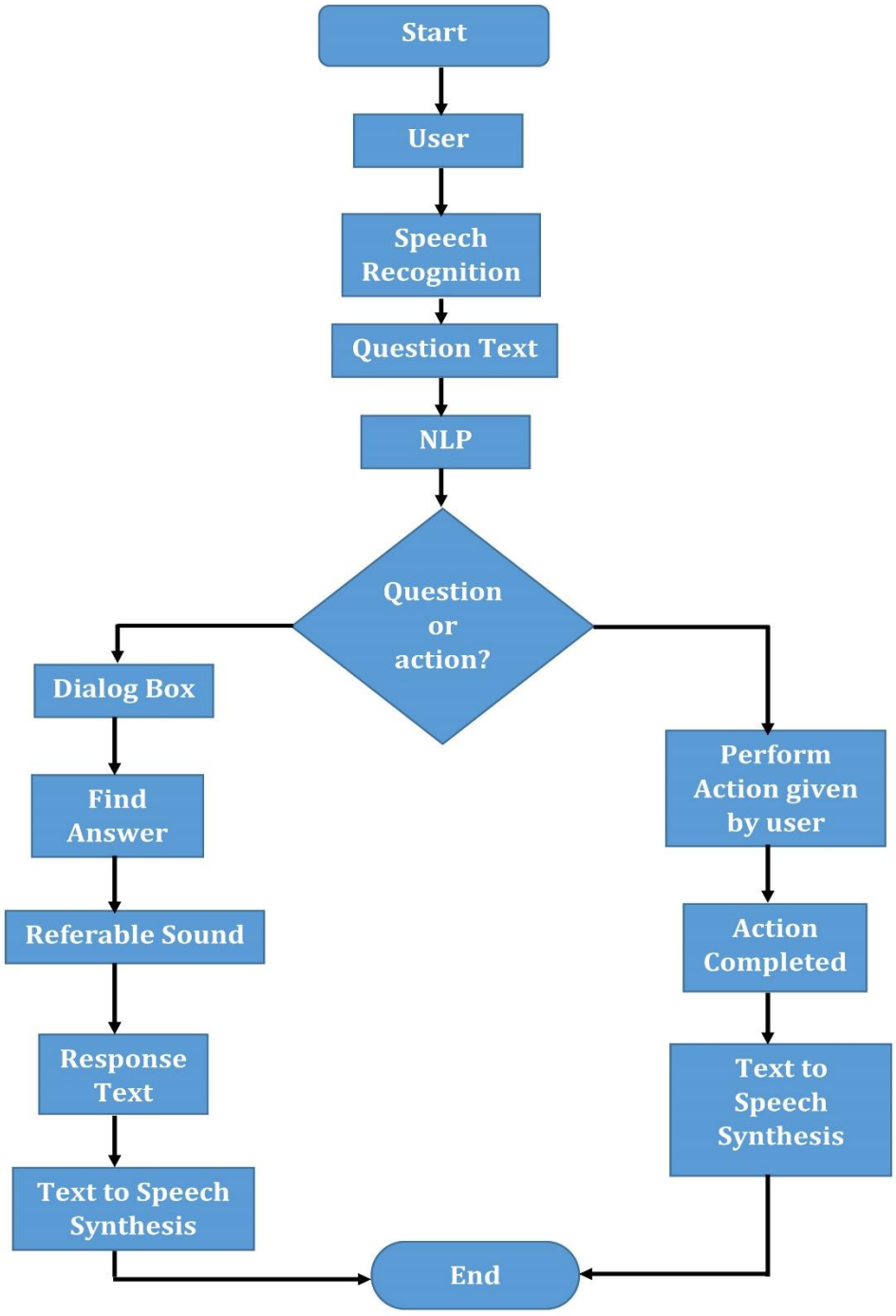


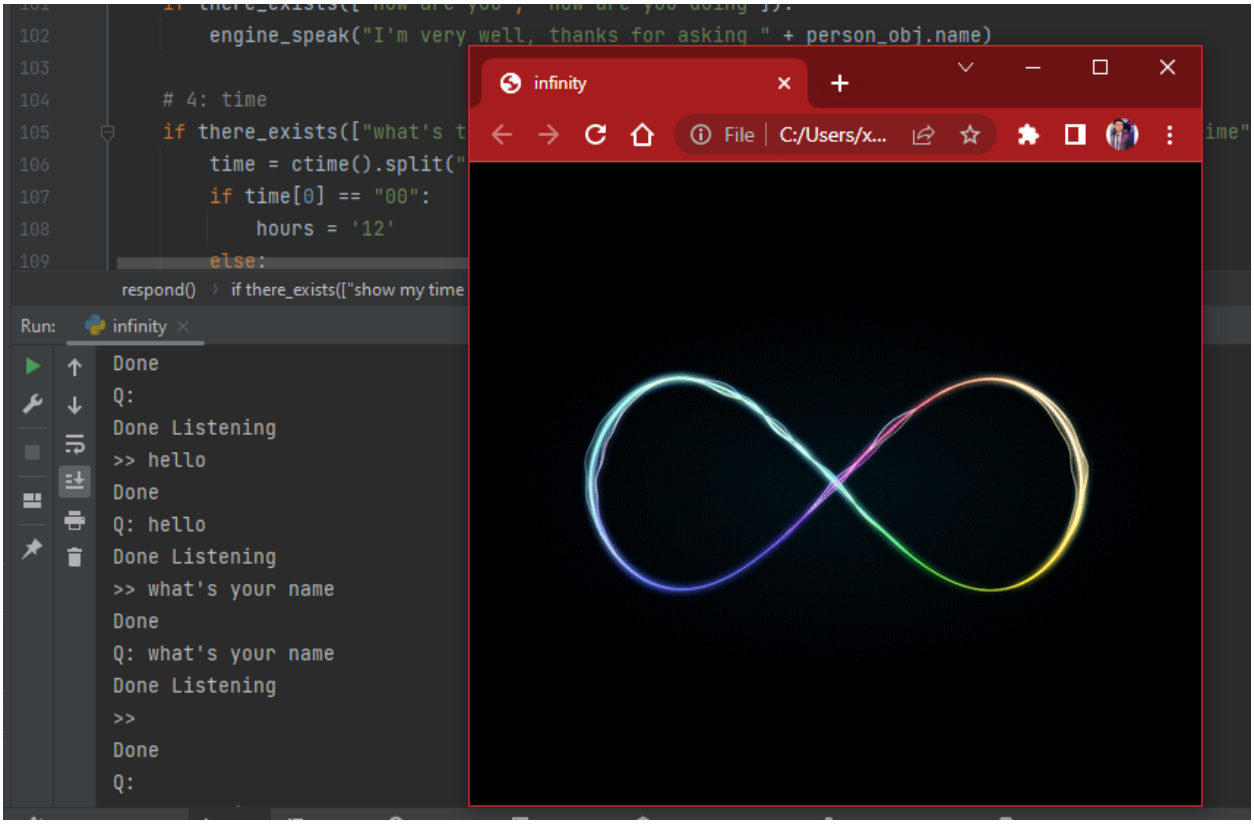
Figure 7.1: System Flow Diagram

8. USER GUIDE

The user's interaction will be solely by voice command nothing is given in text because our project is virtual assistant and it will follow the command. Some of the user guide steps are as follows:

1. How to give command to virtual assistant

The first thing will be the program will run and wait for the program to listen then start give your command or naturally say hello to the virtual assistant.

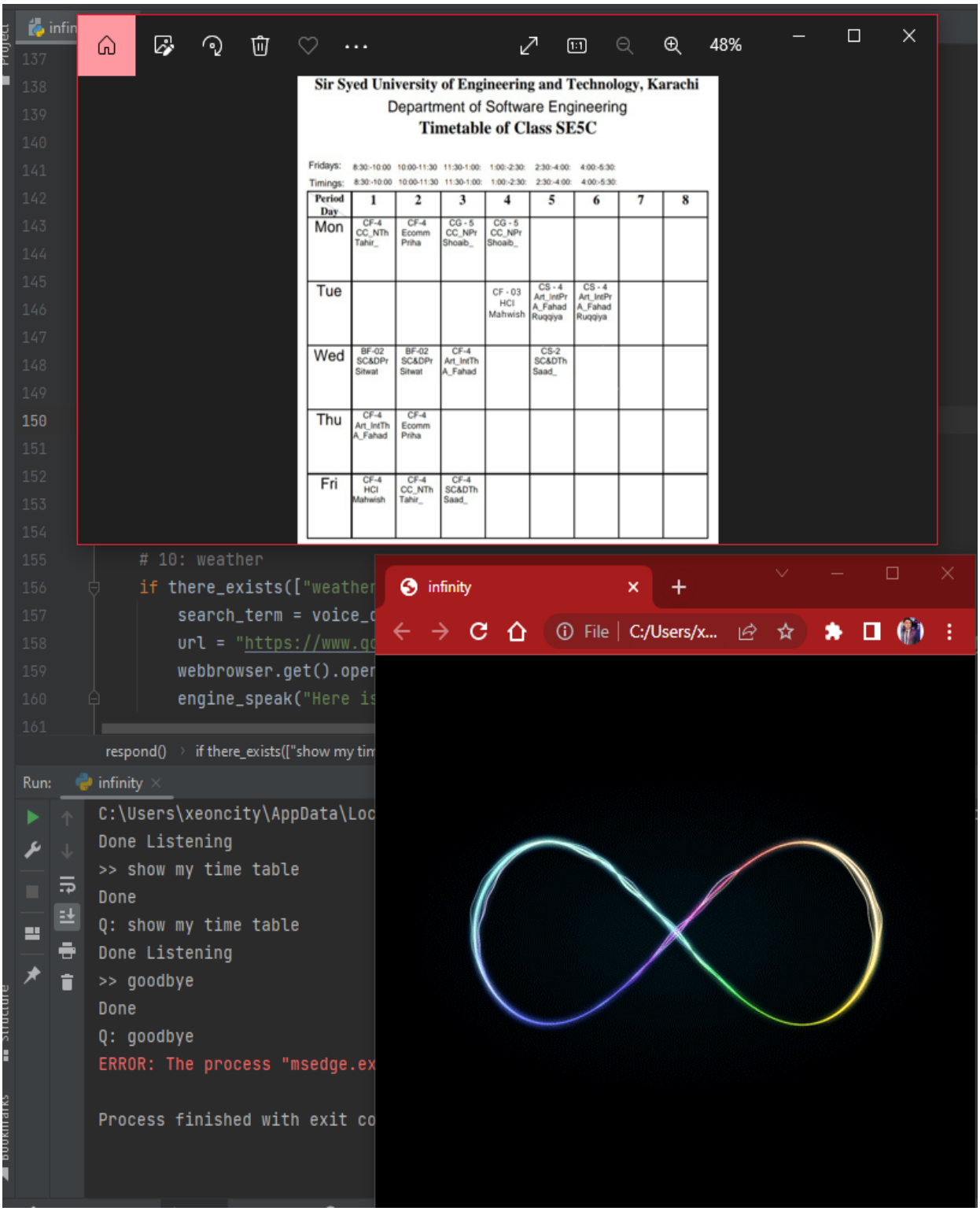


2. Variety of command features

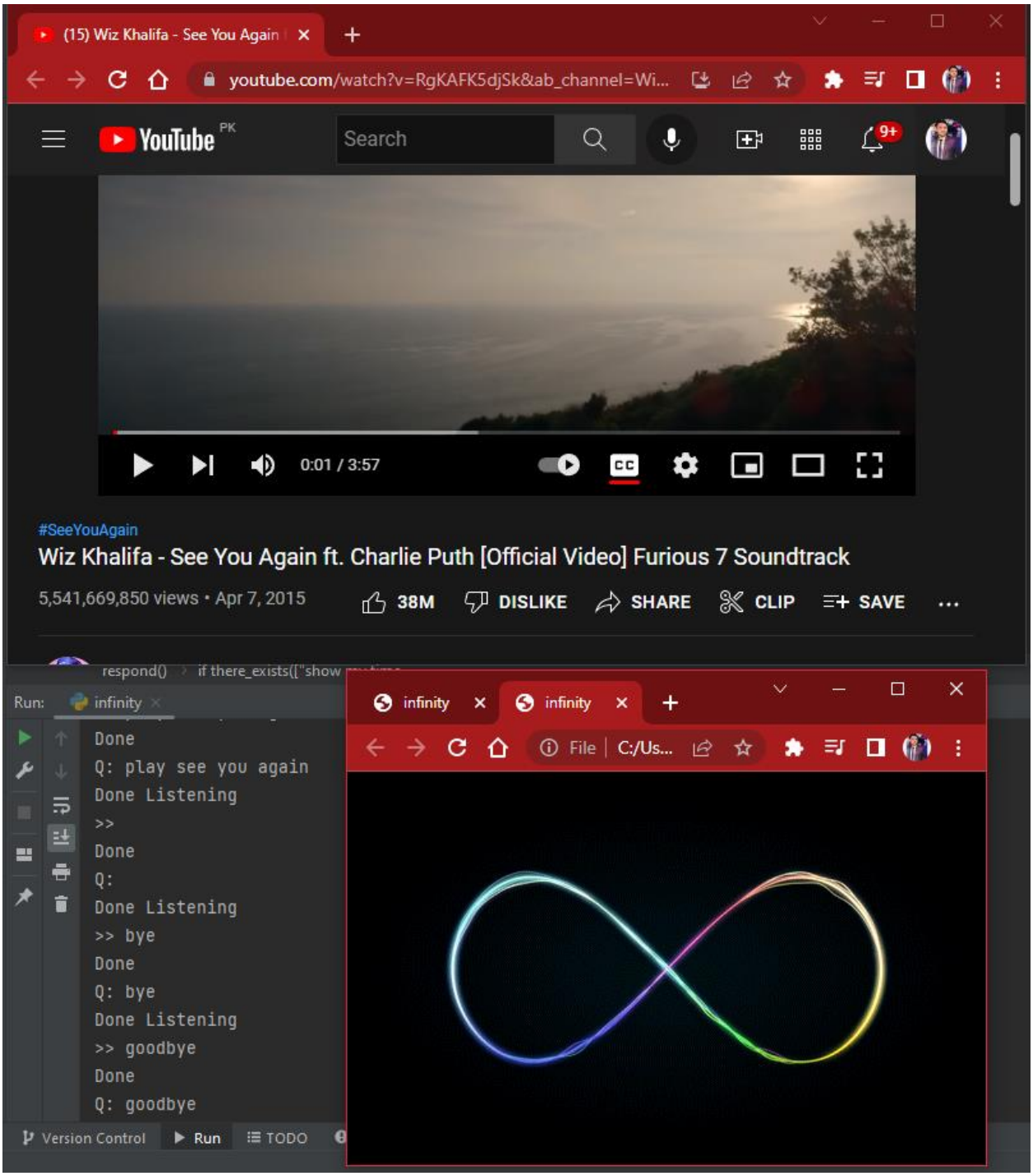
There are variety of task that our virtual assistant perform some of them are

- Play on YouTube song
- What time is it?
- Show my timetable

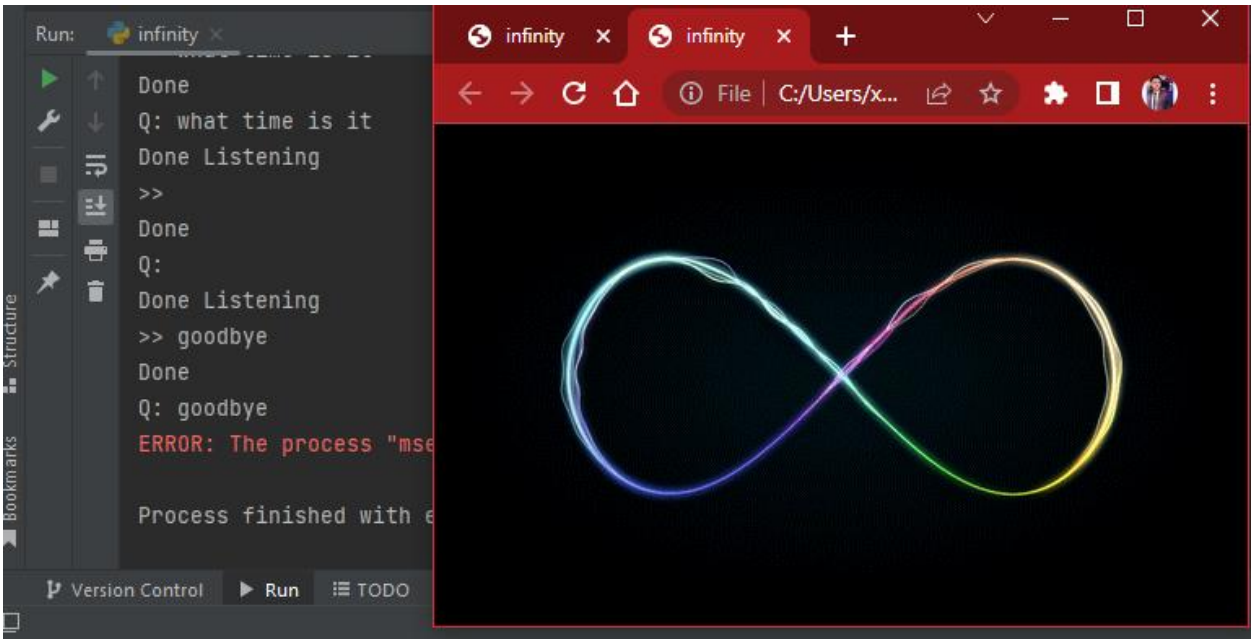
Show my timetable



Play on Youtube Song name



What Time is it?



There are more features the user can try out e.g

- What is your name or what is my name
- How are you doing
- Search for google (anything)
- Game for playing
- Toss a coin
- Calculations
- Screenshot
- Tell me a joke
- Goodbye for virtual assistant to exit

3. Machine Learning in Virtual Assistant

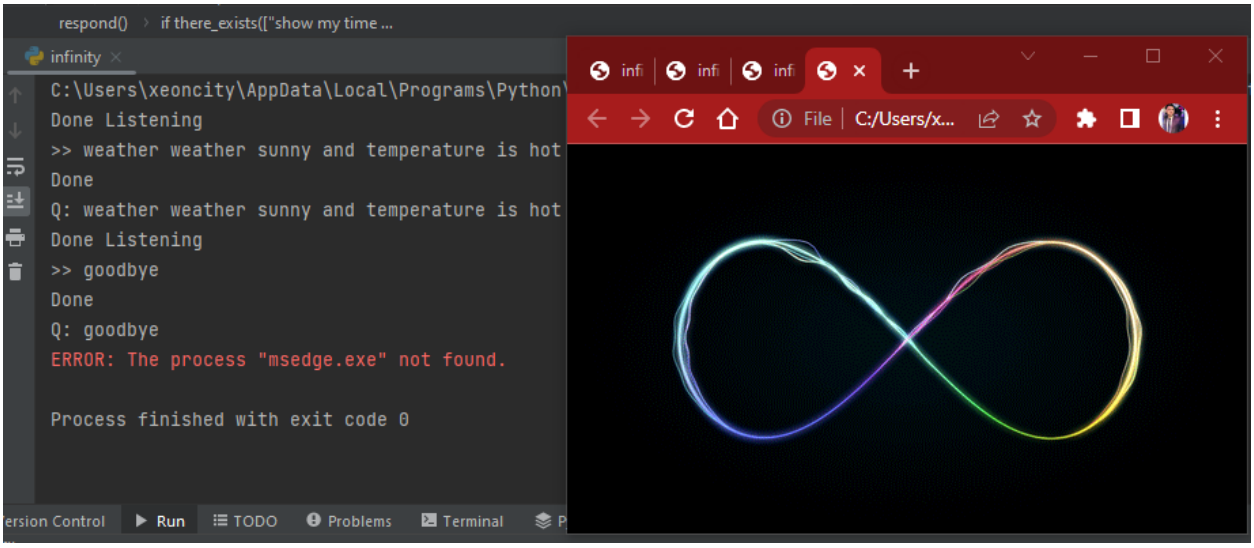
In our virtual assistant we have added two machine learning algorithms.

- Knn Algorithm
- Naïve Bayes

Basically these two algorithms are used for prediction and medical conditions. We have applied knn machine learning algo for weather prediction and naïve bayes for telling us about some medical condition. How these algorithms will work is given below in the ss.

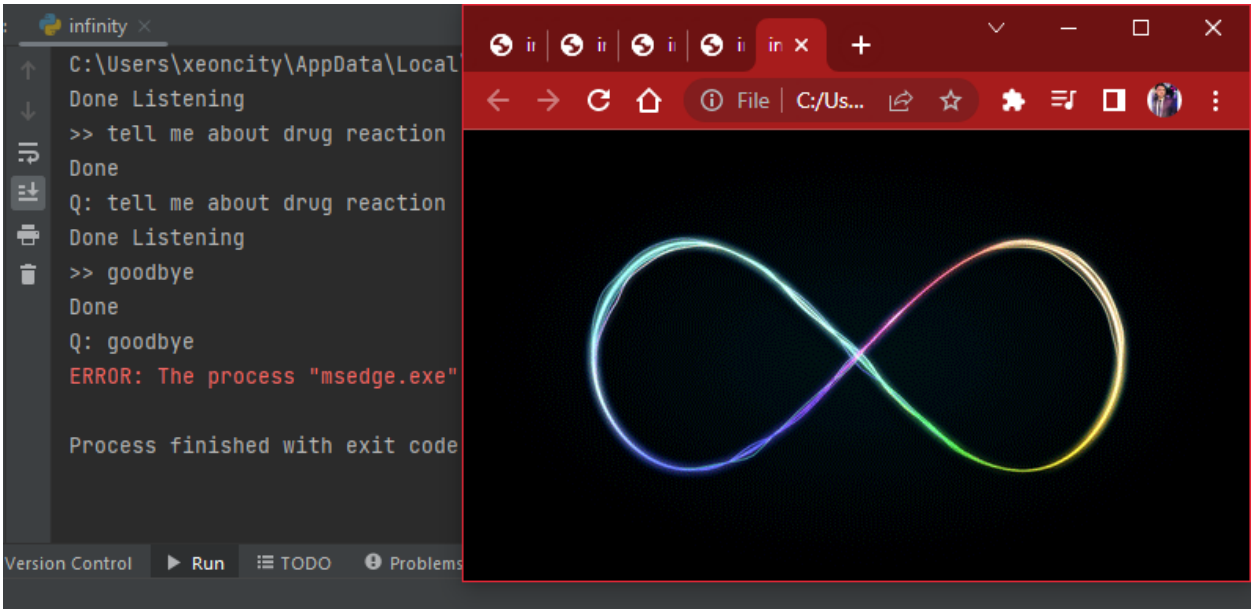
Knn Algorithm for Weather Prediction

If you search for weather sunny and temperature is hot it will predict that whether you should go outside to play or not?



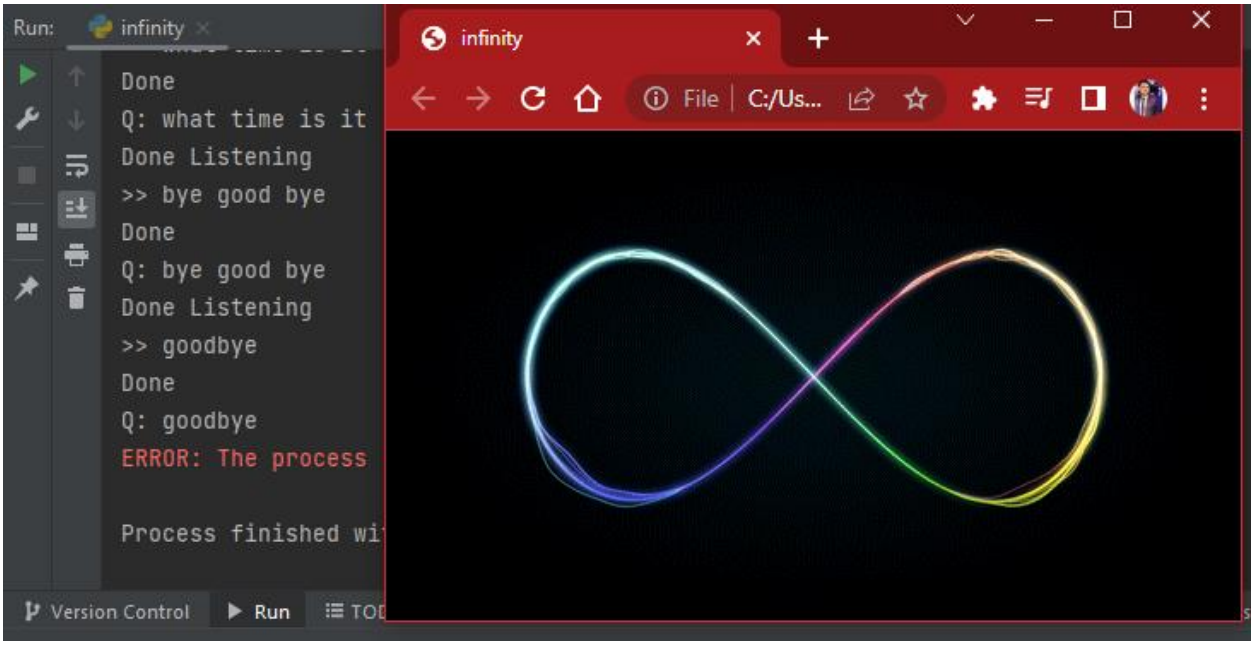
Naïve Bayes Algorithm for disease

If you ask and say search for (a particular disease it will tell you about that particular disease.



4. Virtual Assistant program close

When you have done your task and commands and you want to your assiatnt to exit simply say goodbye and it will turn off.



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