

1.INTRODUCTION

Now-A-Days Natural Language Processing is the area of computer science—more specifically, the area of artificial intelligence—that focuses on teaching computers how to comprehend written and spoken language in a manner that is similar to that of humans[1]. NLP aids programmers in organising tasks like speech recognition, automatic summarization, named entity recognition, and translation[2]. NLP enables computers to speak the languages of people. It saves a lot of time. The majority of businesses employ NLP to increase the effectiveness of documentation procedures and extract information from sizable databases. Voice Assistants are gadgets or applications that respond to people by using AI, NLP, and voice recognition technology[3]. The technology enables the gadget to synthesise, deconstruct, assess, and provide a relevant response to the user's message in return. AI voice assistants can be divided into two categories: general-purpose and bot voice assistants. Brands of voice assistants like Siri and Alexa fall under the first category. Voice Chatbots, on the other hand, are typically the second type where the assistant is built into an application or website to aid consumers in navigating the service[6]. A voice assistant, sometimes known as an intelligent personal assistant, is a brand-new category of goods promoted by Apple, Amazon, and Google that relies on speech recognition for natural language. They enable information retrieval using voice synthesis as well as searches that can be conducted using user-inputted voice commands.



Fig.1.1: Usage of Voice Assistant

Voice Assistants are changing the retail landscape both on and offline by offering users convenience and hands-free experience, and they are able to interpret human speech and respond via synthesized voices.

Users can ask their questions, control home automation devices and media playback via voice, and manage other basic tasks such as email, to-do lists, and calendars with verbal commands[2].



Fig.1.2: Voice Enabled Bot

Virtual voice assistant or personal assistant is an application that understands human voice commands and complete tasks requested by the user. Virtual assistants are available on smartphones, tablets, computers and laptop and even as a standalone device. Five primary personal assistants which are popular include, Alexa, Siri, Google Assistant, Cortana and Bixby[8].

Virtual assistants highlight key points throughout dialogue. Without even sitting on the couch, we may access laptops, mobile devices, and many more devices. These voice assistants gather responses to questions you may ask. The biggest benefit is the time and effort these virtual assistants save.

2.LITERATURE SURVEY

Following research papers are studied in details to understand the proposed recommendation technique and experimental result for predicting the output

2.1 Ritik Porwal ; Ujjawal Tomar ; Vishakha Dubey ; Asst.Prof.Akshita Mishra ; Asst.Prof.Gourav Mandloi “Voice Assistant” 2021 International Journal of Scientific Research & Engineering Trends(ISSN)

- The author mainly focuses on the most efficient way for Voice Recognition. Microsoft Speech Synthesizer is used for the speech synthesis which consists of STT (Speech to text), it sound or voice received from user is converted to text for processing of information and gives us respective output through a voice assistance by TTS(Text to speech).
- It Continues to expand its digital abilities in organizing several events like playing music , guiding services for travelling(Google maps) , game prediction.

Findings:

- 1.Recognizing the Voice
2. Detecting of the user requirement
- 3.Delivering the results for the user requirement

2.2 Abhay Dekate ; Rohan Killedar ; “Study of Voice Controlled Personal Assistant Device” 2019 International Journal of Emerging Trends & Technology in Computer Science

The author discussed about Data Obsessed using Data-Flow Sequence Algorithm. Proposed methods are tested on different cases.

- The author discussed about Home Automation system based on Internet of Things was proven to work satisfactorily by connecting simple appliances(like lights, fans Etc..).
- In this Paper Author discussed about the Core Engine Process.
- Sentence given or receive is passed to NLP and after that NLP core engine process these sentences and it is moved forward to speech synthesizer to respond.
- The main goal of Author is to make human life more comfortable.

Advantages: Most Accurate Output will be delivered.

Findings:

1. Most Relevant Outputs will be given

2. Alerting

2.3 Laura Burbach ; Patrick Halbach ; Nils Plettenberg ; Johannes Nakayama ; Martina Ziefle; Andre Calero Valdez ; "Hey,Siri;Ok,Google;Alexa:Acceptance-relevant factors of Virtual Voice-assistants" Published:2019 Digital Society Research Program

- The author worked related to the effect of natural language processing performance, price and privacy on acceptance of virtual voice assistants.
- The author discussed about the usage of the python's NLTK library, TextBlob and SpaCy libraries in making Virtual Voice Assistance.
- The Author proposed the future scope as the privacy became turned out as the important aspect Acceptance of the Voice Assistant

2.4 Bayu Setiaji, Ferry Wahyu Wibowo , Department of Informatics Engineering STMIK AMIKOM Yogyakarta, Yogyakarta "Chatbot Using A Knowledge in Database-Humanto-Machine Conversation Modeling". 2016 IEEE

- The author discussed about the sentence similarity measurement so that it is easy to find difference between two sentences or strings.
- The Author developed the chatbot using a knowledge in Database-Humanto-Machine Conversation Modeling tells about the probability of calculating a sentence that could be probably represented as equation.

$$\rho(\psi) = \prod_{i=1}^{|\psi|+1} \rho(\psi_i | \psi_0 \dots \psi_{i-1})$$

FINDINGS:

1. Similar Searched Sentences

2. Most Similar and most searched things which were similar

2.5 George Terzopoulos; Maya Satratzemi, "Voice Assistants and Artificial Intelligence in Education", in Department of applied informatics on 26 September, 2019

- The author discussed about The Word Order Similarity Between Sentences. Proposed a method Porter Stemming Algorithm
- The author discussed about the word order similarity used in building a Chat-Bot for Collage Management.

Advantages: Porter Stemming Algorithm is a process of removing Suffixes from words in English

Findings:

- 1.Finding the Suffix of the word
- 2.Gathering the relevant information by using the Prefix.

2.6 "AIML Based Voice Enabled Artificial Intelligent Chatterbot", International Journal of u- and e-Service, Science and Technology Volume 8 - No. 2, 2015.

- Firstly , sentence given or receive is passed to NLP and after that NLP core engine process these sentences and it is moved forward to speech synthesizer to respond.
- Microsoft Speech Synthesizer is used for the speech synthesis which consists of STT is speech to text, it sound or voice receive from user is converted to text for processing of information by bot.

Advantages: Using Voice Speech Synthesizer

Findings:

- 1.Finding the Speech of the Voice given by the user

2.7 Tarun Lalwani, Shashank Bhalotia," Implementation of a Chat Bot System using AI and NLP" International Journal of Innovative Research in Computer Science & Technology (IJIRCST) ISSN: 2347-5552, Volume-6, Issue-3, May 2018

- Author explains about the creation of college chat bot using natural language processing.
- It also explains about the usage of Python's NLTK library in making the chat bot. Semantic sentence similarity is also explained in this paper.

3.METHODOLOGY

3.1. Speech Synthesizer:

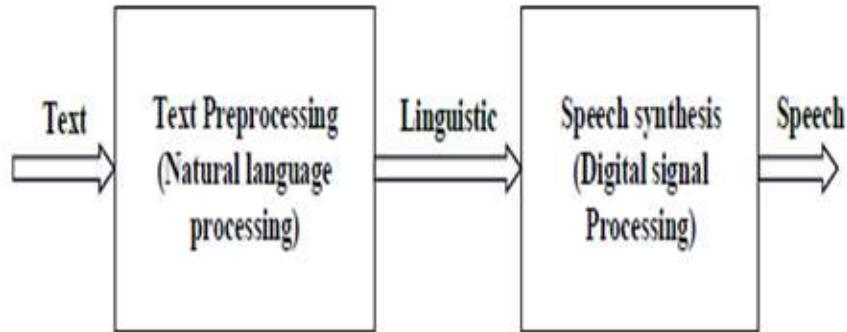


Fig.3.1.1 Text to Speech Synthesizer

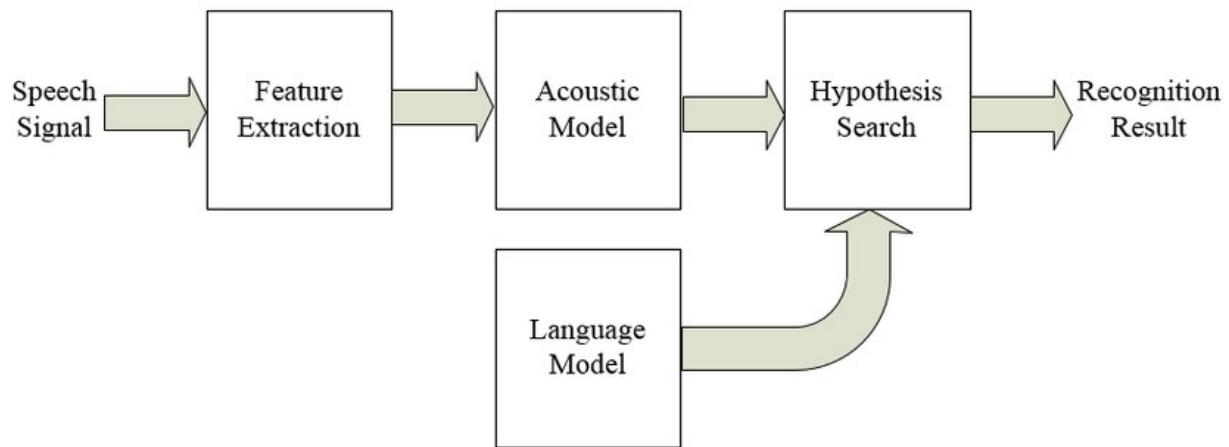


Fig.3.1.2 Speech to Text Synthesizer

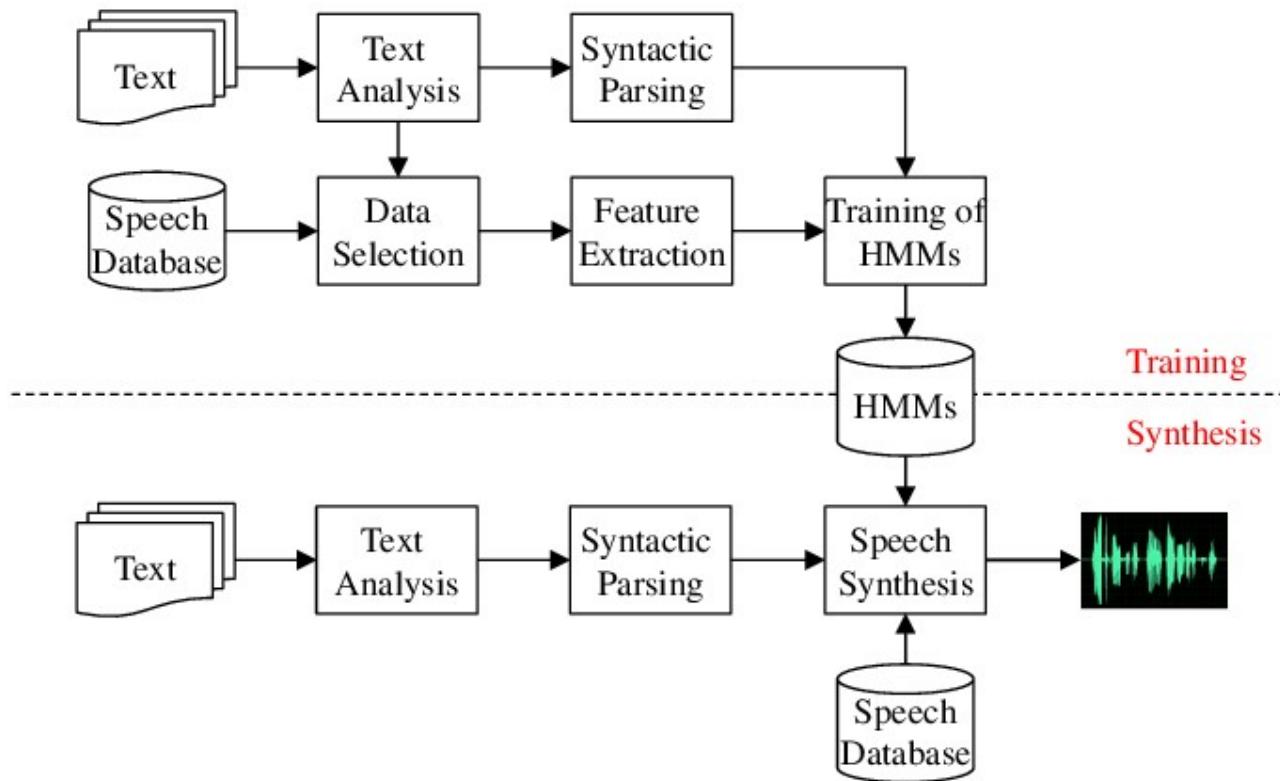


Fig 3.1.3 Speech Synthesizer

Steps Involved in Speech Synthesizer:

- NLP Core Engine processes the input given by the user so that it can be sent to the speech synthesizer to respond.
- Microsoft Speech Synthesizer is used which consists of STT.

3.2. Data Flow Sequence Algorithm:

The steps involved in Data Flow Sequence:

- Initialize Device
- Task Manager
- Service Manager: Analyses the commands and matches them with servers.
- Execute Command: When the matching found for commands, run the py script and gives response

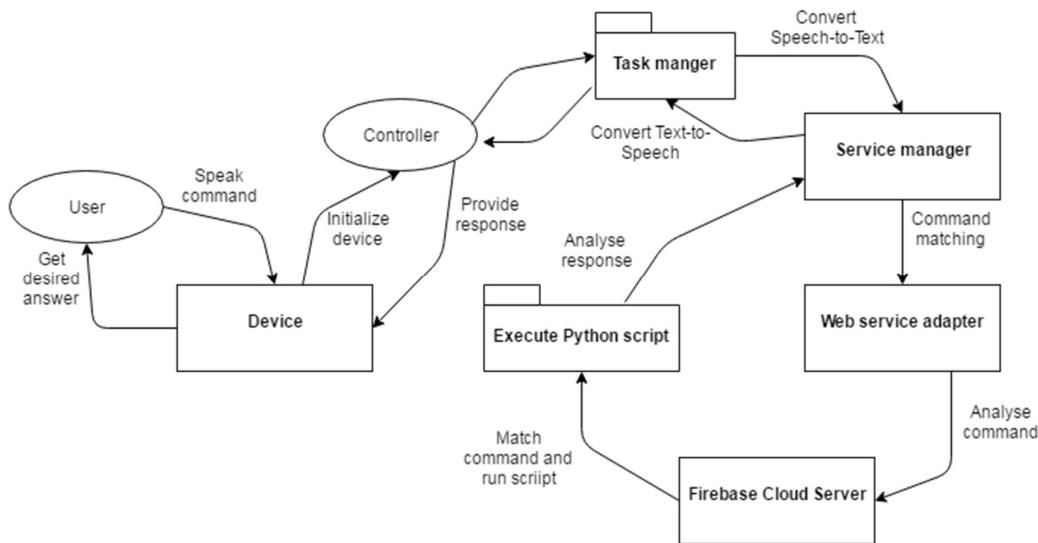


Fig 3.2.1: Data Flow Sequence

3.3. Virtual Assistant consists of core and interface:

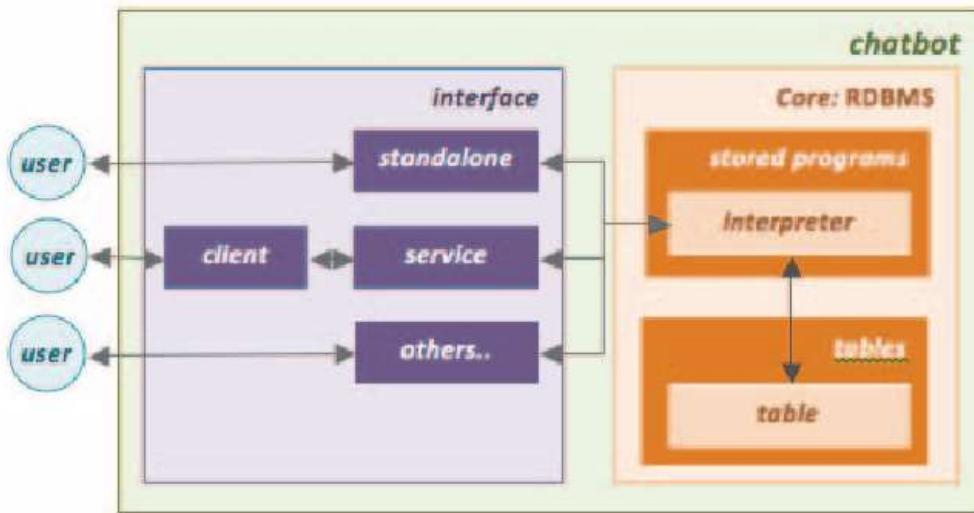
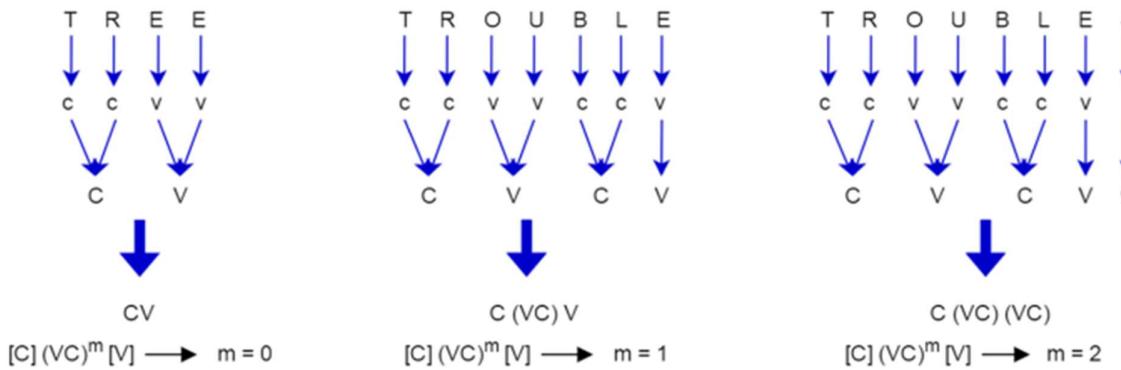


Fig 3.3.1: Global Design of Accessing the Chatbot

- The Virtual Assistant consists of core and interface accessing that core. RDBMS, which is a database, is at its core.
- The interpreter is a stored programme of function and procedure sets for required of pattern matching, whereas the database is made up of tables to store knowledge
- The interface could be a standalone application that can be employed by user for chatting or conversation RDBMS, which is a database, is at its core.

- The interpreter is a stored programme of function and procedure sets for required of pattern matching, whereas the database is made up of tables to store knowledge.

3.4. Porter Stemming Algorithm:



Porter Stemming Algorithm

SSES	→	SS	(m>0) ATIONAL	→	ATE
IES	→	I	(m>0) TIONAL	→	TION
SS	→	SS	(m>0) ENCI	→	ENCE
S	→		(m>0) ANCI	→	ANCE

Fig 3.4.1: Porter Stemming Algorithm

- The Porter stemming algorithm (or 'Porter stemmer') is a process for removing the commoner morphological and inflectional endings from words in English. Its main use is as part of a term normalisation process that is usually done when setting up Information Retrieval systems

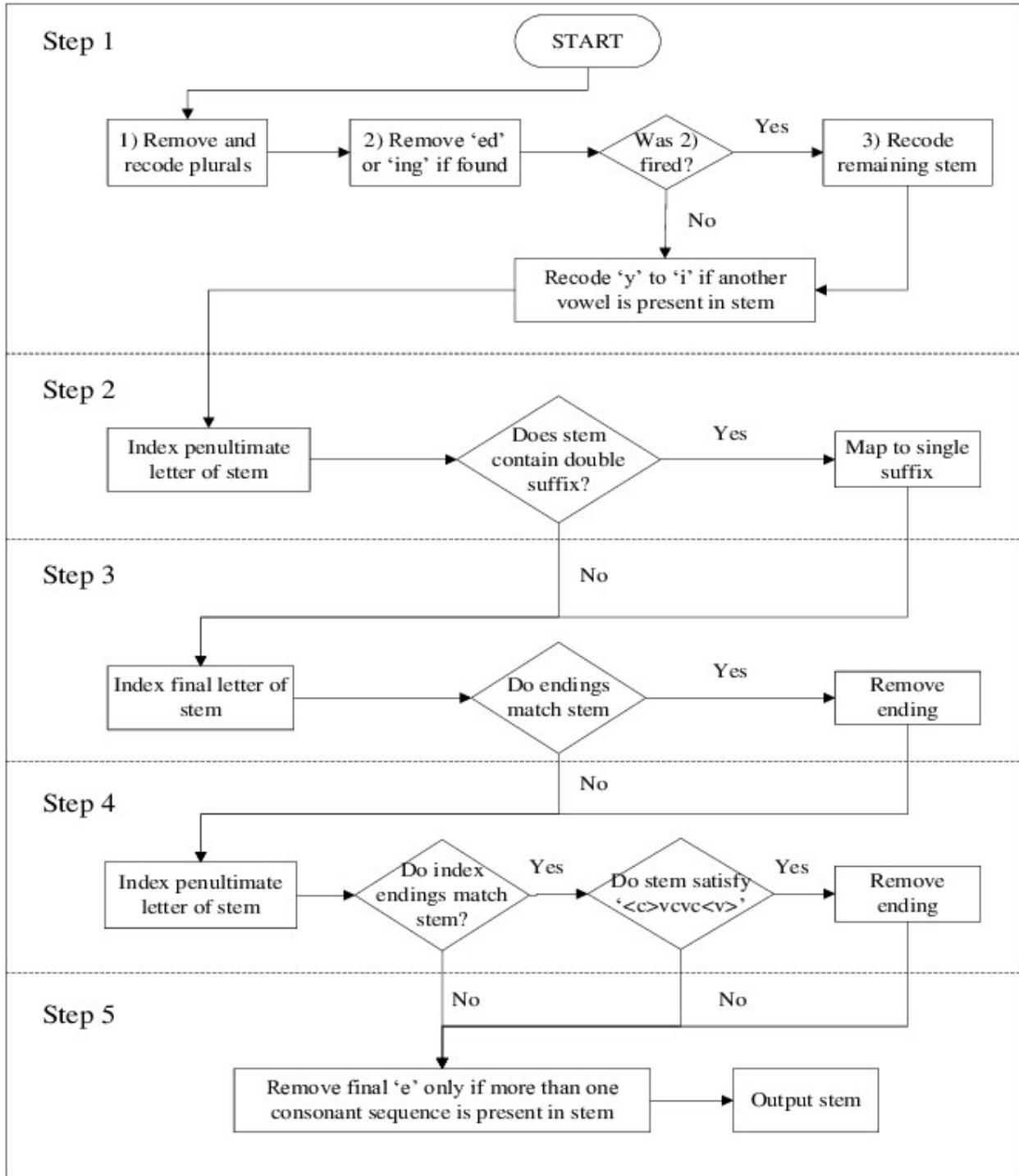


Fig 3.4.2: Porter Stemming Algorithm Flow

- It is a process for removing the suffixes from words in English. Removing suffixes automatically is an operation which is especially useful in field of information retrieval. Following are the steps of this algorithm:
- 1. Gets rid of plural and -ed or -ing suffixes

- 2.Turns terminal y to i
- 3Maps double suffixes to singles ones: -ization , -ational etc...
- 4.Deals with suffixes -full, -ness etc. Takes off -ant,-ence etc... Removes a final -e
- A stemming algorithm, a procedure to reduce all words with the same stem to a common form, is useful in many areas of computational linguistics and information-retrieval work. While the form of the algorithm varies with its application, certain linguistic problems are common to any stemming procedure.

3.5. Stemming and Lemmatization Method:

- Lemmatization is done by using Word Net which is available in Python's NLTK library.

For example, requiring, require and required should map to require .

- Semantic Sentence Similarity:

There are various combinations in which user can input the same query. For example, Q1: What is the notice regarding PG courses re-registration? Q2: Tell me about re-registration in PG courses in our college. Q1 and Q2 both mean the same thing (same sense). Also, there will be many more combinations for this same query and finding all such combinations will not be feasible. The scalability and performance of the system will also get affected. To overcome this problem, similarity is found out between the user input and the queries present in the available question set.

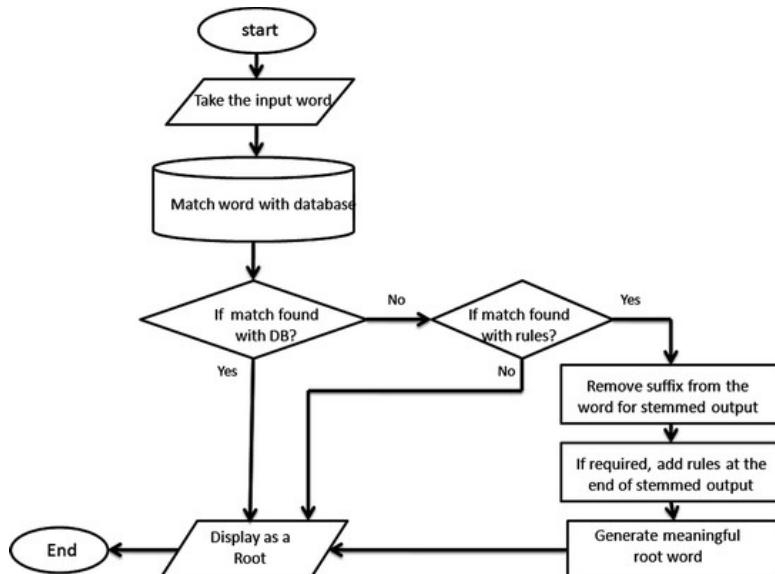


Fig.3.5.1: Design of Lemmatization

4.RESULTS AND DISCUSSION

4.1. Voice Enabled Bot

- The chatter bot performed up to the mark as in case of text provided, results produced were 97.3 percent accurate and more reliable.
- But in case of voice enabled input due difference in accent of user and Microsoft speech synthesizer model whose accent is based on UK or USA users.
- Thus, results obtained were close to the appropriate answer. Thus, from above it can be considered that speech synthesizer needs to be modeled for all kinds of accents such that it processes the voice input more correctly, therefore chatter bot model can produce more accurate results.

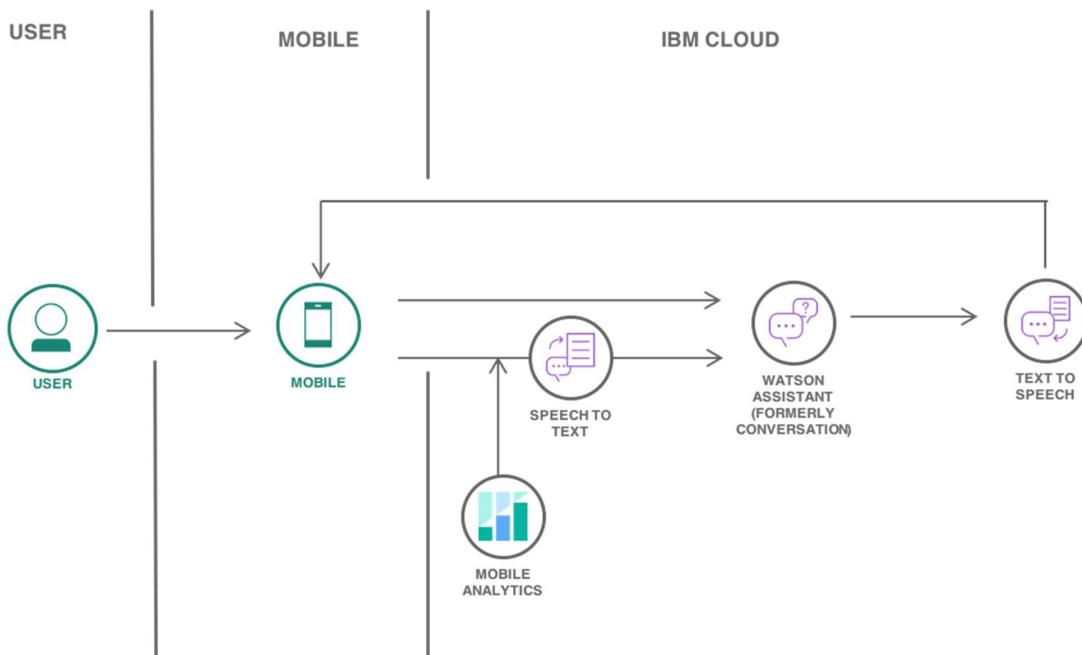


Fig 4.1.1: Voice Enabled Bot

4.2. A Personal Voice Assistant

- It keeps learning the sequence of questions asked to it related to its context which it remembers for the future. So, when the same context is mentioned, it starts a conversation with you asking the relevant questions.
- It performs Arithmetic Calculations based on voice commands and giving back the computer solution through the voice. Search Internet based on user voice input and giving back the reply through a Voice Assistance. Results produced were 98 percent accurate to the input.



Fig.4.2.1. Personal Assistant Use Case

4.3. Virtual Chat Bot using database-human to machine:

- In making a table of database for chatbot, it had implemented a forward-engineering technique. This technique is generating Entity Relationship (ER) into DDL scripts those could be executed as table generating.
- All designs of tables and stored programs had been implemented in the RDBMS MySQL. Before testing process was done, it ought to be entered some knowledge which input sentence patterns stored in the pattern table and response sentences stored in the template table.
- Results produced were 93.2% accurate to the input. In additional it had to be entered mapping as representation of relationship between both pattern and template stored in the pattern template table.

4.4. Virtual Assistants for Education:

- It is a virtual assistant to provide services regarding course activities such as record session data and services related to attendance, task assignment and scoring management. The user just has to register himself to the system and has to login to the system. The Virtual Assistance consists of core and interface that is accessing the core in (MySQL). Results produced were 79.6 percent accurate to the input. Natural language processing technologies are used for parsing, tokenizing, stemming and filtering the content of the complaint.

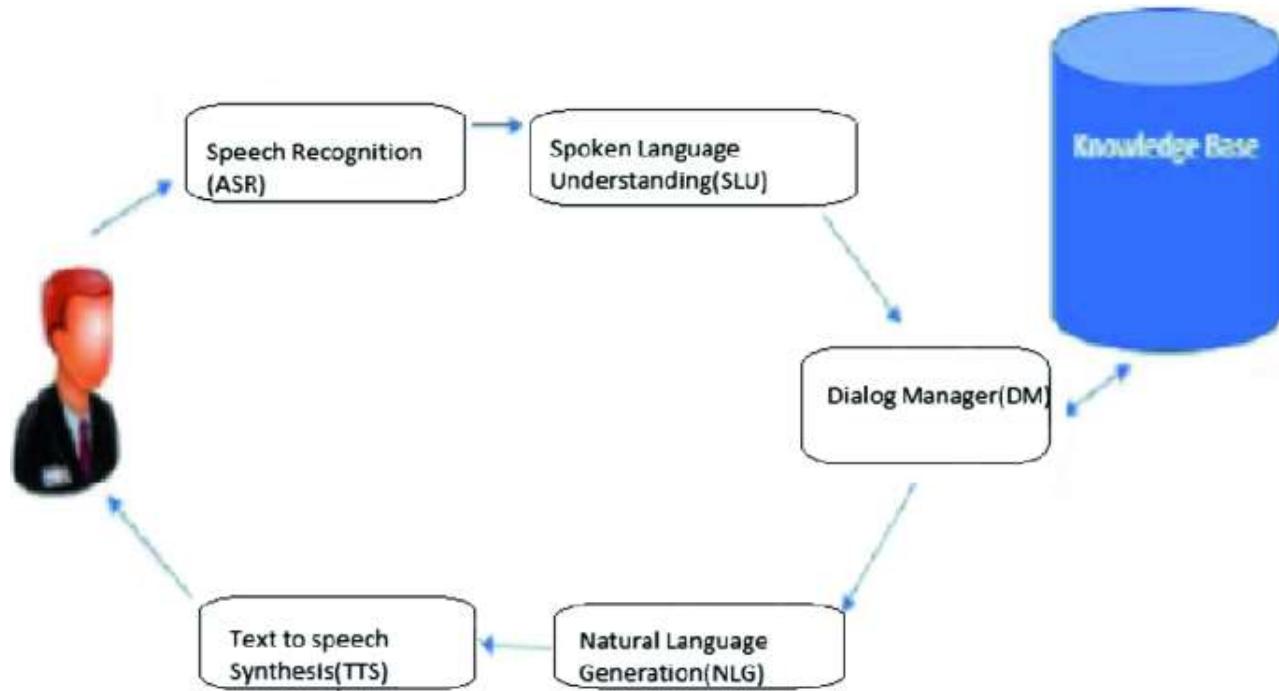


Fig.4.4.1: Education System

4.5. Chat Bot system using AI and NLP:

- It enables the students to be updated with college activities. It saves time for the students as well as teaching and non-teaching staffs.
- It is providing us a readily available information source without taking any physical efforts. It is easily accessible and saving time and money also.
- It is often impossible to get all the data on a single interface without the complications of going through multiple forms and windows.
- The college chat bot aims to remove this difficulty by providing a common and user-friendly interface to solve queries of college students and teacher.

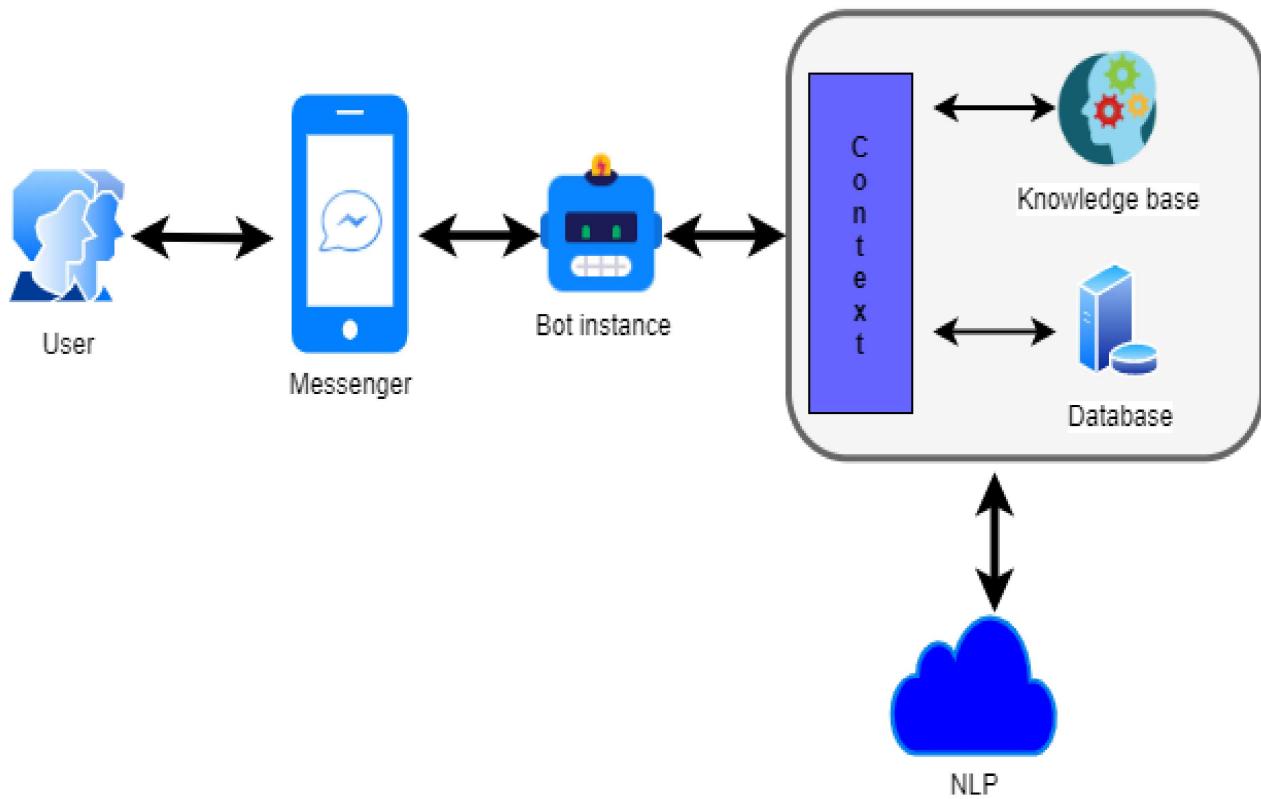


Fig.4.5.1: Chatbot System

5.CONCLUSION

Among The Four individual Reference papers which is done about “Virtual Assistance Using NLP Techniques. After considering the different algorithms are used. Comparative study performed among the various techniques like speech synthesizer, data flow sequence, core and interface accessing, porter stemming. After the Analysis based on the accuracy on the above-mentioned table. The Data Flow Sequence Algorithm has most accuracy for providing the required output as required for the user.

Table 5.1: Accuracies of Different Models

S.no	Model	Accuracy %
1	Speech Synthesizer	97.3
2	Data Flow Sequence	98
3	Core and interface Accessing	93.2
4	Porter Stemming	79.6

6. REFERENCES

- [1] Ritik Porwal ; Ujjawal Tomar ; Vishakha Dubey ; Asst.Prof.Akshita Mishra ; Asst.Prof.Gourav Mandloi “Voice Assistant” 2021 International Journal of Scientific Research & Engineering Trends(ISSN)
- [2] Abhay Dekate ; Rohan Killedar ; “Study of Voice Controlled Personal Assistant Device” 2019 International Journal of Emerging Trends & Technology in Computer Science
- [3] P Laura Burbach ; Patrick Halbach ; Nils Plettenberg ; Johannes Nakayama ; Martina Ziefle; Amdre Calero Valdez ; “Hey,Siri;Ok,Google;Alexa:Acceptance-relevant factors of Virtual Voice-assistants” Published:2019 Digital Society Research Program
- [4] Bayu Setiaji, Ferry Wahyu Wibowo , Department of Informatics Engineering STMIK AMIKOM Yogyakarta, Yogyakarta "Chatbot Using A Knowledge in Database-Humanto-Machine Conversation Modeling". 2016 IEEE
- [5] George Terzopoulos;Maya Satratzemi, “Voice Assistants and Artificial Intelligence in Education”, in Department of applied informatics on 26 September,2019
- [6] Nikhita Kalburgikara , Nikita Ashok Shetb , Paavani Komarlac , Pooja B Sd , Dr. K R Shylajae” A Virtual Assistant using NLP Techniques” International Journal of Research Publication and Reviews,2021.
- [7] Mathangi Sri; “NLP in Virtual Assistants” Research Gate,January 2021.
- [8] G. Molnár and Z. Szüts, "The Role of Chatbots in Formal Education," 2018 IEEE 16th International Symposium on Intelligent Systems and Informatics (SISY), 2018, pp. 000197-000202, doi: 10.1109/SISY.2018.8524609.
- [9] C. Recchuto et al., "Cloud Services for Culture Aware Conversation: Socially Assistive Robots and Virtual Assistants," 2020 17th International Conference on Ubiquitous Robots (UR), 2020, pp. 270-277, doi: 10.1109/UR49135.2020.9144750.
- [10] A. P. Sam, B. Singh and A. S. Das, "A Robust Methodology for Building an Artificial Intelligent (AI) Virtual Assistant for Payment Processing," 2019 IEEE Technology & Engineering Management Conference (TEMSCON), 2019, pp. 1-6, doi: 10.1109/TEMSCON.2019.8813584.