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Implementation of a Chatbot System (College Enquiry)

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Abstract:- The rapid advancement of artificial intelligence has led to the development of more sophisticated chatbots capable of enhancing user interactions. This project presents a chatbot system that integrates speech recognition with traditional text input, enabling users to interact through both voice and text. Using NLP techniques such as tokenization, lemmatization, and part-of-speech tagging, the system effectively processes user inputs to match predefined intents stored in a JSON file. By integrating Google's Speech-to-Text API, this chatbot dynamically processes voice commands, offering an improved, flexible user experience. The system is easily adaptable to various domains through the update of intents, providing a robust solution for dynamic, real-time conversational agents.

I. INTRODUCTION

The field of artificial intelligence has revolutionized many areas of modern life, and one such application is in the development of conversational agents, or chatbots. Chatbots are designed to replicate human conversation and engage users in meaningful dialogues. This project focuses on developing a chatbot using Natural Language Processing (NLP) techniques, which allows the bot to process and understand human inputs and generate appropriate responses based on predefined intents.

In the original version of this chatbot, text input was the only mode of interaction. In this revised version, we have extended the functionality by incorporating speech recognition, allowing users to interact with the bot through voice input. By integrating Speech Recognition along with the existing NLP pipeline (lemmatization, tokenization, stopword removal, and POS tagging), this enhancement provides a more natural and flexible user experience.

The chatbot's purpose is to assist users by responding to specific queries that are categorized into various intents. These intents are predefined in a JSON file, which includes multiple examples of user queries and corresponding bot responses. The system is designed to be extensible and can be easily adapted to different domains by updating the intents file. The focus in this iteration is to improve the interaction flexibility by supporting both text and voice input modes.

In today's fast-evolving digital landscape, providing multiple interaction modes is increasingly essential for accessibility and usability. Voice-based interactions, in particular, have gained popularity with the rise of virtual assistants like Siri, Alexa, and Google Assistant. By integrating speech recognition, the chatbot not only enhances user convenience but also keeps pace with the growing trend toward hands-free and voice-driven applications. This dual-input approach makes the system more versatile and responsive to varied user preferences, ensuring broader adoption in practical use cases.

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II. LITERATURE SURVEY

S.No.	Title	Published Date	Publishers	Proposed Methodology
1	A Web Based College EnquiryChatbot with Results	2018	Sagar Pawar, Omkar Rane, Ojas Wankhade, Pradnya Mehta	Bigram is applied toquantify the text. Improved informationgain algorithm are used.
2	College EnquiryChat Bot	2019	Karanvir SinghPathania	Uses Libraries and Artificial Intelligence Markup Language to have conversations with humans.
3	College Enquiry Chatbot	2021	Mrs. Nidhi Sharma, Gayatri	Made by creating a HTML and CSS file and by writing AIML Scripting for ChatBot Standard startup file: (std-startup.aiml).

The development of chatbots has seen tremendous growth since the inception of the first chatbot, ELIZA, in the 1960s. Over the years, several researchers and developers have explored various methodologies to improve chatbot efficiency, flexibility, and natural interaction. The use of NLP, Machine Learning, and speech recognition has enabled modern chatbots to understand more complex inputs and handle a wider range of tasks.

Our chatbot builds on these ideas but expands further by adding voice interaction capabilities. Previous works such as Sagar Pawar et al. (2018) emphasized text-based approaches using NLP algorithms to quantify user input. However, with advancements in speech recognition technology, voice-based systems have gained popularity, as seen in systems like Amazon Alexa and Google Assistant. The addition of speech recognition in this project takes advantage of these advancements, offering users the option to communicate with the bot verbally or through text input.

Our approach aligns with Emil Babu's 2021 work on "Chatbot for College Enquiry," where a heuristic approach was used to recognize both the intent and entity within user input (college enquiry). This project takes a similar intent-based approach but improves upon user interaction by enabling speech input

III. METHODOLOGY

A. Preprocessing Stage

Preprocessing is an essential step for understanding and processing user inputs. Our chatbot's preprocessing pipeline includes:

- Tokenization: Breaking the input text into smaller units (tokens). For instance, the phrase "What are the college timings?" would be tokenized as ['what', 'are', 'the', 'college', 'timings', '?'].
- Stopword Removal: Eliminating common words that do not add significant meaning to the query (e.g., "is," "the," "of"). Removing these words allows the bot to focus on more relevant terms.
- Lemmatization: Reducing words to their base or dictionary form.
- For example, "running" becomes "run" and "went" becomes "go." This step helps in better matching user inputs with predefined patterns.
- Part-of-Speech (POS) Tagging: Assigning grammatical labels (noun, verb, adjective) to each token in the input, enabling the bot to better understand the structure of the sentence and improve the intent-matching process.

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B. Speech Input Processing

A major improvement in this project is the introduction of speech input. Using the SpeechRecognition library, the bot can now capture and process voice commands from users. The integration works as follows:

- The bot uses a microphone to listen to the user's input.
- The captured speech is converted into text using Google's speech-to-text service.
- The resulting text is passed through the same preprocessing pipeline as typed input, ensuring consistency across both input modes.

This feature allows users to choose between typing their queries or speaking them aloud, making the chatbot more versatile and user-friendly.

C. Intent Recognition

The bot uses a JSON file to store multiple user intents. Each intent contains a list of potential user queries (patterns) and corresponding responses. When a user inputs a query (either by typing or speaking), the following steps occur:

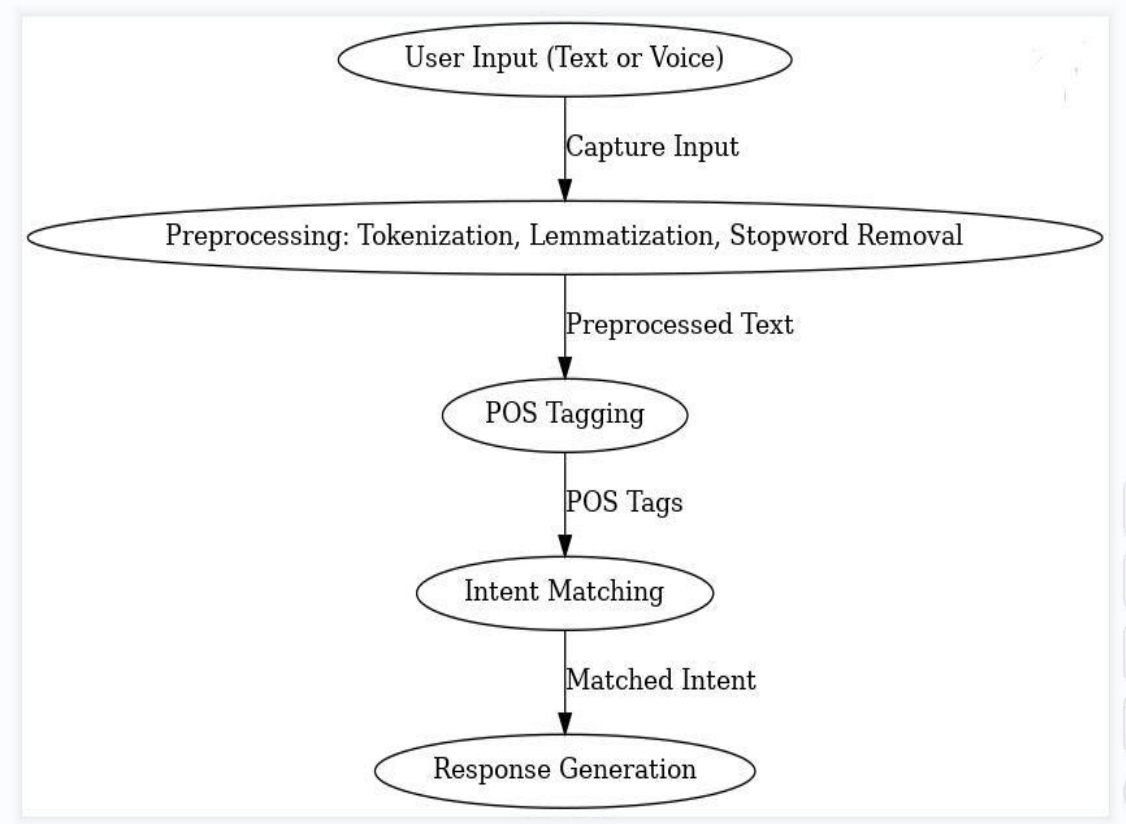
- The query is preprocessed and tokenized.
- The system compares the user's input with the preprocessed patterns from the intents.
- Using set intersection, the bot identifies the intent that best matches the user's query.
- Once an intent is matched, the system randomly selects a response from the predefined options for that intent.

If no match is found, the bot defaults to an invalid intent, which contains generic responses for unrecognized inputs.

D. Response Generation

Responses are generated based on the matched intent. The system selects one of several possible responses associated with the intent, ensuring that interactions feel dynamic and less repetitive. For example, if the user asks about college timings, the bot might respond with one of several variations of the answer, making the conversation feel more natural.

IV. IMPLEMENTATION



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The project is implemented in Python using several libraries, including:

- NLTK (Natural Language Toolkit) for text preprocessing (tokenization, lemmatization, stopword removal).
- SpeechRecognition for handling voice input and converting speech to text.
- JSON for storing predefined intents and responses.

➢ *Key Steps:*

- Loading and Preprocessing Intents: When the chatbot starts, it loads the intents from a JSON file. The patterns for each intent are preprocessed in advance to optimize performance during conversations.
- Handling Voice and Text Input: The bot prompts users to select between voice and text input at the beginning of the conversation. If the user selects voice input, the bot uses the SpeechRecognition library to listen to the user's speech and convert it to text.
- Matching Intent: The chatbot matches the preprocessed user input against the patterns stored in the intents JSON file. The matching is performed using set intersections, ensuring that the bot can recognize variations of user inputs efficiently.
- Generating a Response: Once an intent is matched, the bot generates a response by selecting a random reply from the options stored for that intent. If no match is found, the bot falls back to the default "invalid" intent.

V. CONCLUSION

The enhanced chatbot system presented here represents a significant improvement over the initial design by adding speech recognition capabilities to the existing text-based interaction model. Users can now interact with the bot through either typing or speaking, making the chatbot more flexible and accessible in various use cases. The preprocessing pipeline ensures that both text and voice inputs are handled consistently, providing robust intent recognition and response generation.

This project demonstrates how combining NLP and speech recognition technologies can create an engaging and dynamic conversational agent. By incorporating additional features such as machine learning-based intent classification and contextual memory for multi-turn dialogues, future iterations of this chatbot could become even more sophisticated.

VI. FUTURE SCOPE

While the current system provides basic functionality for both text and speech interaction, there is potential for future improvements:

- Contextual Understanding: Adding support for context tracking could enable the chatbot to handle multi-turn conversations more effectively. The bot could remember the context of previous exchanges and build on them in future interactions.
- Machine Learning Models: Implementing a machine learning-based approach for intent classification (e.g., using a neural network or transformer-based model) could improve the bot's accuracy in understanding user input, especially for more complex queries.
- Voice Synthesis: The next logical step would be to integrate text-to-speech functionality so that the chatbot can respond verbally to user queries, completing the voice interaction loop.
- Domain Expansion: The chatbot could be expanded to handle queries in other domains (e.g., healthcare, finance, or customer service) by simply updating the intents JSON file.

REFERENCES

[1]. Ms. Ch.Lavanya Susanna, R.Pratyusha, P.Swathi, P.Rishi Krishna & V.Sai Pradeep. (2020). College enquiry chatbot. *International Research Journal of Engineering and Technology (IRJET), 07*(3), 784-788.

[2]. Karanvir Singh Pathania. (2019). College enquiry chatbot. *Jaypee University of Information and Technology Waknaghat, Solan– 173234, Himachal Pradesh, Issue-May 2019*.

[3]. Ali Jboor & Maher Salaminon. (2021). Admission chatbot. *International Journal of Research and Development, Palestine Polytechnic University, College of IT and Computer Engineering*.

[4]. College enquiry chatbot using iterative model. *International Journal of Scientific Engineering and Research (IJSER), 7*(1), 80-83.

[5]. Sagar Pawar, Omkar Rane, Ojas Wankhade & Pradnya Mehta. (2018). A web based college enquiry chatbot with results. *International Journal of Innovative Research in Science, Engineering and Technology, 7*(4), 3874-3880.

[6]. Harsh Pawar, Pranav Prabhu, Ajay Yadav, Vincent Mendonca & Joyce Lemos. (2018). College enquiry chatbot using knowledge in database. *International Journal for Research in Applied Science & Engineering Technology (IJRASET), 6*(IV), 2494- 2496.

[7]. Jincy Susan Thomas & Seena Thomas. (2018). Chatbot using gated end-to-end memory networks. *International Research Journal of Engineering and Technology (IRJET), 05*(03), 3730- 3735.

[8]. Prof. Suprita Das & Prof. Ela Kumar. (2018). Determining accuracy of chatbot by applying algorithm design and defined process. In: *4th International Conference on Computing Communication and Automation (ICCCA)*, pp.1-6.

[9]. Prof. K.Bala, Mukesh Kumar ,Sayali Hulawale & Sahil Pandita (2017). Chatbot for college management system using A.I. *International Research Journal of Engineering and Technology (IRJET), 04*(11), 2030-2033.

[10]. Nitesh Thakur, Akshay Hiwrale, Sourabh Selote, Abhijeet Shinde & Prof. Namrata Mahakalkar. (2017). Artificially intelligent chatbot. *Universal Research Reports, 04*(06), 43-47.

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[11]. Amey Tiwari, Rahul Talekar & Prof. S.M.Patil. (2017). College information chat bot system. *International Journal of Engineering Research and General Science, 5*(2), 131-137.
[12]. Malusare Sonali Anil, Kolpe Monika Dilip & Bathe Pooja Prashant. (2017). Online chatting system for college enquiry using knowledgeable database. *Savitribai Phule Pune University, Preliminary Project Report*, pp. 153.
[13]. Balbir Singh Bani & Ajay Pratap Singh. (2017). College enquiry chatbot using A.L.I.C.E (Artificial Linguistic Internet Computer Entity). *International Journal of New Technology and Research (IJNTR), 3*(1), 64-65.