AI Based Chatbot for FAQs

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ABSTRACT

A chatbot is a computer program that runs a conversation in the form of a text. Chat-bot usually provides user-based communication that allows input from the user and receives text from the outgoing. Chat-bot information is stored on a website provided by the owner and the user needs. This program will be given the answers to the user's question with great success. The user must place a requirement on the chat-bot used for the transport-related chat. This model is based on supervised learning strategies with pre-packaged information to focus and create productive models against a training set. The system will use an AI algorithm to provide relevant information about transit to the user.

Keywords: Artificial intelligence, Chatbot, Natural language processing, Deep learning.

1. Introduction

People tend to go to different places and sometimes they may feel completely lost in a new place. At that time they may have difficulty asking people around them to get on the bus to their destination. You arrive at the bus stop, you are ready to board the bus and you have no idea which bus you can take to get to your destination. This is a major problem we face in our daily lives for many years while using public transport to get to the places we want. You arrive at an unfamiliar place and have no idea which bus to take. There will be no information provided about the buses or bus numbers or the bus to your destination. This is the state of the outside world when we move to a new place. When you get to the bus stop you will see many people waiting for the bus. Some of them know which bus to take to get to their destination and some of them are in trouble as to which bus they should take. So in that case, you are in for a shock. If so, most of them have no idea of bus data or bus numbers or times. People face a problem when they first arrive at a destination and do not know which bus they will take. If this is the case, a lot of time wasted on waiting or collecting bus information to get to their destination [1-4]. There is only a solution available to this problem that Chat-bot interacts with all the details of buses and their times making it easy for people to use or communicate from anywhere and anytime.

2. Literature Review

2.1. Designing and Developing a Chatbot Using Machine Learning

Praveen Kumar and Mayank Sharma proposed the paper in the year of 2018.

Problem-Deep Learning is a new area of Machine Learning and research, which was introduced with the aim of taking the Machine learning closer to one of its original and main goal which is: AI (Artificial intelligence). If we speak of automatic learning algorithm, they tend to be linear, the DL (Deep Learning) algorithms are configured to increase complexity and abstraction. Methodology-To learn in depth, imagine a 5-year-old whose first word is cat. The child Keeps on learning what a cat is by showing objects and saying the word cat.

The mother says: "Yes, it's a cat" or "No, it's not a cat". As the child continues to point objects, he becomes more aware of the characteristics and features of all cats. What the child does, without even knowing what he is doing, it clarifies a very complex level of abstraction by constructing a scale in which each level of abstraction is created with the help of Knowledge acquired the layer which was before on the scale. The programs that run on the system which uses deep learning go through the same process. Each algorithm in the way that applies a non-linear approach on its input and it uses what it learns to make a statistical model from the given output. Findings-Repetition continues until the output has reached an acceptable point of correctness. The number of layers in which the process is passing at each stage is what gave the name a prefix as deep.

2.2. Automatic Generation of Business Intelligence Chatbot for Organizations

Mahdi Banisharif and ArmanMazloumzadeh proposed the intelligent chatbot for organizations in the year of 2022.

Problem-Business Intelligence (BI) helps organizations in making data-driven decisions by visualizing the current and historical data. Despite the plethora of BI tools, their accessibility and usability are still issues. To alleviate these issues, organizations use Chatbot. However, due to the variety of requirements and different organizational structures, developing a AI chatbot is a complex task that requires the collaboration of technical and BI experts. Methodology-To address this problem, in this paper, the author proposed a model-driven approach for the automatic generation of personalized BI chatbot for organizations. The approach is implemented as a framework, which includes two components. First is a modelling component that allows the user to model the business-specific chatbot. Second is an automation component that automatically generates the chatbot code. Findings-The results are promising for developing interactive BI chatbot according to various organizational needs.

3. Basic Terminology

A. Chatbot

Chatbot is nothing but a helpful software program in conducting a conversation using sound or text-based methods. Apps in Chatbot are designed imitating human conversations.
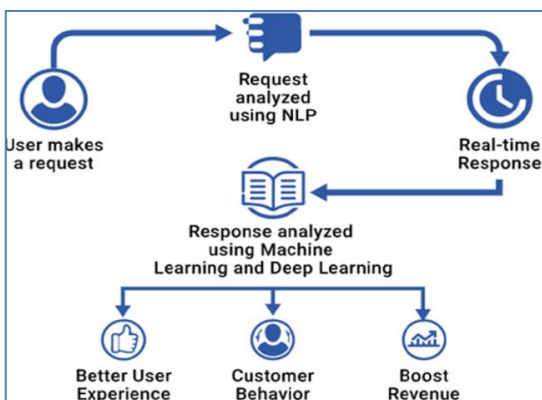
Chatbot use of a variety objective includes customer service, application route, or information collection. Some chatbot are widely used word-order processes using natural language processing.

B. Artificial Intelligence

Artificial intelligence (AI) is the ability of a computer or a robot controlled by a computer to do tasks that are usually done by humans because they require human intelligence and discernment.

C. Natural Language Processing

Natural Language processing (NLP) is a branch of artificial intelligence that helps computers to understand, interpret and control human language. NLP draws on a wide range of fields, including computer science and computer languages, in its efforts to bridge the gap between human communication and computer literacy.

4. System Analysis

4.1. Existing System

The first and perhaps the easiest bots are legal-based chatbot, also known as bot-tree bots. These bots are very common, and many of us may be contacting one through Live Chat features, on e-commerce sites, or through a social media platform. communication with users. When communicating with users, written bots recognize keywords and deliver them in the right way to achieve their goals, such as information about the best deals currently, and more. Such a chatbot has a limited set of skills. However, you can use it for simple tasks like:

Customer support agents who provide customers with automated responses.

Engagement bots inform customers about special discounts.

A legal-based chatbot is able to hold basic conversations based on the "if/when" concept. This chatbot does not understand the context or objectives. Human agents create a chat map with a flowchart, anticipate what the customer might ask, and plan how the chatbot should respond. We use the following logical steps and clear call-to-action buttons to create legal chatbot conversations. Companies create a legal chatbot to answer simple questions and often bring web visitors to a live agent to further the conversation. They are not designed to read and be intelligent over time. We can build a legal chatbot with very simple or complex rules. However, they cannot answer any questions other than the stated rules. Legal-based chatbot does not learn collaboratively and performs and operates only within the context in which they are trained.
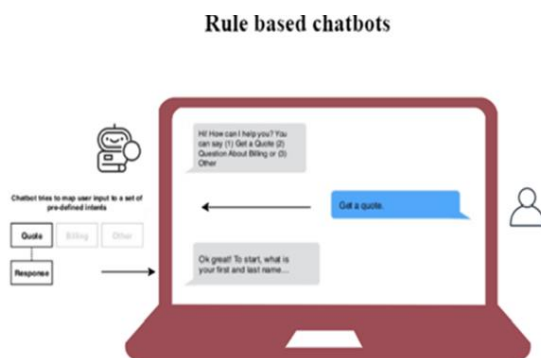
4.2. Proposed System

Unlike rule-based chatbot ,AI-Powered Chatbot is a complex chatbot, usually powered by native language processing (NLP) and machine learning algorithms (ML). The user submits questions to the chatbot asking

for information to move from the source to the location. User input is then compared to the character unit in the target file that includes the chatbot website. Powerful AI bots can respond to the user with pre-defined responses, and ML helps them learn from each user interaction.


Public transport companies have a heavy responsibility: to provide affordable transportation options, maintain multiple transport networks, and keep passengers informed at all times when cost controls. Bot is an AI-enabled chatbot that can improve the performance of public transport networks based on ingenuity.

Chatbot is ready to assist with route planning, provide traffic updates, handle custom alerts, and answer any frequently asked questions. Chatbot allows passengers to find schedules, arrival times, routes, and more within the chat.

5. System Design

5.1. System Architecture
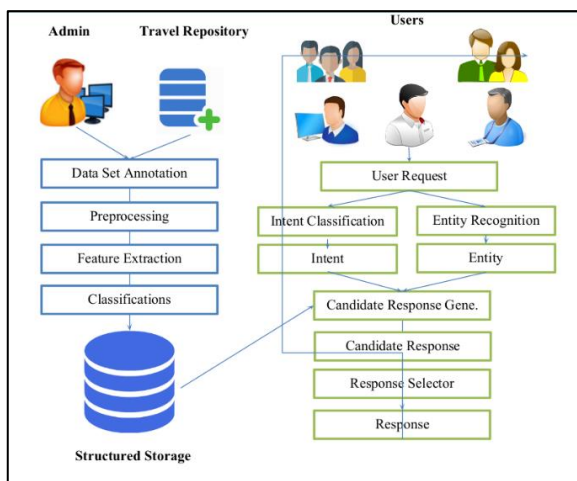
Promoting the use of public transportation and Intelligent Transport Systems, as well as improving transit accessibility for all citizens, may help in decreasing traffic congestion and air pollution in urban areas. In general, poor information to customers is one of the main issues in public transportation services, which is an important reason for allocating substantial efforts to implement a powerful and easy to use and access information tool. This paper focuses on the design and development of a real time bus route information system, arrival and departure for the management of unexpected events, delays and service disruptions concerning public transportation in the city. Peculiarly, we built a bot representation of the city transit based on a deep learning model that considers the interconnections among all the stops of the rides offered during the day. The structure distinguishes the physical stations and the get on/get off stops of each ride, representing

them with two different types of nodes. Such structure allows, with regard to the main focus of the paper, to model a wide range of service disruptions, much more meaningful than those possible with approaches currently proposed by transit agencies. Once the location of a bus stop is entered, the app provides the estimated time of arrival (ETA) of next five buses at the stop along with their route numbers. Searches pertaining to a specific route will also be available.

6. Methodology

A. UI development

Bot is an open-source application that provides a user-friendly interface to deal with the content of government bus services. It supports all three : (A) Modify knowledge base, (B) Data Processing, (C) Model Testing.
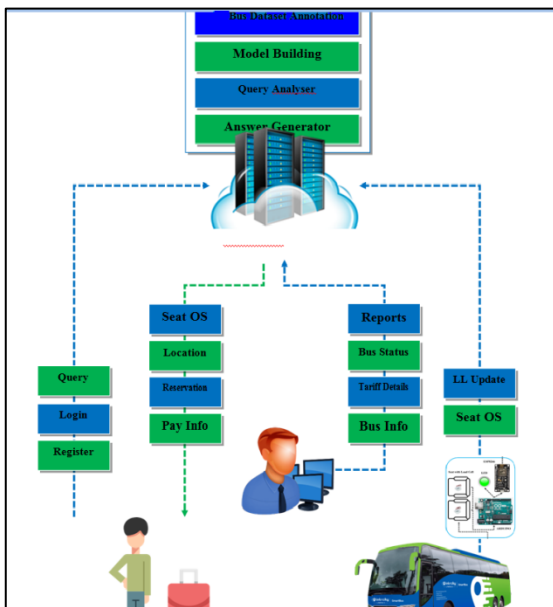
B. Intent Classification

(1) Dataset Preparation

- *Import Dataset*

In this module the admin uploads a dataset (CSV) file. This will be used to train your chatbot
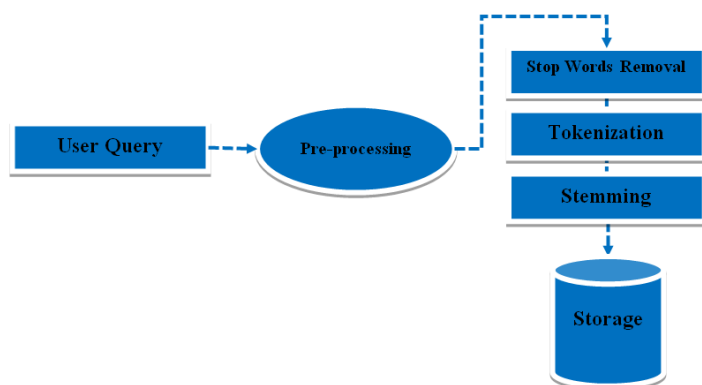
• *Read Dataset*

The chatbot reads dataset to output the purpose for the user intent

•*Explore Dataset – EDA*

Data visualization tool that brings the entirety of data together into a striking and easy-to-follow view.

(2) Data Pre-processing

The data pre-processing phase consists of natural language-based steps that standardize the text and prepare it for analysis.

- *Tokenization*

Breaking up the original text into component pieces is the tokenization step in natural language processing. There are predefined rules for tokenization of the documents into words. The tokenization step is performed in Python by using the Spacy library.

Convert a sentence [i.e. a collection of words] into single words.

Sentence   Tokens
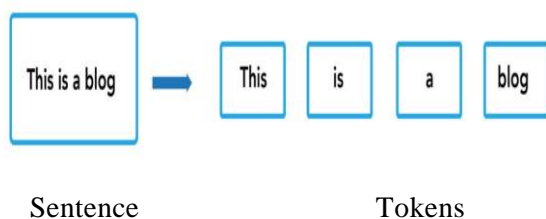
- *Normalization*

These are the steps needed for translating text from human language (English) to machine-readable format for further processing. The process starts with:

changing all alphabets to lower or upper case, expanding abbreviations, excluding numbers or changing those to words ,removing white spaces, punctuation, inflection marks, and other circumflexes.

- *Stemming*

It is a process to find similarities between words with the same root words. This will help us to reduce the bag of words by associating similar words with their corresponding root words.

(3) Feature Extraction

After eliminating irrelevant information, the elaborated list of words is converted into numbers. The TF-IDF method is applied to accomplish this task. Term Frequency is several occurrences of a word in a document, and IDF is the ratio of a total number of documents and the number of documents containing the term. A popular and straightforward method of feature extraction with text data is called the bag-of-words model of text. A bag-of-words model for short, is a way of extracting features from the text for use in modelling, such as machine learning algorithms. A bag-of-words is a representation of text that describes the occurrence of words within a document. It involves two things (1) A vocabulary of known words, (2) A measure of the

presence of known words. We extract features on the basis of Equations Here tf represents term frequency and df represents document frequency.

$$TFIDF = tf * (\frac{1}{df})$$
$$TFIDF = tf * Inverse(df)$$
$$TFIDF(t, d, D) = TF(t, d).IDF(t, D)$$
$$TFIDF(t, d) = log \frac{N}{|d \epsilon D t \epsilon D|}$$

Eq. 1-4

Feature extraction in DL with the context of words is also essential. The technique used for this purpose is word2vec neural network-based algorithm. Equation 5 given below shows how word2vec manages the word-context with the help of probability measures. The D represents the pair-wise illustration of a set of words, and (w; c) is the word-context pair drawn from the large set D.

$$P(D = 1 \mid w, c_{1:k}) = \frac{1}{1 + e^{-(w \cdot c_1 + w \cdot c_2 + \dots + w \cdot c_k)}}$$

Eq.5

The multi-word context is also a variant of word2vec, as shown in Equation 6. The variable-length context is also controlled by the given below mathematics.

$$P(D = 1 \mid w, c) = \frac{1}{1 + e^{-s(w,c)}}$$

Eq.6

7. Overview of Algorithm

- *Long Short Term Memory (LSTM)*

The algorithm used to build this chatbot is the RNN (Recurrent Neural Network) algorithm called Long Short-Term Memory (LSTM) networks that are a type of repetitive neural network that is able to learn system dependence on sequential prediction problems. This is a required behavior in the fields of complex problems such as machine translation, speech recognition, and more. The success of LSTM lies in its application to be one of the first tools to overcome technological problems and deliver the promise of emerging emotional networks.

The LSTM network is made up of different memory blocks called cells (rectangular that we see in the picture). There are two modes that are transferred to the next cell; cell status and hidden status. Memory blocks that are responsible for memory and deception in memory are done in three main ways, called gates. The key to LSM is the cell shape, the horizontal line that passes over the drawing. The state of the cell is like a transmission belt. Go down straight across the chain, with just a little junction of the line. It is very easy for information to flow freely.

LSTM has the ability to extract or add information to the cell environment, carefully controlled by structures called gates. Gates are a way of voluntarily passing information. They are built with a sigmoid neural net layer

and a smart replication function. The sigmoid layer gives the numbers between zero and one, which means how much each part should pass.

8. Conclusion

In this proposed work, we draw a conclusion that the new proposed system using AI based chatbot will help the people who face the transportation related issues .This system will be used to reduce the waiting time of people and helpful to the find the details of the transportation easily.

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