Travelling Chatbot

Ashutosh Nagawade[1], Siddhesh Sawant[2], Yash Kalokhe[3], Vaibhav Dahitule[4],

Mrs. Dipti Chaudhari[5]

[1,2,3,4]Undergraduate Students, Department of Computer Engineering, Dr. D.Y Patil Institute of Technology,Pimpri Pune -411018[1-4]

[5]Mentor, Department of Computer Engineering, Dr. D.Y Patil Institute of Technology, Pimpri, Pune-411018[5]

Abstract: This paper presents an innovative approach to developing a travel application for Android mobile phones that integrates a retrieval-based chatbot. The primary goal of our system is to provide convenient and reliable information about tourist places and accommodations in Pune. By incorporating internet map and hotel/resort booking services, we aim to enhance the overall user experience. Additionally, our proposed architecture includes a retrieval-based chatbot that offers 24/7 customer support, emulating real-person interactions. The chatbot assists users with their inquiries related to the application, ensuring user-friendly communication. Our system strives to empower travel enthusiasts by enabling them to discover the best accommodations and navigate easy routes, ultimately enhancing customer satisfaction.

Keywords: Artificial Intelligence, Deep Learning, Chatbot, Android, Travel.

I.   INRODUCTION

Tourism is a prominent industry in the global economy, contributing approximately 11% to the global gross domestic product (GDP). Travelers increasingly rely on obtaining comprehensive information prior to visiting specific destinations. Consequently, tourists often turn to the internet for assistance. While the internet offers a vast amount of travel information, there is a challenge in ensuring its accuracy and reliability. Moreover, the travel industry faces the high expectations of customer support. As a consumer-centric industry, customer satisfaction is of utmost importance. To address these challenges, we propose the development of an Android-based travel application featuring a chatbot that delivers accurate information and exceptional customer service throughout the day.

A chatbot is an artificial intelligence-powered software solution designed to understand and respond to human communication. These chatbots aim to replicate human interactions convincingly, interpreting questions, commands, or user input to generate appropriate responses. Chatbots serve as digital customer service agents, typically engaging users through text chat communication or voice-based assistance. By leveraging deep learning, a branch of machine learning and artificial intelligence, chatbots can learn from data and human conversations. This enables them to acquire knowledge from text and effectively respond to user queries. [1]

II.   LITERATURE SURVEY

Chatbot interfaces can be categorized into various types, including AI chatbots. AI chatbots utilize text/dialogue-based or voice-based assistance to connect users with desired information, replicating human-to-human conversations. Text-based chatbots are commonly employed on websites and social media platforms to facilitate customer assistance, while voice-based chatbots are prevalent in over-the-phone customer support. AI chatbots, leveraging advancements in artificial intelligence, have gained significant recognition.
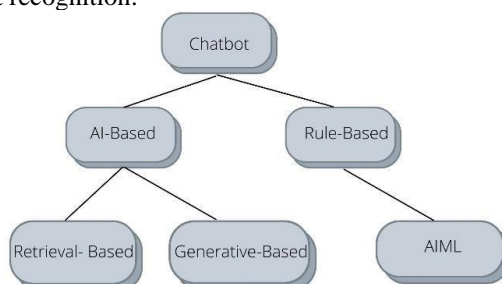

Fig .1. Types of Chatbot

Among the techniques employed in deep learning chatbots is the retrieval-based approach. This technique operates on the principles of graphs or directed flows, wherein chatbots provide the most suitable responses from a database of predefined answers. Responses are determined based on available information, employing methods such as keyword matching and deep learning. The retrieval model relies on data retrieval, resulting in fewer errors. However, its rigid nature limits the generation of novel outputs, as it primarily relies on predefined responses.

ii. Generative-Based Chatbots

An alternative approach to deep learning chatbots is the generative-based method. Unlike retrieval-based chatbots, generative chatbots generate language responses instead of selecting from pre-defined answers. This type of chatbot can be built using the Seq2Seq model, also known as the encoder-decoder model, which utilizes long-term and short-term memory (LSTMs) to generate text based on the training dataset. The Seq2Seq model is widely used in machine translation applications and predicts subsequent words based on the probability of their occurrence following the user's input word.

B. Rule-Based Chatbots

Rule-based chatbots operate on a tree flow structure and do not rely on AI. Instead, they guide users through a series of questions to identify the appropriate solution. All conversation structures and responses are predefined, giving users control over the conversation. To ensure effectiveness, questions asked to rule-based chatbots should be direct and simple. These chatbots can be implemented using simple or complex codes but strictly adhere to the predefined code protocol. A common approach for rule-based chatbots is AIML (Artificial Intelligence Markup Language), an XML language used to define the conversational abilities of the chatbot. AIML can be used in conjunction with a Natural Language Understanding (NLU) processor to interpret text-based questions and generate responses.

III. PROPOSD METHOD

Our proposed system employs a retrieval-based chatbot, which is well-suited for addressing queries and questions in the travel application. With existing information, the system generates responses manually. The chatbot is designed to provide relevant and suitable answers to frequently asked questions. This method is particularly suitable for tasks such as booking, ordering, and customer support.
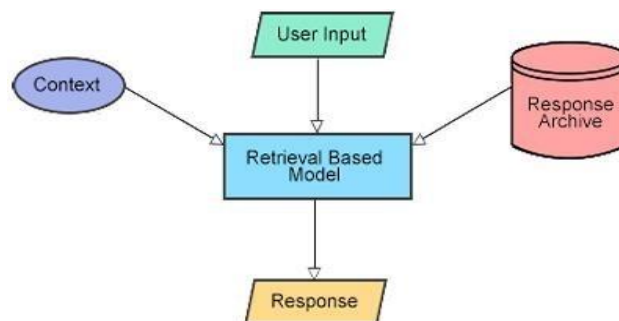

Fig .2. The Architecture of the Retrieval-Based Chatbot System

The figure above illustrates the architecture of the retrieval-based chatbot system. Users input their questions, which are processed by the system to search for an appropriate response. The system matches the user query with a set of pre-existing queries stored in the archive. This chatbot system is trained on a dataset of patterns and responses, utilizing LSTM, a specialized recurrent neural network, to determine the pattern to which the user's query belongs. A response is then generated from the archive of responses.

IV. METHODOLOGY

The chatbot is trained using a dataset that contains various types of patterns and corresponding answers. The retrieval-based chatbot can be developed using NLTK, Keras, and Python programming languages. The methodology involves the following steps:

Step 1. Import and download data files

JSON file: Contains predefined templates and responses.

Step 2. Data pre-processing
When working with text data, pre-processing is performed, including:

Tokenization: Breaking the text into individual words.
Case folding: Treating all characters as lowercase and removing certain punctuation marks such as '!' and '?'.
Stemming: Reducing words to their base form by removing suffixes and prefixes, such as converting "Lemme" to "let me".
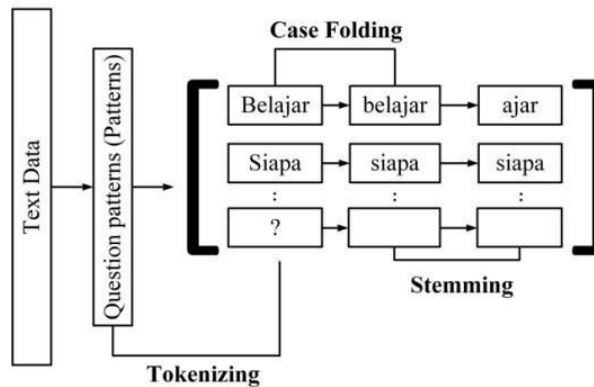

Fig. 3 Stemming Process

Step 3. Feature Extraction:

To extract features, we employ a keyword-based approach that analyzes the keywords present in the document and their frequencies.

Step 4. Build the Model:

We utilize a deep neural network (DNN) model, which consists of multiple layers between the input and output layers, resembling the complex neural structure of the human brain. The DNN performs mathematical computations on the input data to determine the probabilities of each node being true or false. Determining the number of hidden layers and neurons for each layer is a challenge in building deep neural networks. Our proposed DNN model comprises three hidden layers, each consisting of ten neurons. We employ the Soft-max function for data categorization using a direct classifier. The training process involves utilizing a thousand five hundred epochs, where each epoch represents one cycle through the full training dataset. Training a deep neural network typically requires more than a few epochs. With the provided data, we train the neural network to classify sentences of words into tags specified in our file.

$\sigma(Z)$
$i = e^{z_i}$
$\sum e^{z_j}$
σ = Soft-max
e^{z_i} = standard exponential function for an input vector
K = number of classes in the multi-class classifier
e^{z_j} = standard exponential function for output vector
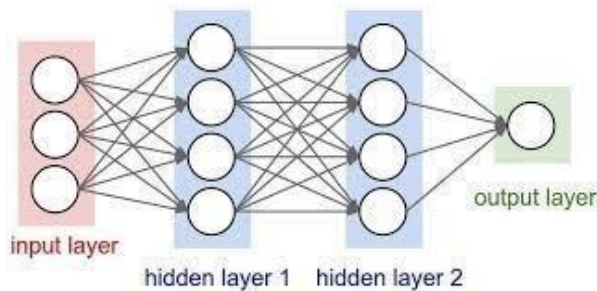(Z) = input vector

Fig. 4 Deep Neural Network

Step 5. Predict the Response:

After the modeling phase, the chatbot system utilizes the created model to make predictions based on the input messages. The output of the estimation includes the label order and response label weights. The label is used to search for matching answers, and one answer is randomly selected from several potential answers. The selected answer is then forwarded and displayed to the user.
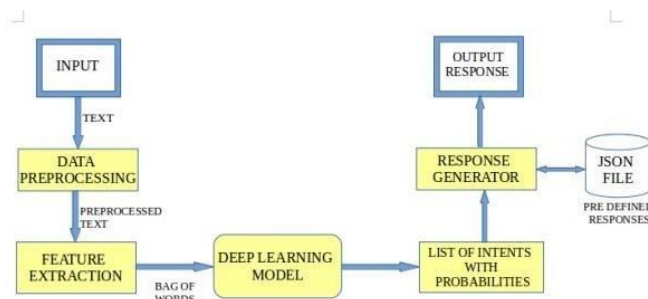

Fig. 5 Overview of Retrieval-based Chatbot

V.   SOFTWARE DESCRIPTION

A. Android Studio:

Android Studio is a software used for creating, running, and designing Android applications. It supports all APIs required for application development and provides an emulator for testing purposes. Multiple virtual devices can be created, and the
software includes a built-in Google Cloud Platform. Android Studio is free of cost and user-friendly.

B. Firebase:

Firebase is a Google platform used for developing mobile and web applications. It enables secure access to databases from
the client side and can be downloaded and used without any cost. Firebase facilitates the development of applications with
reliable database access.

C. Google Maps:

Google Maps consists of APIs and SDKs that assist developers in integrating Google Maps into mobile applications.
It particularly useful for creating location-based applications.

V.   CONCLUSION

In summary, we have presented a unique design for an Android-based travel application featuring an AI-driven chatbot that offers users convenient access to travel information. This application caters specifically to tourists visiting Pune and provides comprehensive details, including images, of various tourist attractions. Additionally, the application integrates a user-friendly hotel and resort booking service. The chatbot acts as a reliable customer service representative, ensuring users receive prompt and accurate assistance round the clock.

Chatbots serve as effective tools for facilitating human-machine communication, enabling users to receive quick responses without any delays. Our app incorporates a chatbot system that generates a log of questions and answers, mimicking a natural conversation between users and the chatbot. By employing keyword matching techniques, the chatbot identifies relevant keywords from user queries and delivers meaningful responses or displays similar answers. The presence of such a chatbot greatly enhances the convenience and usability of the application.

Overall, the proposed travel application with its AI-powered chatbot offers a seamless user experience, making it a valuable resource for travel enthusiasts seeking comprehensive information and reliable customer support.

VI.   REFERENCES

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