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AI College Enquiry Chatbot System

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Abstract-- In this paper, we present a college enquiry chatbot system designed to provide quick and efficient responses to student queries. The chatbot was built using natural language processing techniques and machine learning algorithms. We evaluated the performance of the system by testing it with a dataset of commonly asked student queries. The results showed that the chatbot was able to provide accurate responses in a timely manner. The system has the potential to save time for both students and staff by providing instant answers to commonly asked questions. Our study highlights the effectiveness of chatbot systems in educational environments and suggests the potential for future research in this area..I conversational assistant is a computer program that can be used for online interaction through text or voice messages. They can make human interaction contextual which leads to actual engaging interaction. Python's Rasa X is a framework that is a powerful tool in the creation of chatbots that can serve as a college enquiry system. This research study is focused on identifying the requirements for the development of a dynamic chatbot that supports text as well as voice-based interaction with the users.

Key Words: Artificial Intelligence, Rasa X, Machine learning, College enquiry chatbot, Human-computer interaction, Natural language processing, Speech-to-text.

1. INTRODUCTION

College students often need information regarding college such as timetable, upcoming events of college, about faculties, exam timetables, new assignments and projects with their deadline many more. The traditional way such as making phone calls, browsing the school website, or sending emails is inconvenient and time-consuming since you have to wait for a long time before you get an answer from the other side. If physical support is not available then calling doesn't help in some cases. Chatbots are changing the way of communication over the past few years it has been observed that most of the websites refer to chatbot interaction over actual physical calling support. So, a solution such as a VoiceChatbot is the easiest system to access for any user and is available 24 x 7. Anyone, Anywhere, Anytime without any problem can make use of internet connection and mobile device or other laptop devices to solve doubts. The objective of this research study is to identify the appropriate software components needed for developing a chatbot support system using Machine Learning and Natural Language Processing which can take input through voice as well as text and can easily extract intent and entity of user's message as it can be easily integrated with college website to provide precise and accurate answers to college-related queries by students or parents. To minimize the load of offices of universities and increase interaction between student and college without actually involving any physical human entity that can promote student engaging system with great user interface and quick response.

2. LITERATURE SURVEY

Authors Siti Nazurah Mohd Sau Pi, Mazlina Abdul Majid [1] identified six components of the Smart Chatbot Academic Model through an extensive literature survey from the years 2017-2020. They compared existing chatbot applications for university websites and identified their purpose, type, character, and the programming languages behind them. However as this was a research work, they were unable to validate the identified components and hence could not proceed with the designing and development of the proposed product.

Authors Yurio Windiatmoo, Ridho Rahmadi, Ahmad Fathan Hidayatullah [2] implemented a chatbot based on deep learning which could be integrated with Facebook Messenger to answer university-related queries. The evaluation results of the model gave nearly perfect scores of precision, recall, and F1 with fast response time. However, the chatbot had not been used operationally on campus and thus its effectiveness and ease of use for users could not be measured yet.

Authors Olusegun Lala, Temilola Okedigba, Halleluyah Oluwatobi Aworinde [3] implemented an admission enquiry chatbot using IBM Watson for rapid response to admission related queries. When evaluated with Botium, the chatbot gave an accuracy of 95.9% with optimal and real-time feedback. While the model was successful in most aspects, it could only answer text-based queries with no support for voice input.

Authors S. Kumari, Z. Naikwadi, A. Akole, P. Darshankar [4] implemented a voice and text-based chatbot which could answer admission-related queries. In addition to the previously implemented works, this chatbot allowed the users to express their satisfaction with the provided answers by pressing the like or dislike buttons. This data was stored at the backend which served as a guideline for the Administrator to improve the answers framed. However, it could not understand the user's query if there were any glitches in input due to human spoken language, like a grammar error or a context error.

Authors Koundinya Hrushikesh, Ajay Krishna Palakurthi, Vaishnavi Putnala, Ashok Kumar [5] implemented an online chatbot system for visitors to the college website based on the AIML language which is a type of XML that enables the

user to get academic information. The chatbot utilized WordNet calculation and grammatical form labeling to distinguish the feeling of the words. The main limitation of WordNet is that it does not

provide a clear distinction criterion between atomic and non-atomic lexical units due towhich the chatbot is unable to recognize more words.

Authors Neelkumar P. Patel, Devangi R. Parikh, Darshan A. Patel, Ronak R. Patel [6] developed an interactive university chatbot with a GUI similar to a conventional messaging application that could answer text-based queries with minimal response time and very few database hits. On the downside the chatbot worked well only if the user framed the query using predefined keywords; it provided default answers when synonyms of keywords were used.

Authors Kulkarni, Pradnya, Ameya Mahabaleshwarkar, Mrunalini Kulkarni, Nachiket Sirsikar and Kunal Gadgil [7] threw light on the latest research in the field of Conversational AI along with the improvements achieved over the traditional counterparts. They explored the three main components of Conversational AI along with their accuracy, methodologies, and drawbacks.

Authors Ralston, Kennedy, Yuhao Chen, Haruna Isah and Farhana Zulkernine [8] developed a voice interactive and multilingual chatbot that could effectively respond to the users' mood, tone, and language using IBM Watson Assistant for responding to users' needs regarding exam stress. While it was a novel approach to the existing works, it could provideonly about 76.5% accuracy.

Authors Xiong, Wayne, Lingfeng Wu, Fil Alleva, Jasha Droppo, Xuedong Huang, and Andreas Stolcke [9] enhanced their conversational speech recognition system based on Microsoft for Switchboard and CallHome domains by adding the CNN-BLSTM system. The resulting system had reduced error rates than its previous iterations.

The following table contains the comparison of variousexisting chatbot frameworks that were considered while designing the proposed chatbot.

A survey conducted by Braun, Daniel, Adrian Hernandez Mendez, Florian Matthes, and Manfred Langen [10] comparesthe NLU capabilities of the above frameworks. As chart-1 shows, Rasa ranks second overall and outperforms Watson and DialogFlow. This supported our decision to use Rasa as the framework behind our proposed chatbot.

Table -1: Comparison of Existing Chatbot Frameworks

Framework	Hosting Model	Pricing	Languages Supported
DialogFlow	Cloud	Free with optional enterprise plan	Vary by channel
Amazon Lex	Cloud	Pay per use	English
IBM Watson	Cloud	Varies. 10000 free transactions per month	English, Japanese
Microsoft LUIS	Cloud	Basic: Up to 1000 transactions per second; $0.75 per 1000	Vary for prebuilt entities and prebuilt domains

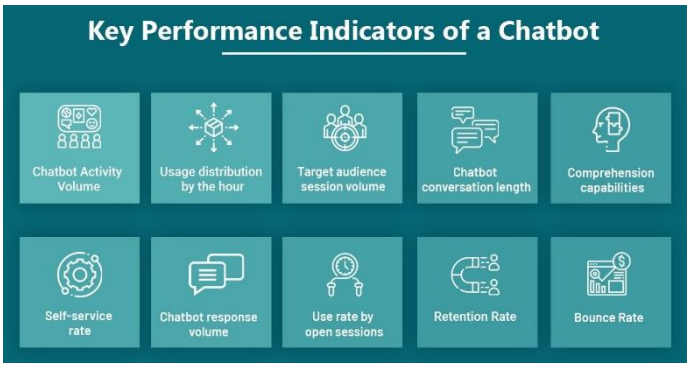

Chart -1: Performance Comparison of Chatbot

3. PROPOSED SYSTEM

The proposed methodology makes use of both qualitative and quantitative perspectives, and includes a broad array of approaches such as literature reviews, expert opinions, focus groups, and content validation. Students can enquire about facilities and query related to exams, academics, fee structure, etc.Students can also ask questions related to placement activities.

3.1 Project Scope

The chatbot is an AI-based chatbot that receives questions from users in audio or textual format, converts the audio intotext format, tries to understand the question by processingthe text using NLP, and finds an appropriate answer to the question. In natural language processing, human language isdivided into several pieces so that the grammatical structure of statements and the meaning of those pieces can be analyzed and understood in context to the whole conversation. This lets computers read and understand spoken or written text in the same way as humans. For example, when the chatbot receives the question "How manydepartments are there in the college?" it will answer "The college has 6 departments". The main objective is to reducethe burden on the college faculties by deferring the responsibility of answering the visitors' doubts regarding the college to the chatbot by creating a web-based chatbot that can be incorporated with the college website and can answer the users' text as well as audio-based queries. The goal is to provide visitors and faculty a quick and easy way tohave their doubts answered as well as offer the developers the means to incorporate new information in the chatbot's information repository.

3.2 User Classes and Characteristics

The two classes of users for this application based on the mode in which they query the chatbot are as follows:

1. Text- These users provide input in textual format by typing in the text box.
2. Audio- These users provide input in audio format which will first be converted into a textual format or the chatbot server to process.

3.3 System Architecture

Rasa is an open-source machine learning framework toautomate text-and voice-based conversations. It should provide us with all the functionality that we might need forimplementing the project. Rasa helps us build contextual assistants capable of having layered conversations with lotsof back-and-forths. Python's pyttsx3 library should be sufficient for converting audio into text.

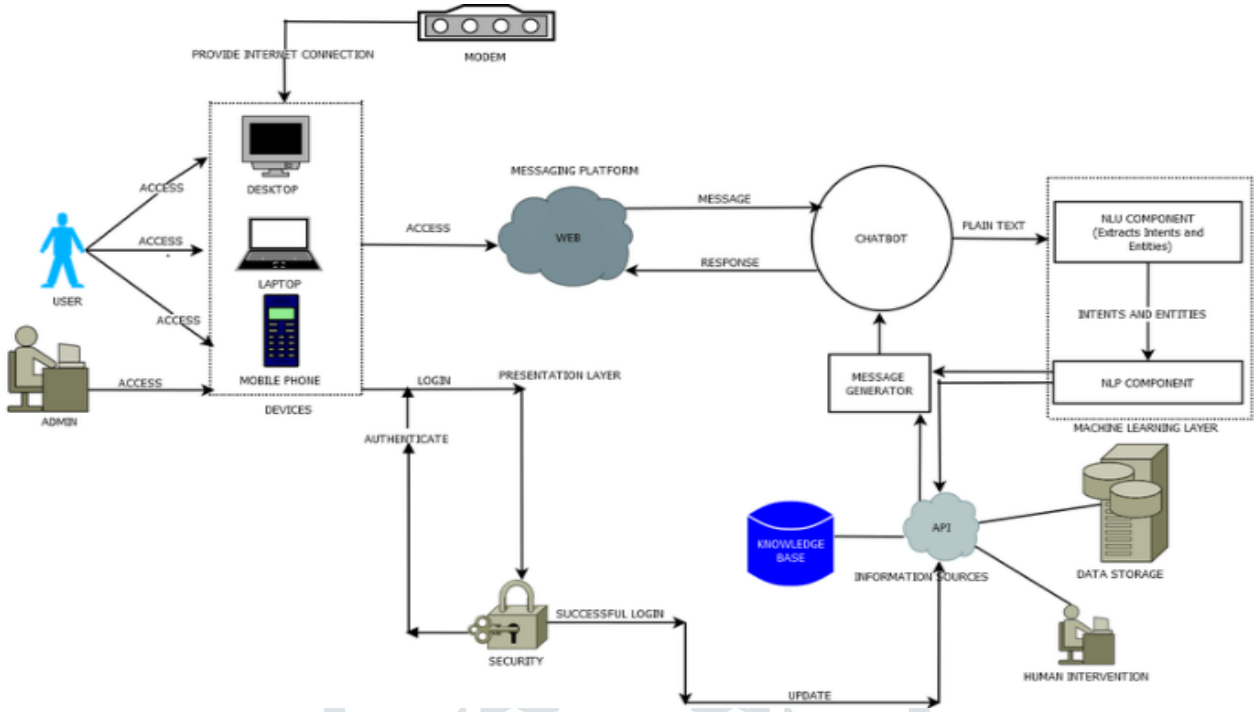

Fig -1: System Architecture

3.4 Functional Requirements

1. Users should be able to enter their query textually or inaudio format.
2. The chatbot should be able to process that query.
3. It should fetch an appropriate response.
4. It should be able to relay that response to the user.
5. In case the query is out of scope, provide a default answer.

3.4 Database Requirements

1. NLU Dataset with more than 100 examples for intent.
2. NLU Dataset with more than 100 examples for the entity.
3. Stories dataset with staring stories.
4. One dataset specifying Rules for the chatbot.

3.5 Software Requirements (Platform Choice)

1. Advanced Natural Language Processing. There are two options in the chatbot space: Click or AI.
2. Multilingual AI.
3. Easy Channel Integration.
4. Easy Backend Integration.
5. Enterprise-Grade Security.
6. Sentiment Analysis.
7. Hybrid Chat.

4. LIMITATIONS

The proposed chatbot does not support regional languages.It would be able to process and answer questions in Englishonly as it is the only language supported by Rasa NLU. spaCyis one of the default pipelines for processing user inputs in Rasa. While it works well when server capacity is low,demand for a higher configuration server to host the chatbotapplication might be a challenge.

5. CONCLUSION AND FUTURE WORKS

This research study proposes a college enquiry chatbot thatcan be integrated with a college website to interact with visitors and answer their questions about the college. The proposed chatbot will be able to accept both text-based as well as audio-based input from users. We have conducted acomprehensive literature survey to find the most appropriate chatbot framework and have referred to existingworks that could provide an insight into the domains of NLP and Conversational AI.

This research study is focused on identifying the requirements for the development of a dynamic chatbot thatsupports text as well as voice-based interaction with the users.

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