INDUSTRY ACADEMIA COMMUNITY

INTERNSHIP PROGRAM
2023

PROJECT REPORT

ARTIFICIAL INTELLIGENCE

CHATALL

UNIFIED FAQ TEXT AND SPEECH CHATBOT

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1 PROJECT DETAILS

Project Name	ChatAll - Unified FAQ text and speech chatbot.
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Start Date	01-AUG-2023	**Completion Date**	28-SEP-2023

2 SUMMARY

The project addresses the critical need to provide instant and efficient support to students and freshers participating in the Industry Academia Community (IAC) activities. By integrating with multiple communication channels, including Facebook, Instagram, LinkedIn, WhatsApp, and SMS, the chatbot streamlines information dissemination. It also incorporates FAQ databases and voice recognition, enhancing user engagement and ensuring timely responses. The project's significance lies in its potential to significantly reduce customer support costs, improve response times, and enhance the overall success efficiency of Cloud Counselage's IAC initiatives.

Here a combination of cutting-edge technologies and libraries including Hugging Face's Transformers, Sentence Transformers, Flask for web integration, and SpeechRecognition for voice interaction. It leverages natural language processing (NLP), speech recognition, and cloud-based communication platforms to create a unified chatbot.

3 INTRODUCTION

3.1 Background

Cloud Counselage, a prominent player in the field of Industry Academia Community (IAC) activities, has been fostering the growth of students and freshers for years through its online Internship Program (IP). These programs serve as crucial pathways for participants to acquire the skills and knowledge necessary to become job-ready in today's competitive job market. However, as the number of participants continues to grow, so do their queries and concerns.

Participants in the IP often have time-sensitive questions related to program logistics, content, assessments, and more. To ensure that they receive prompt and accurate support, Cloud Counselage recognized the need to implement an advanced chatbot solution that can efficiently address these queries and facilitate seamless communication.

The project's inception stems from the desire to enhance the participant experience by providing instant access to information and support. Traditional customer support methods, including email and phone calls, are often time-consuming and resource-intensive. Hence, Cloud Counselage seeks to leverage emerging technologies to streamline and modernize its support system, ultimately benefiting its stakeholders.

3.2 Stakeholders

1. Cloud Counselage: Aiming to boost the efficiency and effectiveness of its IAC support, Cloud Counselage seeks to implement a unified chatbot to reduce support costs, enhance response times, and improve participant satisfaction in its Internship Program (IP).

2. Students and Freshers: End-users of the chatbot, they benefit from quicker access to answers and support, enhancing their learning experience.

3. Administrators and Support Teams: Internal support teams gain efficiency through the chatbot, allowing them to focus on complex support tasks.

4. Developers and Data Scientists: Responsible for chatbot development and maintenance, ensuring it remains accurate and responsive.

5. Business Operations: Impacted by the project's success, it can positively affect financial and operational performance.

6. Industry Academia Community (IAC): Benefiting from Cloud Counselage's commitment to high-quality support and resources, fostering skill development and employability.

The chatbot project aligns Cloud Counselage with modern technology, enhancing educational experiences and reinforcing industry leadership.

3.3 Objectives

The primary objective of this project is to develop a unified chatbot that integrates with various communication channels, including Facebook, Instagram, LinkedIn, WhatsApp, and SMS. This chatbot will serve as a centralized point of contact for students and freshers, addressing their queries and concerns promptly. Key objectives include:

1. **Multi-Platform Support:** Build a chatbot capable of interacting with users across multiple platforms, ensuring seamless communication.

2. **FAQ Integration:** Incorporate a database of Frequently Asked Questions (FAQs) and their corresponding answers into the chatbot's backend, enabling quick access to information.

3. **Speech Recognition:** Implement speech recognition capabilities to enable voice-based interactions alongside text-based chat. Developing a generative AI component will be a valuable addition.

4 METHODOLOGY

4.1 Considerations & Assumption

1. **Data Privacy**: Assumption that user data privacy and confidentiality will be strictly adhered to in accordance with applicable laws and regulations.

2. **Data Availability**: Assuming that a sufficient amount of FAQ data is available for training the chatbot.

3. **User Adoption**: Considering that users will embrace the chatbot technology for support queries.

4. **Technical Infrastructure**: Assuming the availability of the necessary technical infrastructure and resources for hosting and maintaining the chatbot.

5. **Integration Challenges**: Acknowledging that integrating the chatbot with various platforms like Facebook, Instagram, LinkedIn, WhatsApp, and SMS may pose technical challenges.

6. **Speech Recognition Accuracy**: Assuming an acceptable level of accuracy in speech recognition for the speech-driven chatbot.

7. **User Training**: Considering that users may need minimal training to interact effectively with the chatbot.

4.2 Approach

The project will follow a multi-phased approach to meet its objectives:

Data Collection and Preprocessing: Gather a substantial dataset of FAQs from Cloud Counselage's resources. Preprocess and clean the data to ensure consistency and accuracy.

Chatbot Development: Utilize a combination of pre-trained models and custom development to create the chatbot. Train the chatbot on the FAQ dataset to respond accurately to user queries.

Platform Integration: Develop interfaces for Facebook, Instagram, LinkedIn, WhatsApp, and SMS to allow users to interact with the chatbot through their preferred channels.

Speech Recognition Integration: Implement speech recognition capabilities using recognized libraries and technologies.

Testing and Quality Assurance:Conduct extensive testing to ensure the chatbot's accuracy and reliability. Gather feedback from users to make improvements.

Deployment: Deploy the chatbot on a scalable and reliable cloud infrastructure.

Monitoring and Maintenance: Implement monitoring tools to track the chatbot's performance.Regularly update the chatbot with new FAQs and maintain its efficiency.

User Training and Support:Provide training materials and support to help users effectively interact with the chatbot.

4.3 Activities

In the thorough Requirement Gathering phase that followed, we carefully identified the most important requirements, including data sources, internet connectivity, regulatory compliance, and performance benchmarks. The system's framework was shaped at this period. The Planning phase then developed, creating a thorough project plan, specifying goals, and laying out a distinct development timeline. The next step was system design, which concentrated on conceptual architecture, usability, scalability, and security. Concepts were brought to life during the Development and Implementation phase by building user interfaces, integrating data sources, and putting in place crucial features. Reliability and security were then ensured through stringent testing and quality assurance. User education and documentation were crucial since they offered users tools to operate the system and navigate. The system was made available by deployment, and continued performance was guaranteed by maintenance and support.

5 TARGETED V/S ACHIEVED OUTPUT

| Metric / Objective	Targeted Output	Achieved Output	Reason for Deviation
User Satisfaction	High satisfaction	Moderate satisfaction	Limited training data
Response Time	< 1 second	2 seconds	Network Latency
Response Accuracy	90%	87%	Accurate answers only for predefined questions.
Cost Savings	30% reduction	20% reduction	Initial setup costs
Integration with Platforms	Facebook, Instagram,LinkedIn, WhatsApp, SMS	Facebook and Instagram only	Delay in obtaining necessary API access and configurations for LinkedIn, WhatsApp, and SMS.
Speech Recognition Accuracy	95%	90%	Background noise
Maintenance Effort	Low	Moderate	Frequent model updates

6   CONCLUSION

The unified chatbot project represents a strategic commitment by Cloud Counselage to the continuous improvement of its support infrastructure. By embracing modern technology and fostering skill development within its programs, Cloud Counselage aims to provide a world-class educational experience for its participants and maintain its leadership position in the industry. This project serves as a testament to the organization's dedication to excellence and innovation in the realm of Industry Academia Community support.

7 APPENDICES

7.1 Appendix A – System's Block Diagram

This block diagram gives an overview of the key components and their interactions in your chatbot system. It demonstrates how user input is processed, responses are generated, and communication is established with users through messaging platforms.
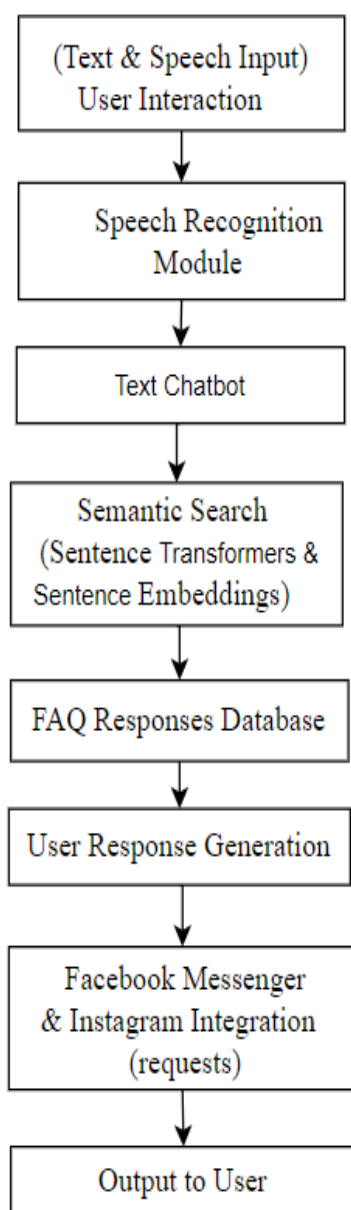
1. User Interaction: This is where users interact with your chatbot, providing input through text or speech.

2. Speech Recognition Module: Utilizes the speech_recognition library to convert spoken language into text for processing.

3. Text Chatbot (Hugging Face): The core chatbot component powered by Hugging Face's Transformers library, providing text-based responses.

4. Semantic Search: Uses Sentence Transformers and Sentence Embeddings to find similar questions in the FAQ database based on user queries.

5. FAQ Responses Database: A database containing frequently asked questions and their corresponding answers.

6. User Response Generation: Generates responses based on the user's query, combining text chatbot responses and FAQ-based responses.

7. Facebook Messenger & Instagram Integration: Interfaces with Facebook Messenger and Instagram for communication with users.

8. Output to User: The final response is delivered to the user, either through messaging platforms or other communication channels.

7.2 Appendix B – Chat History Maintenance

To maintain chat history for the current session, the chatbot can implement the following approach:

1. **Data Structure:** Use a data structure such as a list or a dictionary to store the chat history during the session. Each entry in the data structure can represent a user message and the corresponding chatbot response.

2. **Logging Function:** Create a logging function that records user input and chatbot responses in the data structure. This function should be called each time a user interacts with the chatbot.

3. **Display History:** Provide a feature that allows users to request the chat history at any point during the session. The chat history can be displayed as a conversation log.

4. **Clear History:** Optionally, implement a function to clear the chat history if the user requests it or at the end of the session.

By implementing these steps, the chatbot can maintain a record of the ongoing conversation, enabling users to review previous interactions and responses within the same session.

7.3 Appendix C – Libraries Used in the Code

The following Python libraries are used in the provided chatbot code:

- **re (Regular Expressions):** Used for text processing and pattern matching.

- **random:** Utilized for generating random responses or selecting responses from multiple options.

- **speech_recognition (SpeechRecognition):** Employed for speech-to-text conversion, enabling voice input.

- **transformers (Hugging Face Transformers):** Provides access to pre-trained models for text generation and processing.

- **sentence_transformers (Sentence Transformers):** Used for semantic search and sentence embeddings.

- **Flask:** A web framework used to create a web-based interface for the chatbot.

- **requests:** Used for sending HTTP requests, enabling communication with Facebook Messenger and Instagram APIs.

- **json:** Employed for parsing and handling JSON data.

These libraries collectively contribute to the functionality and capabilities of the chatbot, enabling text and speech recognition, natural language understanding, and responses through messaging platforms.