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## AI CHATBOT FOR TRANSPORTATION SYSTEM

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**Abstract:** Public transportation is utilized proficiently by a huge number of individuals everywhere. Individuals will in general make a trip to better places and at specific occasions they might feel totally lost in another spot. Our chatbot acts the hero right now. A Chatbot is frequently depicted as perhaps the most encouraging apparatuses for correspondence among people and machine utilizing man-made reasoning. It is a product application that is utilized to lead a web-based visit discussion through text by utilizing regular language preparing (NLP) and profound learning methods. It furnishes direct contact with a live human specialist as GUI. This AI chatbot affirms the current area and the last objective of the client by posing a couple of inquiries. It looks at the client's question and concentrates the fitting sections from the data set. The profound learning methods that are utilized in this chatbot are liable for understanding the client goals precisely to keep away from any confusions. When the client's aim has been perceived, the chatbot gives the most significant reaction to the client's question demand. Then, at that point, the client gets all the data about the transport names alongside their numbers so the individual can make a trip securely to the ideal area. Our chatbot is executed in python's Keras library and used Tkinter for GUI.

**Keywords - Chatbot, Artificial Intelligence, Natural Language Processing, Deep Learning, Keras, GUI, Tkinter.**

### I. INTRODUCTION

Individuals regularly travel to better places and some of the time they might feel totally lost in another spot. They may not have the foggiest idea about the route and transports to arrive at their objective. They might confront trouble in asking individuals around them to get into the transport which goes to their objective spot. You show up at the bus station, prepared to get your transport and you don't know which transport to take to arrive at your objective. This is the principle issue we experience in our day to day routine for a long time while utilizing public vehicle to arrive at the ideal spots. You go to an obscure spot and you don't know concerning which transport to take. There will be no data given with regards to the transports or about the transport numbers or the transport that takes you to the objective spot. This is the rest of the world situation when we go to another spot. At the point when you arrive at the bus station you will see many individuals hanging tight for the transport. Some of them realize the specific transport to be taken to arrive at their objective and some of them are in a predicament on which transport to be taken. So in that circumstance, you are totally worried. Here came to realize that a large portion of individuals utilize public transportation for their everyday making a trip to arrive at their objective. All things considered, a considerable lot of them don't know of the transport information or about the transport numbers or timings.

ReIndividuals deal with an issue when they are new to the spot and don't realize which transport to take. All things considered, much time is squandered for hanging tight or for get-together the data about the transport what they need to get in to arrive at their objective. There is one arrangement possible for this issue is that an intelligent Chatbot that gives the whole information of the transports and their timings which makes it simpler for individuals to utilize or to impart at any spot or any time. One central concern is that chatbots are fundamental for client everyday life.

### II. BASIC TERMINOLOGY

#### A .CHATBOT

A Chatbot is only a product application that aides in leading a discussion by utilizing audio or text - based methodologies. The projects in a Chatbot are created to copy human conversations. The utilization of Chatbot's for different purposes incorporate client administrations, demand directing, or for data gathering. Some chatbots are widely utilized for word-order measures by utilizing Natural language processing.

#### B. ARTIFICIAL INTELLIGENCE

Artificial Intelligence copy human insight power in different gadgets. These AI gadgets are modified to reflect like individuals and copy their activities. Artificial Intelligence addresses the machines that display normal attributes that are like human personalities, for example, Problem-settling and Comprehension.

- C. NATURAL LANGUAGE PROCESSING (NLP)

Natural Language Processing is the program interface of how PCs and people collaborate with one another. This procedure permits PC projects to break down immense measures of language information from different assets. The NLP developers can sort out the information to perform different errands, for example, analyze text, text summarizing, subject extraction, stemming, text mining, automatic summarization, interpretation, speech recognizing, segmentation, and automated question answering.

- D. NATURAL LANGUAGE TOOLKIT (NLTK)

Natural Language Toolkit is essentially modified for building and applying emblematic and statistical NLP in python. It is a set-up of libraries including text processing for tokenization, parsing the text, classification of text, stemming of words, and reasoning of semantics.

- E. KERAS

Keras is a neural network API library, in python. It runs on top of It is successful in running on top of R, PlaidML, TensorFlow, Microsoft Cognitive Toolkit.

- F. TKINTER

Tkinter is an interface that creates the GUI (Graphical User Interface) applications.

- G. TensorFlow

Tensorflow is a software library framework that primarily centers around machine learning that utilizes dataflow diagrams and differentiates programming over different number of tasks to assemble models. It is utilized by the developers to make enormous scope development applications including the neural networks. It is fundamentally applied for Classification, Understanding, Prediction, and Creation.

### III. PROPOSED WORK

#### PROJECT DESIGN METHODOLOGY:

The user gives the inquiries to the Chatbot requesting the bus number that goes from source to destination. The Chatbot comprises of the all intents that have the bus numbers alongside their routes. The user input is then contrasted and the strings in the intent file which comprises of the Chatbot database. If the input values match with the database values the Chatbot will display the output by specifying the bus number. Then the desired output is displayed to the user.

They deconstruct the sentence or query inputted by the user by following the NLP techniques and mechanisms and determine the type of sentence for better accuracy. Our model is built on supervised learning techniques with already pre-loaded data to extract and build efficient models against the training set.

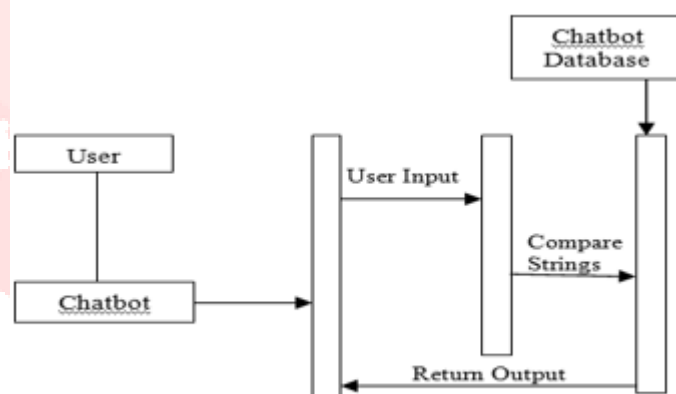


Figure 1: UML Diagram of Chatbot

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### IV. ARCHITECTURE DIAGRAM

Natural language processing (NLP) is a blend of natural language understanding (NLU) and natural language generation (NLG). NLP is one of the types of AI that permits chatbots to comprehend the users messages and react likewise. Artificial intelligence is only the field of

causing gadgets to do the undertakings people do. NLP plays a very significant role with regards to building chatbots. NLP has the below layers:

1. Application.
2. A platform for Data Lake.
3. NLP Engine.

#### 4. Data Storage.

NLP is separated into two important parts:

- a) Natural Language Understanding: NLU maps the inputs provided by the user to their helpful descriptions. It analyzes strange appearances of the language.
- b) Natural Language Generation: NLG is utilized for message arranging, message mining, sentence arranging, and message acknowledgment. Python comprises of a library named NLTK (Natural Language ToolKit) which executes NLP. Coming up next are the techniques present in NLP:
  - a) TOKENIZATION: It is the activity that breaks an unstructured sentence into basic reasonable words. It likewise creates a valuable and structural derivation of an inputted sentence by the user.
  - b) STEMMING: The methodology in which the given words are standardized into its fundamental structure or root structure is called Stemming.
  - c) LEMMATIZATION: In this interaction, distinctive arched types of a word are assembled as a gathering. The output acquired is an ideal word in the wake of joining every one of the words.
  - d) STOP WORDS: Stop words are used to make a sentence to extract the exact meaning.
  - e) PARTS OF SPEECH: It is a pre-defined library that contains the parts of speech in python language.
  - f) CHUNKING: It utilizes pieces of words from a sentence and gatherings them to make greater chunks.

The NLP Engine's principle usefulness incorporates Natural Language Understanding.

#### NATURAL LANGUAGE UNDERSTANDING (NLU):

NLU is the activity of delivering huge expressions in the structure of normal language. It incorporates –

- a) Text planning: It retrieves important content from the database.
- b) Sentence planning: It picks the required words, structures pertinent phrases with those words, and gives a significant sentence.
- c) Text realization: It is only planning the progression of the sentence plan relating to the sentence structure. Basically the natural language understanding is harder than natural language generation.

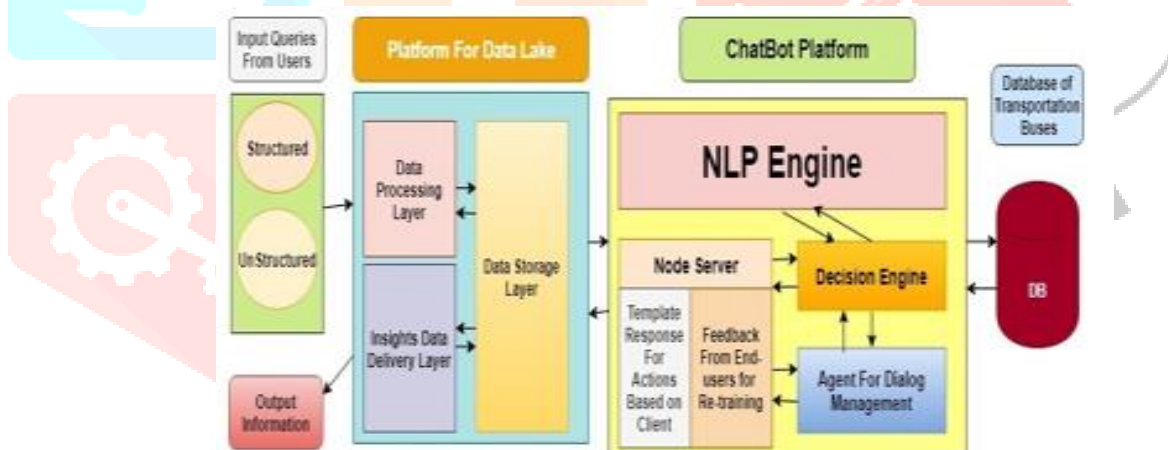


Figure 2: Chatbot Architecture

#### V. OVERVIEW OF ALGORITHM USED

The algorithm we utilized in building this chatbot is a RNN (Recurrent Neural Network) calculation called "LSTM" which is used to classify the category for which the users message is had a place with and it will give an arbitrary response from the record of responses utilizing text arrangement.

Quite possibly the most impressive artificial neural networks and is a notable subset of RNN is "Long Short-Term Memory" which is intended to recognize patterns in sequences that are available in numerical time series data emerging from government organizations, financial exchanges which likewise incorporates text, handwriting, and the spoken word.

LSTM's have a temporal dimension. LSTM's normally take less time and requested into a responsible way when contrasted with different networks. Some errors can return through back propagation by time and layers, LSTM's help safeguards those errors. They will in general keep a determined error rate and permits the recurrent networks to proceed with the continue learning process throughout a few time steps and opens a channel to connect sources and their comparing results remotely. LSTM's includes gated cells in which the details gathered from the resources are stored.

Like the PC memory, the data can be put away in, or manipulated from a cell in LSTM's. The gates have the usefulness of opening and shutting which empowers the cell to take meaningful choices about the storage of information whether to read or compose the data into the cell. The gates present in LSTM's are analog which are executed with element-wise multiplication by sigmoids. These sigmoids are available in the scope of 0-1. Analog is consistently profitable over digital due to differentiable nature and appropriateness for back-propagation. These gates receive the signal and conclude whether to pass the information or block the information and filter them as per their own set of weights. The weights which are utilized for modulating the information and hidden states are modified by means of the RNN training process.

These cells understand when to permit the data to join, desert, or be erased by the recurrent process of making irregular estimates, back-propagating the errors occurred, and altering weights by means of gradient descent.

The following figure shows the information regarding how the data is flowing through the memory cell and the manner in which it is managed by the gates.

Beginning from the foundation of the diagram, the three-way arrows show where the data flow into the cells at different plots. The converging of current input and previous cell state is fed to the cell and also fed to all three gates. These gates choose the method of handling with the input.

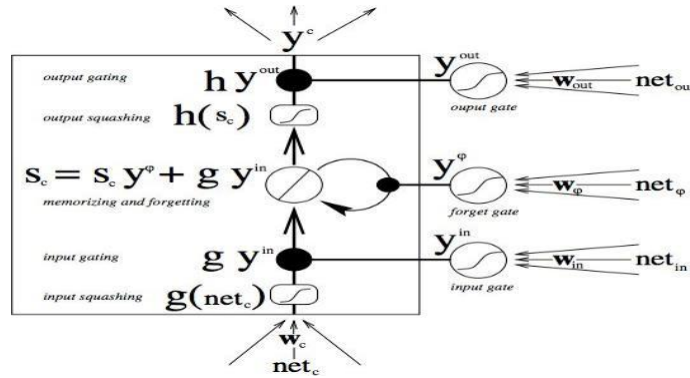


Figure-3: LSTM Representation

In the underneath diagram, the gates are presented in their working model which has straight lines. These lines address the closed gates and blank circles that address open ones. The forget gates are addressed by the lines and circles which are running evenly down the hidden layer of the underneath figure.

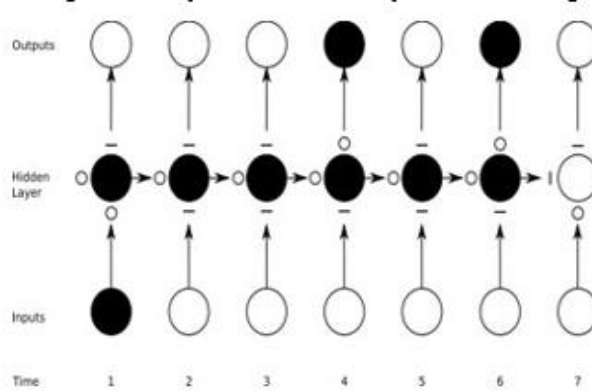


Figure-4: Neural Network Diagram

The primary function that is performed by the feed-forward networks is to map one input to the corresponding output. In any case, the recurrent networks are fit for mapping one input to many outputs that are related with it.

VI. DATASET AND TOOLS

The bus dataset is taken from the Pune city buses information database and formatted into the intents.json file. This JSON file includes the patterns we need to find and the responses that it will deliver to the user. The tool is used for running the chatbot is Python IDLE.

VII. RESULTS & OBSERVATIONS

A. DESCRIPTION OF RESULTS and OBSERVATIONS

We used deep learning technique like LSTM to fabricate our chatbot. Our chatbot is prepared recursively on the bus dataset which includes intents, patterns, and response. The libraries that are imported to make client support chatbot are NLTK, TensorFlow, Keras, tflearn.

- A)Intents.json – This file comprises of the multitude of data that we utilize for training the model. The data file contains an assortment of tags that have as of now defined patterns, responses in it.
- B)train\_chatbot.py – This file is involved a script that is utilized in building the model. It trains the model by using deep learning techniques to arrange and distinguish what the user is asking the bot.
- C)words.pkl – All the distinct words are stored in this pickle document and it involves the records of our jargon.
- D)Classes.pkl – The classes.pkl is likewise a pickle file that involves the list of all classifications that can be utilized to store all the tag names to classify when we are predicting the message.



E)Chatbot\_model.h5 – This model is trained which includes a various leveled data format and has stored weights and the architecture of our training model.

F)Chatgui.py – The Chatgui.py is a content script where we will assemble a GUI (Graphical User Interface) that is needed for the better client experience to used our chatbot

We will build this Chabot by following these steps:

#### 1.Import the necessary libraries and load the information –

Make another python file named train\_chatbot where every one of the necessary modules and packages are imported. For reading the JSON data file in our python program we imported the JSON package. This package has the functionalities that are utilized in parsing.

#### 2.Preprocessing the information -

Working with raw data is clashing, so data needs to go through a great deal of pre-processing methods for the machine to easily understand. We utilize the tokenizing method to break the sentences into words. Our intents file contains a list of patterns and responses, which are tokenized individually and attaches the words in a list of records.

Our tags are set in a list of classes to add every one of the intents related with patterns. Then, we will lemmatize each word i.e, we convert words into the lemma form and eliminate duplicate words from the list of words with the goal that we can reduce every one of the canonical words. The words contain the vocabulary of our chatbot and classes contain the entities to classify. We make a pickle file by using the pickle.dump () method. This file stores all the objects acquired while running the python file which is used during the process of prediction.

#### 3.Create training and testing data –

The training data is made which takes the input entry and gives the output response.

#### 4.Training the Model -

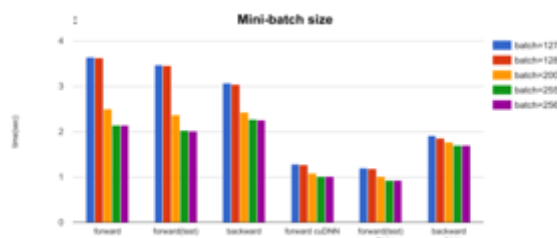
Our deep learning models architecture comprises of 3 thick layers. The Keras sequential API is used for this. The first layer comprises of 128 neurons, the second layer has 64 and the last layer has the very neurons as that of the quantity of classes. The remaining dropout layers are acquainted to reduced the over-fitting of the model. We have utilized the SGD optimizer and fit the information to begin the training process of the model. After the training of 200 epochs is done, the model's accuracy arrived at 100%, then, at that point, we saved the trained model using Keras model.save function

#### B. TEST CASE RESULTS:

In our test case, we spoke with the bot by requesting that a couple of questions to know the course from Shivajinagar to Swarget. As our chatbot is now prepared with the intents file that comprises of the information related with the question, it actually takes a look at the tags, classes, and pickle files for the data and gives the response as needs be in the given style. A chatbot can have the option to distinguish any question regardless of the grammar utilized by various users.

#### C. PERFORMANCE ANALYSIS:

Long Short term memory algorithm is utilized in our chatbot to guarantee that the exactness increments when compared with different algorithms being used. In this methodology, the words given by the user are clearly understood by the recurrent training of the input context. In our work on recognizing the user context, the precise outcomes given by our algorithm are more important. respective of the language structure utilized by various users.



#### D. COMPARATIVE STUDY:

When coming to customary existing algorithms like Multinomial Naïve Bayes and Restricted Boltzmann machine learning algorithm, the performance level is exceptionally low. The multinomial Naïve Bayes algorithm exhibited the exactness of 76 on the evaluation set. Ultimately, for the Restricted Boltzmann calculation, we tracked down that the exactness is 79 for CD at a learning rate of 0.003, 5000 iterations for a mini-batch size of 200, and a K-value of 1.

Table 1: Comparison of the proposed algorithms

Algorithm	Accuracy
Multinomial Naïve Bayes	76.57
Restricted Boltzmann	79.3
LSTM	95.02

### E. FIELDWORK DETAILS

The principle point of the chatbot is to explain the questions of users that they have with respect to the bus number details. As a part of field work, we have gone to various bus stations and bus stops and enquired about the users about the problem they are facing in recognizing the buses. The discussion fabricated cleared a way for a superior comprehension of the expectations. The expectations are the prerequisites of the project development. The accompanying inputs are given by the users at the time of field work. Our chatbot helps society in a knowledgeable manner where the users will feel happy with the data they acquired from our chatbot.

## VIII. CONCLUSION

The primary target of the paradigm is to succeed a chatbot. This thought was created by considering the issues faced by travelers. A wide range of the literature review is done to secure harmony in every one of the tasks, where a chatbot is viewed as the best model to fulfill the prerequisites. Examination on the chatbot attracts a nexus to see more with regards to the consuming fleeting advancements and inconsistent calculations like Man-made consciousness, AI, Python, and NLP.

- AI chat bot helps people to easily find bus numbers, their arrival time and best routes.
- Keras help us to train model so that chatbot will respond to user's query.
- Chatbot gives correct results if we provide destination location and current location of user.
- This saves time of user and prevents travel scam.

## IX. FUTURE WORK

These after are the future augmentations to the work:

1. This application can be used for authorization services.
2. Initiate database and sustain users.
3. Improve the efficiency of application by providing voice chat .
4. Broadening it to web support.

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