

Smart ChatBot for college information enquiry using Deep Neural Network

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Abstract— The project intends to create an interactive website and assist with navigation to a certain location inside the college. Information about the college, the administration, departments, activities, etc. is available on the GRIET (Gokaraju Rangaraju Institute of Engineering and Technology) website. It gives parents and students the information that requires. Instead of visiting the college for each inquiry, a chatbot application that enables students and parents to obtain information about the institution may simply resolve the issue online, saving a great deal. Using the flask framework, the chatbot model is coupled to the HTML (Hyper Text Markup Language) and CSS-coded (Cascading Style Sheet) website. A deep neural network is trained using PyTorch for the chatbot model. It is instructed on all of the frequently asked questions and typical queries. The chatbot is available at any time where parents and students can get the information. The navigator provides directions to an individual to the desired locations effortlessly in GRIET Organization.

Keywords— *interactive website, chatbot, HTML, CSS, deep neural network, PyTorch.*

I. INTRODUCTION

Websites are used by every industry, including those in the fields of health, e-commerce, finance, and IT services. Several developments have been made to the websites to make them more dynamic and engaging. To improve human-computer contact, conversational user interfaces (CUI) were created. These CUI later evolved into voice assistants like Google Voice Assistant, Apple's Siri, Alexa, and interactive chatbots. Voice assistants and chatbots are two types of conversational agents. With the help of voice

assistants, you can interact with the user interface through voice commands or speech-to-speech chats. Chatbots are graphical user interface (GUI) software that may be used on the web or mobile devices. They can respond to common questions and enable human-like conversations. Various chatbots are available like the ALICE bot which uses AIML (Artificial Intelligence Mark-up Language) and the program Eliza. Such a chatbot does pattern matching, which involves matching specific patterns.

A chatbot, also known as a chatterbox, Bot, Artificial Conversational Entity, or response engine, is a computer software designed to encourage spoken or written communication between intelligent human beings. Chatbots are effective natural language interfaces that allow users to carry out tasks without directly contacting human agents via phone calls or emails, and they naturally engage in conversation with users. Chatbots improve the efficiency of administrative officers' work and the standard of the student experience on educational websites. Chatbots would be created to answer questions about college facilities, staff, and locations. Chatbots are highly engaging and efficiently give responses that are appropriate to the user's inquiry.

The proposed chatbot integrated with the website provides answers to FAQs (Frequently Asked Questions), general queries, and all the relevant information about the GRIET organization. The website provides general information like administration, admission, departments, placements, social media contact details, and location navigator in GRIET.

II. LITERATURE SURVEY

Dr. Vishwanath Karad discussed the creation of an AI-based chatbot model for educational institutions in "Research Paper on Chatbot Development for Educational Institute, 2020." When a user enters a query, the system uses a knowledge base to check the entire question for pattern checking and utilizes natural language processing to respond. While Dr. Viswanath's method requires that the entire question be present in the knowledge base to receive a response, the proposed system tokenizes the query, extracts the root word from it via stemming, and responds to the query related to the root word in the database. A smaller database is needed to compare the Proposed System to Dr. Viswanath's [1].

The research paper "University Chatbot System using NLP" describes the working of a chatbot using cosine distance similarity measure with an accuracy of 83.17%. The proposed model is a deep learning model with a loss value nearer to 0.018. The suggested model is a more advanced learning model [2].

In "College Enquiry ChatBot Using Iterative Model" developed by Payal Jain a stop words-based human-PC framework is used. Payal Jain describes a database where all the related information is stored in a knowledge base and developed a web interface. The created database stores data about inquiries, answers, watchwords, logs, and criticism messages. The proposed system uses NLP(Natural Language Processing) techniques and Deep Neural Networks for storing the root words, matching the corresponding response, and giving output in the text as well as in speech. The proposed model consists of a small database compared to Payal Jain's which takes less time to respond to the user [3].

"College Enquiry Chat-Bot System", by Harshala Gawade, Vedika Patil, Prachi Vishe, Sonali Kolbe. A Chatbot is designed using a knowledge base and pattern matching (AI), it is a college-oriented intelligent machine that solves college-related queries. It only provides answers to knowledge-based-available inquiries. When a user submits a chatbot query, preprocessing occurs as the next phase, followed by a keyword match against the knowledge base to produce the response. The response is provided to the bot and is appropriately worded for the user. The suggested model utilizes deep neural networks that interact with the user effectively [4].

The research paper "GALGOBOT – The College Companion Chatbot" describes the development of a chatbot using the RASA framework and Mysql database using the XAMPP (X-operating system, Apache, Mysql, Php, Perl) server. The chatbot is integrated with a website using webhooks. GALGOBOT uses HTML, CSS, AJAX (Asynchronous JavaScript And Extensible Markup Language), jQuery, JavaScript for the front end and PHP(Hypertext Preprocessor), and Python for the back end. The proposed website is developed with HTML, CSS, and javascript and the data is stored in JSON (Javascript Object

Notation) intent file. The proposed chatbot is developed with NLP techniques. Updation of the database in GALGOBOT is more complex than the proposed model [5].

The model in "AI and Web-Based Human-Like Interactive University Chatbot (UNIBOT)" makes use of HTML, CSS, and jQuery. The PHP file uses Ajax to receive a response, and jQuery is used to show the user's messages. The project deals with the user's request in form of a question-based message and processes it to deliver a desired response in form of a message/text. Compared to the UNIBOT system, the proposed system uses advanced techniques like Stemming, Tokenizing, and Bag of words from the Natural Language Processing (NLP) and Deep Neural Network model, It also outputs both text and speech and requires less processing time [6].

"Human-Computer text conversation through NLP in Tamil using Intent Recognition" research paper describes the development of a college website with student details and an interactive chatbot. The chatbot is developed with an NLP agent, intents database, and entities to extract useful data from input. Google translate API (Application Programming Interface) is used for the conversion of English language-based inputs and outputs into the Tamil language. Webhook is used to integrate the chatbot with the website [7].

III. PROPOSED MODEL

The existing system is less interactive than the proposed model, and also it does not contain the chatbot application that has been included in the proposed model. And It does not have a navigation facility too. The proposed system is designed for students and parents to know about college effectively and easily online. It gives information about the college, administration, events, departments, etc, on the website. Where the website is created using HTML, CSS, and javascript as the front-end. Modules included in this website are the home page, Administration, Admission, placements, Contact, Departments, Chatbot, and Navigation. The home page is the beginning of the website. It contains the vision, mission, and objective of the college. The course contains details for specific branches and the relevant courses that are available in the college. Download shows different textbooks to the user that can be easily downloaded and accessed by the user. Contact allows registered users to give feedback such as suggestions or complaints and contains contact details. Navigation is also included on the website which is developed using HTML and CSS. It provides directions to the individual to the desired locations effortlessly in GRIET Organization. By clicking on the map of the respective location one can get directions easily on the website itself. Natural language processing(NLP), and PyTorch are used to build a chatbot that answers all queries. Here the chatbot can take text as the input and provide text and speech as output, where the pyttsx3 library is used for Speech Recognition.

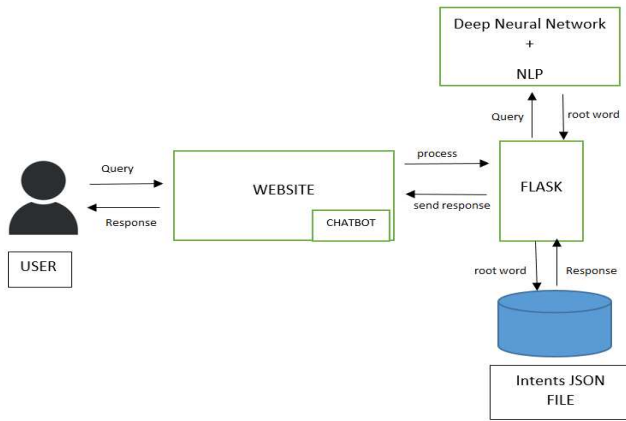


Figure 1: System Architecture

The System Architecture (Figure 1) follows from the user visiting the website or giving a query to the Chatbot. The query is processed through NLP and Deep Neural network then responded to the website through flask integration.

A. Execution steps

The following steps can be followed to use the website and chatbot:

1. Go to the GRIET website
2. Look up the necessary information on the webpage.
3. If the relevant information cannot be obtained, select the chat icon at the bottom of the website. Opens the chatbot application
4. Type the necessary query and press the send button.
5. The chatbot evaluates the inquiry, identifies the root words, selects the best tag from the backend, and then displays the responses relevant to the estimated tag.
6. The user receives the required reply.

B. Database

The database is created to store datasets (JSON Intent file) of the form tag, pattern, and responses that assist the chatbot in retrieving and responding to specific requests. Tags (root word) are a collection of uniform inquiries. Patterns are queries about particular tags. Answers are provided in response to the pattern questions. The output is the responses.

C. Chatbot

The chatbot takes the user's request as the input, analyzes the input query, processes the query with a trained neural network model, identifies the suitable tag, and answers the responses of the tag. The data is saved in form of tags, patterns, and response datasets.

D. Navigation

The location navigator provides quick access and directs to the various important locations in GRIET Organisation.

IV. IMPLEMENTATION

This project's primary goal is to provide answers to numerous college-related problems. The implementation makes use of the following applications, modules, or frameworks:

a) WebDesign

An important component of any system is the Graphical User Interface (GUI). With the aid of HTML, CSS, and Javascript, the main page, Administration, Admission, placements, Contact, Departments, Chatbot, and Navigation have been developed for the UI of the Model.

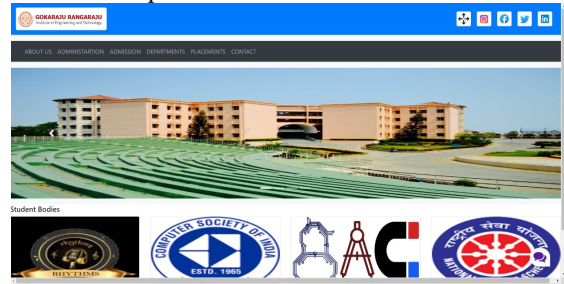


Figure 2: UI of Model.

Figure 2 depicts the Model's UI (User Interface). JavaScript is used to call the Chatbot framework and receive a response from it, while HTML, CSS, and Java are used to construct the front end. Python is utilized to create the back end, and JSON is employed as the database format.

b) NLTK

Natural Language Tool Kit (NLTK) is a toolkit designed for Python-based NLP operations. Numerous text-processing packages and test datasets are included in NLTK. Using NLTK, a variety of activities are carried out, including the tokenizing and parsing tree.

In the proposed system following methods of NLTK are applied to the input query that is provided:

- **Tokenizing:**
Tokenization converts a sentence into an individual collection of words. It follows a Structured process.
- **Stemming:**
Finds the root word of the given word.
- **Bag of Words (BOW):**
It is an algorithm that turns the text into vectors of fixed length. This can be done by keeping track of how frequently a word appears in a document.

c) Deep Neural Network

Deep learning is a branch of machine learning that uses artificial neural networks and a set of processing layers to extract increasingly more complex properties from data. All the relevant information, FAQ, and general queries are written as intents data, The deep neural network is trained on the data and the model is saved with the PyTorch library as "data.pth".

d) Flask

Python-based Flask is a web application framework that gives you the tools, libraries, and technologies you need to create a web application. Flask integrates the website with the Pytorch model of the chatbot.

V. RESULT

A chatbot system has been built to satisfy the users' general and academic needs about GRIET. A chatbot can simulate or generate a response from the predefined intents data. The responses that the Model predicted are being retrieved via Javascript code. When a user asks a question in the chatbot, the question is examined, and handled by the model, and the response is retrieved from intents (database).



Figure 3: GRIET Website

The System website (figure 3) provides all the general information about the GRIET organization. It has modules: administration, admission, departments, placements, chatbot, social media contact details, and location navigator in GRIET.

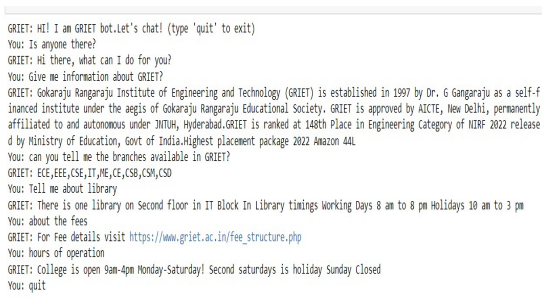


Figure 4: Chatbot Response

Figure 4 describes the responses by the chatbot to the user's queries in the form of text and speech.

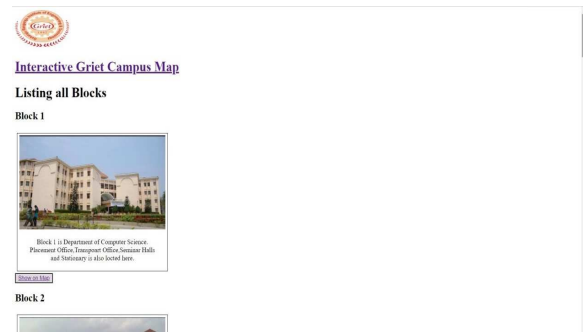


Figure 5: Navigator

The GRIET Organization's location navigator(figure 5) offers easy access and directions to all of the key locations.

VI. CONCLUSION AND FUTURE SCOPE

A chatbot is an easy and flexible tool to get the required information in less amount of time. Usually, users may not find the required information easily on the website, in this case, the chatbot will be a great help. The project successfully built the chatbot for the GRIET organization.

The scope of the chatbot can be expanded in the future to enhance its existing functionalities by expanding the data about the GRIET organization, implementing a more complex model to improve the performance and making the chatbot take the input in speech format, and testing it on a live website.

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