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Smart College Enquiry Chatbot Using Deep Learning Algorithm

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ABSTRACT

A type of human computer dialogue system known as a chatbot uses natural language processing to communicate with users via text, speech, or chat. It is primarily used to increase conversion rates and is built to handle millions of requests at once. Natural language input activates a category of intelligent, conversational software algorithms known as chatbots. A chatbot is an interactive artificial intelligence computer that analyses user input and texts to choose the best course of action. The chatbot was created using a deep learning model and algorithms for natural language understanding. Natural language processing methods like tokenization and lemmatization are used to process the question. The Deep Neural Network (DNN) algorithm receives the processed query after spelling correction. The suggested chatbot will use a sequential DNN model with five hidden layers to search the knowledge base for the appropriate response to the processed inquiry. The suggested strategy will assist in directing individuals inside the campus to various blocks via links to Google Maps and inside the blocks via text directions. The model has a 98.2% accuracy rate.

Keywords: Deep learning, Navigation, Artificial intelligence, CNN, Natural language processing, Chatbot

1. Introduction

A chatbot was a computer programme that could converse with people naturally, much like humans do in real life. For many duties like responding to inquiries, it can take the role of a person. An agent who converses with users in straightforward English is known as a chatbot. It had been constructed in an effort to deceive people. Machine learning is a key component of chatbot success in AI, enabling them to understand user queries and provide the right response. [1]. A chatbot for the college management system has been developed using AI algorithms that look at user inquiries. To react to the user's questions, artificial intelligence has been implemented. The user can then obtain the appropriate answers to their concerns [2]. For quick, accurate, and always-available answers to questions, a chatbot is required. Deep learning uses high-level, abstract modelling techniques on data to change nonlinear functions, which are layered and intricately interconnected [3]. A user must typically start a new topic or ask a question for a chat bot to function. Software agents that simulate an entity, typically a human, include chat bots. These programmes use artificial intelligence to comprehend user input and give thoughtful responses based on predetermined knowledge bases [4]. Command line, graphical user interface (GUI), menu-driven, pattern, natural language, etc. are all examples of user interfaces that can be utilized to operate software programmes. Although GUI and webbased are the two popular user interfaces, there are times when a different user interface is required. This area is well suited for a chatbot-based conversational user interface [5]. To work with this generation of pupils, instructors now face a significant hurdle. Additionally, students who are more interested in online learning tend to have the ability to view the study materials non-linearly. This conclusion was reached after a thorough investigation into the various navigational strategies used by pupils to function in a virtual environment. [6]. To improve conversation comprehension, a multi-resolution RNN is used to represent high-level course and natural language tokens [7]. Contrary to the traditional conversation systems like ELIZA, which are largely built with hand-crafted rules, researchers have recently started to develop principled and data-driven approaches to build open domain conversational systems due to the advantages of the large scale social conversation data that is publicly available and the rapid advancement of deep learning approaches. [8]. Non-task centred chatbots are gaining popularity recently, and the secret to creating a chatbot is learning how to respond to messages in an appropriate (human-like and natural) manner. The approaches currently in use are either retrieval based or generation based [9]. Nevertheless, because there is still a problem with the language's library, the server's development is not complete. If text recognition is possible for chatbots to learn from, an AI will be able to respond to messages more accurately. Tensorflow training enhances the accuracy of these chatbots using the convolution neural network technique [10].

AI is used by chatbots to create a false intelligence that enables them to understand human questions and respond appropriately. Long Short Term Memory (LSTM) networks, a particular type of recurrent Deep Neural Networks, and Natural Language Processing (NLP) networks are used in this system to deliver valid answers to the users' varied inquiries (DNN). This consists of software that will help the user converse with a machine by leveraging artificial intelligence. The remaining of paper as follows: section-II presents proposed system with methodology. Section-III propounds results and discussion and finally, section-IV concludes the paper.

II. Proposed Work Explanation

  The necessity for traditional websites to have a chat feature, where a bot is needed to be able to communicate with users and address their questions, is what spurs the development of chat-bots. A user can get their question answered at any moment. The drive to adopt a College Enquiry Chat-bot is driven by all of these benefits of a chat-bot. A retrieval-based chatbot that uses AI principles to have conversations with people could be the subject of a student Chabot project. Through the chatbot that is used for talking, users can simply ask questions. There is no required conversation format; students are free to use any format they choose. The responses are relevant to the user's inquiries. If the answers are discovered to be unreliable or unavailable, the admin essentially creates an unanswered table where the queries are stored. In case of emergency, we are just providing a message that reads, "Our representatives can get to bear with you shortly." Subsequently, those queries will be updated by the admin.

  Long Short Term Memory (LSTM) networks, a particular type of recurrent Deep Neural Networks, and Natural Language Processing (NLP) networks are used in this system to deliver valid answers to the users' varied inquiries (DNN). This approach can make it easier for the user to receive updated relevant notifications. The user won't have to spend a lot of time looking for the right notices. System architecture is represented in Fig.1.
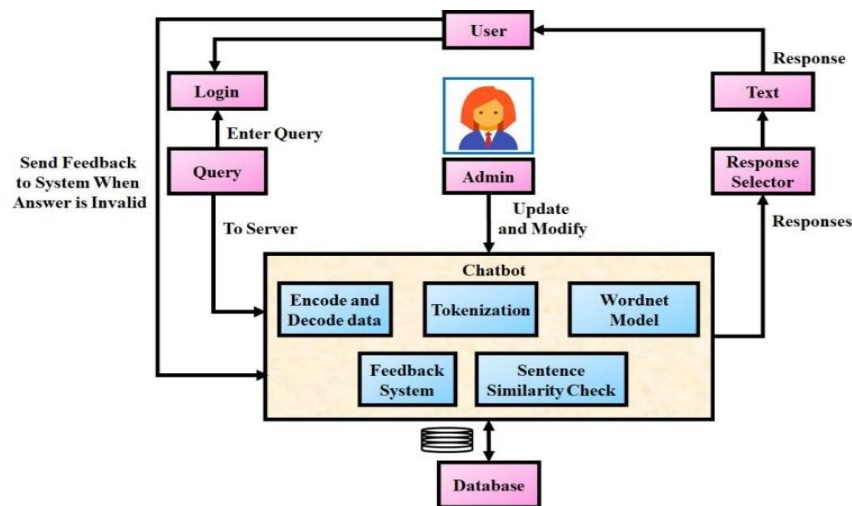

Fig.1 System Architecture

2.1 Database

  To answer the users' questions, the database contains a variety of intents and entities. To respond to user navigation-related inquiries, the database has been supplemented with 70 intents as part of the proposed technique. These intentions have been developed to include all of the necessary instructions. To respond to a specific college's navigational questions, a data collection was manually produced. It can be distributed by the writers upon request. Tag, pattern, and response are the three components that make up the intent. Tag aids in categorising the query. Sections of user communications are matched using message patterns.

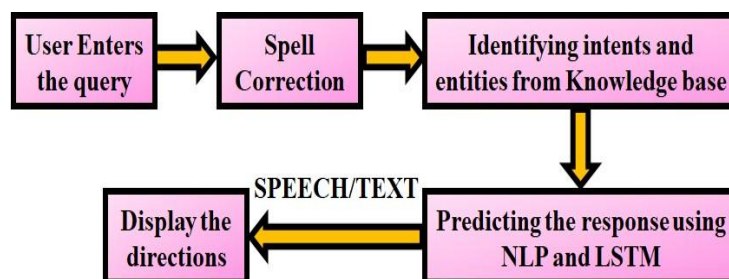The user will see the response once the query has been matched.

Fig. 2 Chatbot methodology

2.2 Pre-processing

  First, the labels are transformed into lists, and then the label encoder included in the sklearn.preprocessing package is used to accomplish the encoding. Tokenization divides the text pieces into tokens. After completing the tokenization process, the text is processed. The word index method is used to give each word a value.

2.3 Model Development

The five hidden layers of the sequential model are applied. The patterns and labels were used to train the model. The chatbots architecture diagram is shown in Fig. 3. The proposed model is trained using data that has been pre-processed using the tokenization and lemmatization techniques. To predict the appropriate label for a given pattern, the model is trained on labels and patterns.
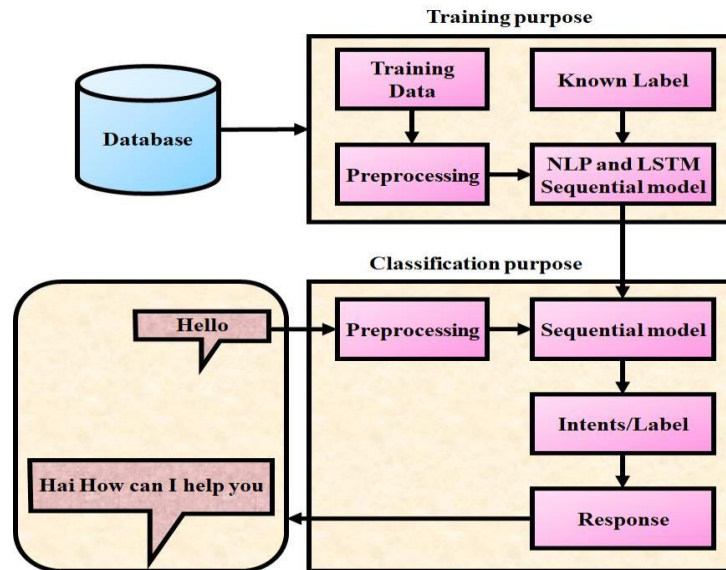

Fig. 3 Chatbot architecture

2.4 Algorithm for Model Training

A loaded intentions knowledge base is available. This file's data is pre-processed before being used. We'll keep all of the intents' tags in a list named labels that will be used for training purposes. Train the sequential model following the numerical transformation of the labels and patterns. The model was evaluated using 20% of the data after training on 80% of the data. If the model doesn't produce good results, keep repeating this training.

Step 1: Start.

Step 2: Load the intents.json file.

Step 3: Perform data cleaning.

Step 4: Store the tags of the intents.

Step 5: Convert the labels and patterns into numerical form.

Step 6: Create a sequential model.

Step 7: Add the 5 hidden layers with ReLU activation.

Step 8: Compile the model.

Step 9: Train the model on labels and patterns.

Step 10: Now test it with some input.

Step 11: Stop 3.5 Integration Flask web framework is used to integrate the frontend of the chatbot with the trained model.

Natural Language Processing (NLP) and Long Short Term Memory (LSTM) networks, a specific type of recurrent Deep Neural Networks, will be used in this system, which is essentially a web application that offers valid answers to the various inquiries of the users (DNN). They have finished developing a rather clever Chabot for fundamental college-related questions, including admission-related questions in particular, based on NLP and DNN. A solid understanding of text, signs, and semantics is required for NLP systems. The NLP system uses a variety of techniques to comprehend text and symbols.

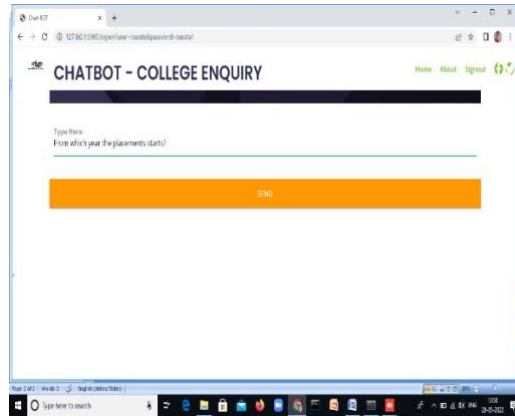## III. Results and Discussion

- ▪ Admin Login

- Add query and dataset
- User Login
- Asking Queries
- Providing feedback

Fig 4. User Registration

Fig 5. User Login Page

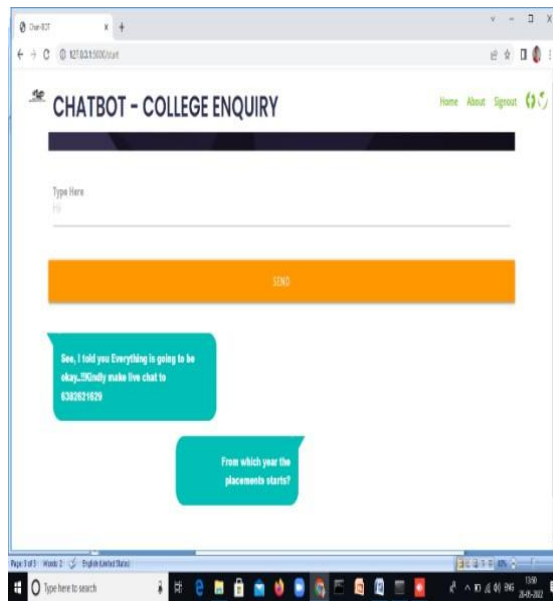Fig 6. Chat Application

Fig 7. User Ask Question
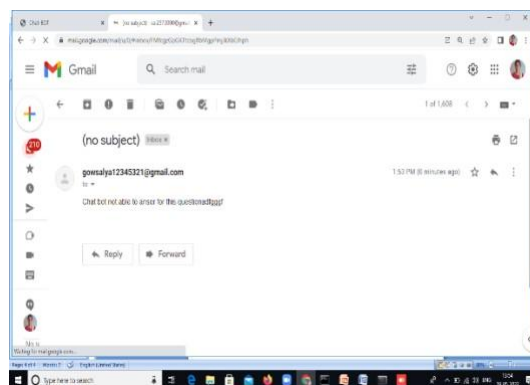

Fig 8. Admin Reply Answer

Fig 9. Feedback Manager

3.1 Modules Description

3.1.1 Admin Login:

System only has one administrator (there is no registration for admin). The administrator must log in using their username and password. The admin who is in charge of keeping the college chatbot system up to date has a number of tasks to complete, such as adding the query to the database, altering the data, deleting the data, viewing user feedback, and so on.

3.1.2 Add Query And Dataset:

If the administrator adds the dataset, the chatbot offers three ways to add the query: by adding a question, by adding a response, or by choosing the category that the dataset belongs to. If the administrator views the dataset, the chatbot enables seeing the dataset by category.

The chatbot also offers the two extra alternatives of deleting and editing the dataset.

3.1.3 User Login:

The user is welcomed by the chatbot system, which then asks them for their login information. Then, the user and the chatbot begin a conversation.

3.1.4 Asking Queries:

The chatbot system will ask the user to enter their question in words if they are not pleased with the rule-based response, and the chatbot will then provide the appropriate response. The database is first verified for the user's query. The user receives an acceptable response if the query is genuine. If the question is unfounded, the chatbot invites the user to ask questions about the college.

3.1.5 Providing Feedback:

After the chat, the chatbot requests user input. Feedback is gathered to learn how users feel about the chatbot.

IV. Conclusion

The proposed system is used to deliver responses in relation to user input. User-submitted questions will receive responses from this system. The primary goals of this project are to create an interface and a database that will record data on questions, responses, keywords, and questions that aren't valid. Reduced workload for college employees and faster user query responses are two additional major goals. They have suggested a web-based chatbot system that combines Deep Learning-based techniques for this. It virtually always provided the consumers with the right answers to their concerns. For this chatbot system, performance and accuracy are very important, and response time is also quite fast.

Future enhancement

Can be used in online college counselling in future.

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