

Netaji Subhas Institute of Technology

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Natural Language Processing

(COCSE27)

Project Report

“Virtual Assistant Technology”

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Introduction:

The evolution of technology and the rise of digitalization has created new opportunities for people to connect and share knowledge regardless of their physical proximity. However, the shift from joint families to nuclear families has been a major trend in many societies around the world. There are many advantages of this inclination, the amount of knowledge pool that could have been present under one roof has been divided substantially. The technological advancements come as a big boon to fill in this gap, with the progress from a simple radio, to televisions, to computers and mobile phones, to the advanced Virtual Personal Assistance or commonly known as VPA, have become highly helpful. VPAs are intelligent software programs that can perform a wide range of tasks and functions, the tiniest of calculations and also finding solutions of complex problems, can be done in a snap with minimal involvement of any human, and can be customized to meet the specific needs and preferences of individual users.

While VPA's are used these days in numerous places as a chatbot in numerous websites in different fields to serve as an example, the inclusion of the voice or speech is a very new domain in it. Voice identification can be classified as a complex problem due to factors such as pronunciation of words, the dialects, and words may have multiple meanings, sentences can be interpreted in different ways. These problems or hurdles can be computed using the technology of machine learning like neural networks.

Problem Statement:

Emergencies can happen at any time and in any place, leaving individuals vulnerable and in need of immediate help. With the prevalence of mobile devices, many people rely on their smartphones to call for help or notify their emergency contacts in such situations. However, in some instances, individuals may not be able to access their mobile devices due to injury, disability, or other reasons, which can lead to delays in getting help and potentially worsen the situation.

To address this issue, there is a need for a virtual personal assistant (VPA) with an emergency contact feature that can be activated through voice commands or a single button press to quickly and easily notify designated contacts in case of an emergency. Such a feature would provide users with a sense of security and peace of mind, knowing that they can quickly and easily alert their loved ones or emergency services in case of an emergency, even if they are unable to physically access their mobile devices.

Motivation:

There has been an increased focus in the healthcare department after the covid pandemic and a lot of people have started to take care of their health seriously. Taking this ever growing industry into account, and reading many research papers on the same, it was brought to our knowledge that virtual personal assistants such as Alexa do not have an emergency contact feature. If someone has fits, or screams and collapses, they do not have the time or capacity to hold the power button of their phone for a long time nor give commands to the VPA. And so, the VPA could be programmed to automatically notify emergency services or designated contacts in case of a medical emergency, reducing the risk of complications and potentially saving lives.

Novelty:

While many of the VPA's enable different features, they fail to take any action in case of an emergency as their action begins only once the bot has registered its desired word or name, followed by a command, despite it listening to all the conversations that goes about whenever connected to a power supply. To tackle this grave issue, our bot detects the frequency range of the voice, if it is found to be above a certain threshold for some amount of time, and is followed by a very low frequency sound (or disturbance noise which may or may not be present) the bot will send a WhatsApp and a telegram message to the emergency contact listed. Moreover, it will also be able to contact the emergency helpline number 911.

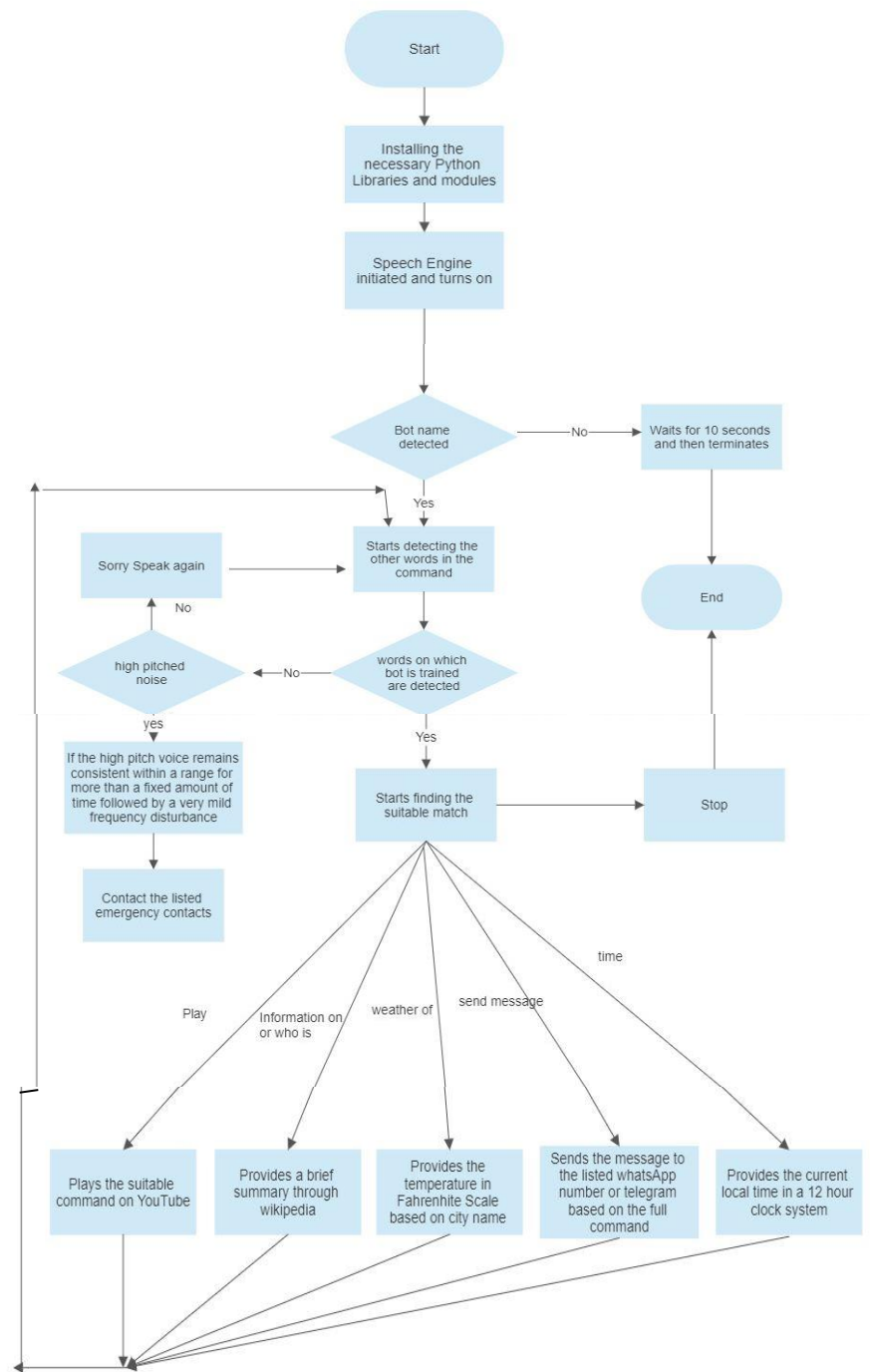
Technologies used :

1. **NLP** - (natural language processing) to understand and interpret user requests. NLP enables VAT's like Alexa to understand the context, intent, and meaning behind user requests, even when the requests are made using natural language.
2. **ASR** - (automatic speech recognition) to convert spoken words into text. ASR enables the VAT's to understand what users are saying and transcribe it into a format that the system can understand.
3. **TTS** - (text to speech) The VAT's use TTS to convert text into spoken words. TTS enables it to respond to user requests with natural-sounding voice responses.
4. **NLU** -(natural language unit) to analyze and interpret the meaning of user requests.

Working:

1. All the necessary python libraries and modules are loaded
2. As per the directions, the speech_recognition library is initiated and it builds a connection with the microphone on the system (either inbuilt or the external microphone).
3. The microphone is initiated and it starts to view the voice or the speech.
4. Once the word 'Happy' (Happy is the name of the bot) is recognized by the bot, it will start listening to the words that follow it and if the following words are found it will perform the respective functionality:
 - a. "play" - It will open up a YouTube window to play the respective song or video as mentioned in the command.
 - b. "Time" - It will mention the current time in the 12 hours clock system.
 - c. "Who is" or "information on" - It will present you with the relevant information that is found on Wikipedia.
 - d. "Send message" - this functionality is possible in two different manners, i.e. we are able to send the message to the desired person through 2 different applications - WhatsApp and Telegram
 - e. . "weather" - with the help of the weather API we are able to find the temperature of the suitable city which is requested by the user through voice command.
 - f. . "Stop" - the bot simply comes out of the loop.
5. The other option all together is say that if "happy" is not recognized but instead a voice with a high frequency range (for testing purpose we have considered above 300Hz) for at least 10 seconds which is followed by a very low frequency noise (can be considered as a disturbance or background noise) which is not evidently recognized, say it's below 50Hz and if this continues for more than 20 seconds, an emergency message will be sent to the emergency contacts listed along with a phone call.
6. If none of the above cases satisfied, the bot will simply state that it couldn't understand you properly.

Flowchart:



Link to the project: (with code and video of its working)

[Project Link - Click here](#)

Results:

The accuracy that we have been able to achieve with the current model is 81%. Since our model has been developed at a low level and we have used the most basic microphone, in order to get precise results, it is best to be present in a silent environment.

Drawbacks and Assumptions:

Since Alexa's voice recognition technology is not perfect, there is a risk of false alarms triggering an emergency response. This could cause unnecessary stress and concern for both the user and the emergency contact. Our project makes use of high frequency changes to detect distress in the user's voice. However, this situation is similar to loud house parties and also to a baby crying. In order to deal with this, the emergency feature can be provided as an optional toggle, that the user can switch off during parties and turn it back on later. Secondly, the emergency contact number needs to be preprogrammed and in case of a change needs to be programmed again.

References:

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