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Smart Tourist Guide using Machine Learning

Prof. R. M. Kawale^[1], Mukund H. Sutar^[2], Ayubkhan D. Nadaf^[3], Vishal M. Chormale^[4], Siddheshwar G. Pawar^[5]

“Information Technology Department, Savitribai Phule Pune University

PDEA's College of Engineering Manjari (Bk), Pune – 412307 (Maharashtra) India

Abstract— This study investigates the notion of developing a travel application for Android smartphones that includes a retrieval-based chatbot that can facilitate users. About all the tourist attractions in Pune, our system offers accurate and trustworthy information and an online map. A retrieval-based chatbot system will also be included in the suggested design, which will enable it to offer people in need, to make the program more user-friendly, the system will offer text help so that users may converse with the bot. We identified that many different websites offer different kind of services. Websites offer bookings services but no way to discover places the tourists may visit. This bot will only respond to inquiries about the application and direct users so they may operate it without difficulty. Our approach will inspire all other tourists to seek out the simple routes, and will significantly raise consumer happiness, and retention.

Keywords— Retrieval, Deep Learning, Chatbot, Android

I. INTRODUCTION

Currently, tourism is the strongest and largest business in the world economy, accounting for 11% of Gross Domestic Product (GDP) worldwide. Nowadays, a lot of tourists prefer to make a quick selection after gathering all the necessary background data.

And as a result, tourists look online for assistance. Tourists may get a lot of comprehensive travel information online. The issue is that while exploring the internet, tourists may not always find accurate and trustworthy information. It is often essential for travellers to consult with experts, natives, or friends about which tourism attractions to visit at their desired destinations (e.g., where to go, where to stay, and how to get there, Customs and Immigration rules, warnings, and so on).[1] The fact that this information availability was left behind was due to mainly two problems, namely lack of quantity of information in English as the international lingua franca, and the low quality of English in many available tourism information media.[2] The high standards for customer service may provide another difficulty for the

tourism sector. Consumers have always been the focus of the tourist sector. The studies related to Asia Pacific region show that tourism is primary business in India, Thailand, Myanmar, Indonesia, Vietnam, Bangladesh, Pakistan and Nepal, etc. and religious tourism holds a good share for tourist inflow.[4] Keeping the consumer happy and satisfied is crucial. As a result, we plan to create an android-based travel application with a bot that offers accurate information and top-notch customer care throughout the day. The use of mobile applications for mobile devices is rapidly growing and has become apparent for the world's largest industry travel and tourism.[3]

A chatbot is a software solution that can interpret and reply to human conversation. It is built on artificial intelligence technology. Generally, these chatbots are designed to simulate real-life human conversations with users.

The chatbot knows how to comprehend inquiries, orders, or user input and then answer appropriately. Bots may be constantly developed to make interactions appear more lifelike. Chatbots are frequently used as digital customer care agents, acting as the user's initial point of contact and giving relevant information or reasonable replies to concerns. This approach is most commonly used for text chat conversation or voice-based support.

Chatbots may learn from data and human discussions with the use of deep learning, an artificial intelligence and machine learning discipline. These chatbots may be taught to reply to users and trained to gain consciousness from text.

II. LITERATURE SURVEY

There are several sorts of chatbot interfaces. The following are a few of the most well-known systems for building chatbots:

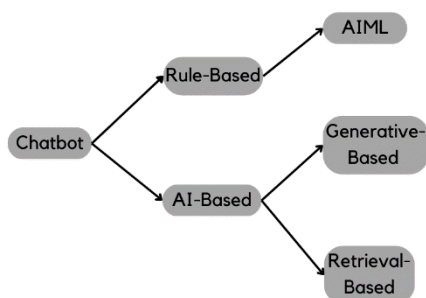


Fig. No. 1. Types of Chatbot

A. AI Chatbots

Artificial intelligence (AI) chatbots are text/dialogue-based or voice-based assistance that links people with the information they need by simulating a real-world discussion between two people. On websites and social media platforms, text-based chatbots are frequently used to help with customer support. The majority of voice-based chatbot deployments are for telephone customer service. AI chatbots have become very popular in recent years.

Two ideas may be used to model these AI chatbots:

i. Retrieval-Based Chatbot

A retrieval-based chatbot is one of the deep learning chatbot techniques. These chatbots function according to graph theory or directed flow theory. From a database of predetermined responses, chatbots offer the most practical answers. The solutions are based on the facts at hand. To choose the best response, retrieval chatbots employ techniques like deep learning and keyword matching. There are less errors since the retrieval approach is totally focused on data fetching. However, because it simply offers a predetermined response and does not provide a fresh output, this could appear to be overly restrictive.

ii. Generative-Based Chatbots

Generic chatbots are another use of deep learning. An independent chatbot system called a generative chatbot develops your language combinations rather than selecting from predetermined responses. Using the Seq2Seq paradigm, this bot may be produced. This model, sometimes referred to as the encoder-decoder model, generates text from the training data using long-term and short-term memory (LSTMs). Applications for machine translation can also benefit from the seq2seq approach. In a nutshell, what is the encoder-decoder model or seq2seq used for?

Following the user's entered word, each of the following words will be predicted considering the likelihood that the word will appear.

B. Rule-Based Chatbots

Rule-based chatbot assists consumers with their inquiries employs a tree flow rather than AI. This implies that the chatbot will ultimately leverage questions to lead users to the

appropriate solution. To allow the user to take charge of their interactions, all present structures and replies are provided. Because of this, all inquiries have to be straightforward. The rule-based chatbots may be created using basic or complicated codes, but they must always adhere to the code's protocol in order to function. Rule-based Chatbots may be designed using the following idea:

i. AIML

Artificial Intelligence Markup Language is known as AIML. It is an XML language used to create software agents that can speak. It has a set of guidelines that outline the chatbot's capacity for discussion. It can be used in conjunction with a Natural Language Understanding (NLU) processor that uses these principles to react to text-based inquiries made with a chatbot's assistance. A chatbot with more rules is more intelligent.

III. PROPOSED METHOD

Our proposed system will employ a retrieval-based chatbot. Given that the queries or questions in the travel application may be simply estimated, it will be the ideal match for our proposed solution. The replies would be personally produced using the knowledge of previously collected data. The bot will be trained to respond appropriately and relevant to the majority of questions. It is the best way to make reservations, place orders, and get customer service.

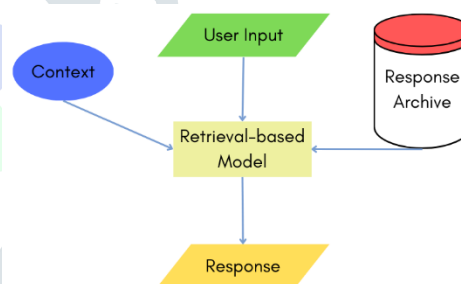


Fig. No. 2. The architecture of Retrieval-based Chatbot System

The architecture of the retrieval-based chatbot system is shown in the above diagram. Here, the user will provide feedback in the form of queries. After processing it, the system will begin looking for the best response. The user query will be compared to the list of queries already archived. The collection of patterns and replies will be used to train this chatbot system. A response is then created from the archive of responses using Long Short-Term Memory (LSTM), a unique recurrent network, to determine which pattern the user's query corresponds to.

IV. METHODOLOGY

The dataset's types, patterns, and responses will be provided to the chatbot. Natural Language Toolkit (NLTK), Keras, and Python can be used to build this retrieval-based chatbot. Python is what we're using in this system.

Step 1: Import and download data files

JSON file - a data file with pre-built templates and answers.

Step 2: Data pre-processing

Pre-processing will be done on the text data while working with,

1. Tokenization

The easiest and first thing you can do with text data is tokenize it. It is the practise of reducing a entire text to a few key words.

2. Case Folding

Every character is treated as lowercase, and some punctuation, like "!" and "?" is removed.

3. Stemming

The method of condensing a word to its word stems, which are suffixes and prefixes subtracted (such as connection).

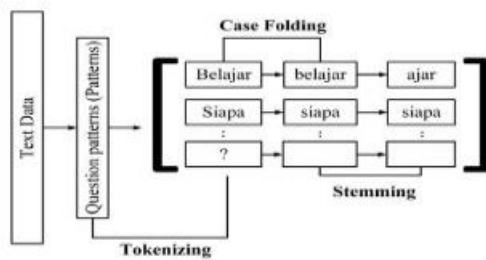


Fig. No. 3. Stemming Process

Step 3: Feature Extraction

The collection of keywords and the frequency of the keywords in the document are extracted by feature extraction.

Step 4: Build the Model

Deep Neural Networks (DNN) are artificial neural networks that have several layers between the input and output levels. It resembles the intricate neural network found in the human brain.

Mathematical manipulation is possible while using DNN, and it is predicated on each node's ability to be true or false. Data from the input layer is used as input by the first hidden layer. Mathematical calculations on our inputs are made at hidden layers to determine the probabilities for each. Calculating the number of hidden layers and the number of neurons for each hidden layer is one of the difficulties in building deep neural networks.

Three hidden layers are used by the proposed DNN model to process the input. Ten neurons make up each of these hidden layers.

One of the functions used is soft-max. The data can be classified using Soft-direct max's classifier. There are a total of 2,500 epochs in use. A cycle across the entire training dataset constitutes an epoch. A deep neural network often requires more than a few epochs to train. With the use of this information, we will train a neural network to identify a sentence's tags in our file.

$$\sigma(\vec{Z})_i = \frac{e^{(z)_i}}{\sum_{j=1}^k e^{(z)_j}}$$

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

$(Z)^{\rightarrow}$ = Input Vector

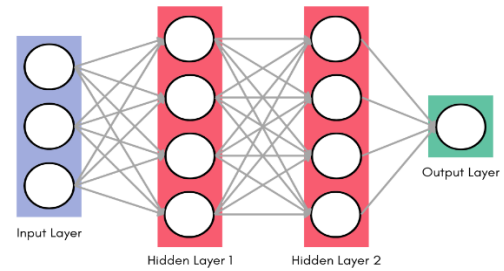


Fig. No. 4. Deep Neural Network

Step 5: Predict the response

In this phase, after modelling, the chatbot system employs the built-in model to anticipate outcomes for the entered messages in this phase.

The label order and response label weights are the estimation's outputs. One of several potential answers is chosen at random after the label has been used to look for responses that match it. The user will be shown the forwarding and display of the chosen response.

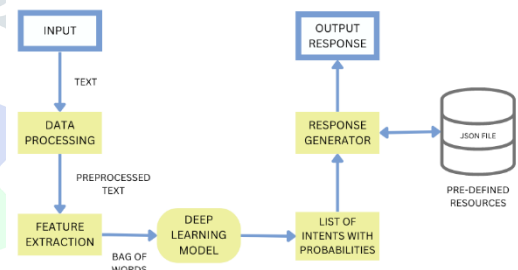


Fig. No. 5. Overview of Retrieval-based Chatbot

V. SOFTWARE DESCRIPTION

- A. Android Studio is used to develop, run, and design Android applications. It allows you to create applications using any API (Application Programming Interface). To launch or test the application, it has offered an emulator. Many other virtual gadgets can be made. It includes an integrated Google cloud platform. Android Studio is cost-free and simple to use.
- B. Google developed a framework called Firebase that can be used to create both online and mobile applications. It is available for free download and use. It facilitates the development of client-side apps with secure database access.
- C. A system of APIs and SDKs (Software Development Kit) makes up Google Map. Giving users the option to use Google Maps in mobile apps is helpful to developers. It facilitates the development of location-based software.

VI. CONCLUSION

In conclusion, we've suggested a design for a mobile application that runs on Android and has an AI-powered chatbot to assist users in finding the trip information they require whenever and wherever they are. Users will be able to access comprehensive information, including images, on all Pune tourism attractions. Additionally offered are suggestions and practical hotel/resort reservation services.

This enables users to have a positive chatbot customer care experience. Chatbots are excellent tools for facilitating human-machine interaction. The software is made to get quick responses from bots and provide prompt, accurate answers to user requests. To answer users' questions, a chatbot system creates a Q&A (Quality and Assurance) log in the form of a chatbot. The chatbot then retrieves pertinent keywords from the sentence and responds to the queries.

VII. REFERENCES

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- The logo is a shield-shaped emblem. At the top, the word 'JETIR' is written in a large, serif font. Below the text is a stylized flower or star shape composed of several colored petals (red, yellow, green, blue, and purple). A laurel wreath encircles the bottom and sides of the central emblem.
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