Travel Application with Chatbot Service

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Abstract— **This paper explores the idea of creating a travel application with a retrieval-based chatbot for android mobile phones that can help users conveniently. Our system provides effective and reliable information about all the tourist places and accommodations in Pune. With internet map and hotel/resort booking services integrated into the system. Also, the proposed architecture will be implementing a retrieval-based chatbot system that can provide 24/7 customer support to help the users in need. The system will provide text assistance so that the users would be able to communicate with the bot making the application more user-friendly. The bot will replicate the kind of interactions a user might have with a real person. This chatbot will simply answer the questions related to the application and guide the users so that they can use it with ease. Our system will encourage all fellow travel lovers to find the best accommodations, easy routes and will greatly improve their customer satisfaction.**

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

I. INTRODUCTION

Tourism is currently the strongest and largest industry in the global economy, generating approximately 11% of global gross domestic product (GDP). Nowadays many travelers prefer to make a concise decision by getting all the prior information required to visit a certain place.

And due to this, tourist turns to the internet for help. The Internet does provide considerably vast travel information to tourists. However, there is a problem that tourists cannot always receive accurate and reliable information while browsing the internet. Another challenge the travel industry may face in this regard is the high expectations of customer support. The tourism industry has always been consumer-centric. It is very important to keep the customer happy and satisfied. Therefore, we are intending to develop an android based travel application with a chatbot that will provide correct information and excellent customer service all day.

A chatbot is a software solution based on artificial intelligence technology that can understand and respond to human communication. Typically, these chatbots are built to convincingly recreate real human interactions with users. Chatbot understands how to interpret questions, commands, or user input and then respond accordingly. The bots can be continuously improved and make interactions look more realistic. Chatbots are commonly used as agents for digital customer service, serving as the user's first point of contact and providing useful information or reasonable answers to questions. Most of the time, this technique works through text chat communication or voice-based assistance.

With the help of deep learning which is a branch of machine learning and artificial intelligence chatbots can learn from data and human conversations. These chatbots can be trained to develop consciousness from text and taught to respond to people.

II. LITERATURE SURVEY

A Chatbot interface can be of many different types. Some of the popularly known systems of creating a chatbot are as follows:
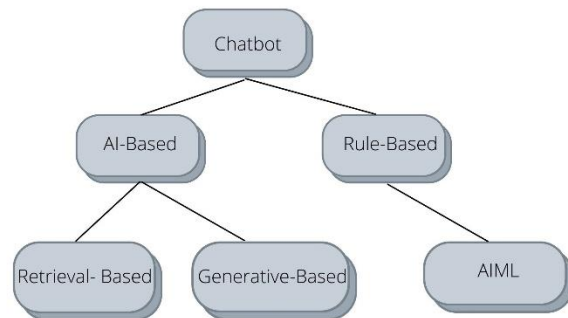

Fig .1. Types of Chatbot

A. AI Chatbots

AI or Artificial Intelligence chatbots are text/dialogue-based or voice-based assistance which helps and connects humans with the data that they want by replicating an actual human-to-human conversation. Text-based chatbots are often used on websites and social media platforms to facilitate customer assistance. Voice-based chatbots are mostly deployed for over-the-phone customer support. Nowadays AI chatbots have gained a lot of recognition.

These AI Chatbots can be modeled on two principles,

i. Retrieval Based Chatbot

Into the deep learning chatbots, there is one technique called a retrieval-based chatbot. On the theory of graphs or directed flows, these chatbots work. Chatbots provide the foremost feasible responses from a database of predefined responses. Answers are based on available information. Retrieval chatbots use methods such as keyword matching and deep learning to determine the most appropriate response. The retrieval model is entirely based on data fetching, so there are fewer mistakes. However, this may seem too rigid as it only provides a predefined answer and does not produce a new output.

ii. Generative Based Chatbots

Another deep learning method is generative chatbots. A generative chatbot is a standalone chatbot program that generates your language combinations instead of choosing from predefined answers. This bot can be created using the Seq2Seq model. This model, also known as the encoder-decoder model, uses long-term and short-term memory LSTMs to generate text from the training dataset. The seq2seq model is also useful in machine translation applications. In short, what is the seq2seq or encoder-decoder model for? After predicting the word entered by the user, it will predict each of the

following words using the probability of occurrence of that word.

B. Rule-Based Chatbots

A rule-based chatbot uses a tree flow instead of AI to help customers ask questions. This means that the chatbot will ultimately guide users with questions to find the right solution. All structures and responses are predefined for the user to take control of their conversations. That is why all the questions should be direct and simple. The Rule-based chatbots can either be built by simple or complex codes but the bot will always follow the code protocol, it will not do anything outside of it. Rule-based Chatbots can be modeled on the principle of,

i. AIML

AIML stands for Artificial Intelligence Markup Language. It's an XML lingo for making voice-based software agents. It has a set of rules which describe the conversational abilities of the chatbot. It can be used with a linguistic communication Understanding (NLU) processor which takes these rules to respond to the text-based questions asked with the help of a chatbot. More number of rules equals a more intelligent chatbot.

III. PROPOSED METHOD

The system that we are proposing will use a retrieval-based chatbot. It will be a perfect match for our proposed system as the queries or questions in the travel application can be easily estimated. With the understanding of pre-existing information, the answers would be created manually. The bot will be conditioned in such a way that it will give a befitting and relevant response to most asked questions. It is the most suitable method for booking, placing orders, and customer support.
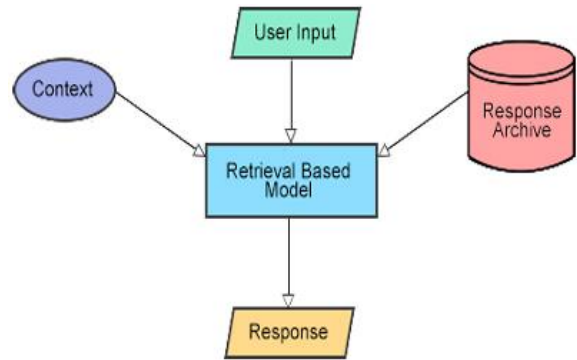

Fig .2. The architecture of Retrieval-based Chatbot System

The above figure describes the architecture of the retrieval-based chatbot system. Here the user will give input in form of questions. The system then will process it and start searching for an appropriate response. It will match the user query with the set of queries already stored in the archive. This chatbot system is trained with the dataset of patterns and responses. It uses LTSM, a special recurrent network to differentiate which pattern does the user's query belongs to and then a response is generated from the archive of responses.

IV. METHODOLOGY

The chatbot will be instructed on the dataset that contains types, patterns, and answers. This retrieval-based chatbot can be created using NLTK, Keras, Python. In this system, we are using python.

Step 1. **Import and download data files**

JSON file: A data file containing predefined templates and responses.

Step 2. **Data pre-processing**

When working with text data, pre-processing will be performed on the

1. Tokenization

Tokenization is the simplest and first thing you can do with text data. It is the process of breaking an entire text into tiny words.

2. Case folding

A method is performed that treats every character as lowercase and removes some punctuation, such as `!` and '?

3. Stemming

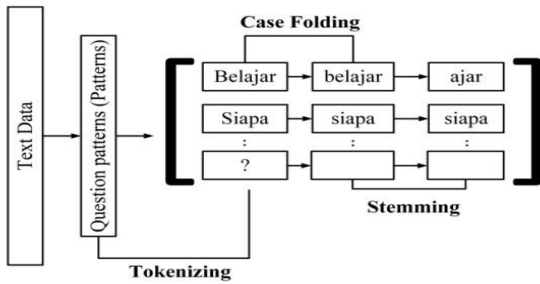The process of reducing a word to stems added to suffixes and prefixes, or word stems (such as lemme).

Fig. 3 Stemming Process

Step 3. **Feature Extraction:**

Feature extraction does extraction on the set of keywords and frequency of the keywords in the document.

Step 4. **Build the model**

An artificial neural network with several layers in between the input and output layers is called as deep neural network. It resembles the complex neural structure of a human brain. Using DNN we can find mathematical manipulation to convert input into the output, it is done based on each node to be true or false. The input layer takes input data and gives the inputs to the first hidden layer. At hidden layers mathematical computations on our inputs are performed so that it can set their respective probabilities. One of the challenges in creating deep neural networks is to calculate the number of hidden layers, as well as the number of neurons for each of the hidden layers.

The DNN Model proposed has three hidden layers to process the input. Each of these hidden layers is made of ten neurons. Soft-max is a function that is being used. With Soft-max, the data can be categorized by the direct classifier. The number of epochs used is thousand five hundred. An epoch is one cycle through the full training dataset. Usually, training a deep neural network takes more than a few epochs. With this data, we will train a neural network to take a sentence of words and classify it as one of the tags in our file.

$$\sigma(\overrightarrow{Z})_i = \frac{e^{z_i}}{\sum_{j=1}^{k} e^{z_j}}$$

σ = Soft-max

e^{z_i} = standard exponential function for an input vector

K = number of classes in the multi-class classifier

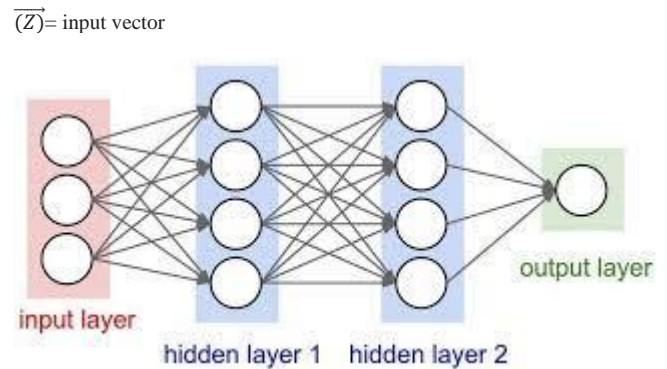e^{z_j} = standard exponential function for output vector

$(\overrightarrow{Z})$ = input vector

Fig.4 Deep Neural Network

Step 5. **Predict the response**

In this phase, after modeling, the chatbot system uses the model created to make predictions about the messages entered. The output of the estimation is the label order and response label weights. The label is used to search for answers that match the label, and one of several answers is randomly selected. The selected answer will be forwarded and displayed to the user.
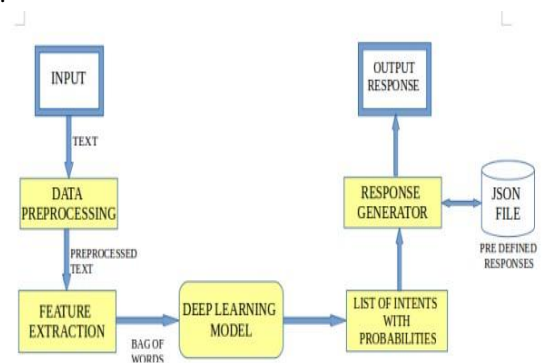

Fig. 5 Overview of Retrieval-based Chatbot

V.   SOFTWARE DESCRIPTION

A.   Android Studio is software used to create, run, design android applications. It supports all APIs to build an application. It has provided an emulator to run or test the application. One can create many virtual devices. It has a built-in Google cloud platform. Android Studio is free of cost and easy to use.

B.   Firebase is a platform created by Google which is used for building mobile and web applications. We can download and use it without any expenditure. It helps in building applications with secure access to the database from the client side.

C.   Google Map is a set-up of API and SDKs. It helps developers to give access to use Google maps in mobile apps. It helps in creating location-based applications.

VI.   CONCLUSION

In conclusion, we have proposed the design of an Android-based mobile application with an AI-powered chatbot that helps users get the travel information they need anytime, anywhere. Users will be able to get detailed data including pictures of all tourist attractions in Pune. Guidance and convenient hotel/resort reservation services are also provided. This allows users to receive satisfactory customer service through the chatbot. Chatbots are great tools for human-machine communication. The app is designed to receive fast responses from bots, providing accurate responses to user questions without delay. Chatbot system generates a Q&A log in the form of a chatbot to respond to the users' queries. Then the chatbot summons applicable keywords from the sentence and answers those questions. If a match is found, a meaningful answer is provided or a similar answer is displayed. It is convenient to use chatbots

VII.   REFERENCES

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