An NLP Based Contrivance to Simplify Customer Interaction

R.Dharaniya, Naveen Nanda.M, Ramasubramanian.R, Nitin.R, Vaishnavi.S

Abstract: *An intelligent application is an instrumental driving force in retention and satisfaction of customers. Consertle would be one of the first banking applications in India that enables users to interact with an intelligent application through a chat bot that is specifically designed to understand, interpret and analyze user behavior so as to provide better and more efficient results. While chat bots itself are a new introduction to the Indian financial system, an intelligent chat bot enables customer to instant and more efficient query resolution.Currently, most banking applications are visual medium which requires customer to proceed through various levels of data entry and selection in order to get the desired response. It may be a query related to one's account, transactions or information about the bank in general; but the process to get a satisfactory result is a relatively long and tedious process. It is notable that automation in the financial sector is largely primitive even after the outbreak of technologies such as AI, CV, ML, etc.Natural Language Processing and Machine Learning enables the creation of an automated system that takes in input in the form of voice and/or text, processes it and gives an intelligent response to the user which would be aimed at satisfying their current requirements along with the possible, predicted, immediate query that is likely to arise. The key component of application Consertle is the portable mobile application that upholds the chatbot, where NLP based speech to text conversion and interpretation takes place, thus production accurate results and also providing suggestions, by analyzing user behavior which is dependent upon many factors.*

Keywords : Naturallanguage Processing, Query Resolution, Machine Learning, Chatbot, Speech-to-Text

I. INTRODUCTION

In the current system of banking applications, it involves a minimum of several minutes of procedure ranging from user input, query processing and displaying the output. Leading banks get thousands of requests every minute and the network traffic is another issue that boggles upon the existing delayed query management system. The time per customer query would be reduced significantly with the use of application Consertle thereby reducing traffic too. The time for the entire process can be reduced to less than a minute via the proposed system thereby increasing efficiency to a large extent. The suggestion mechanism analyses user behavior periodically thereby understanding the trend of succeeding questions, thus ensuring a schematic and organized way of customer guidance. This leads to reduced load on the customer side, where the customer need not start over from the first step to get other information(s), instead, the application guides them to the succeeding question directly. Such an automated intelligent application would be path-breaking for the financial sector as it provides a win-win situation for both the customer and the banks. Additionally, as easy access portal such as application Consertle enables customer to get additional information on their banks thus creating essential awareness.

II. LITERATURE SURVEY

In the paper, "Chatbot and bully free Chat" by Mrs.V.Selvi,M.E, et.al [1] Chatbots is a collaboration among individual and bot which gives us a proficient help and support in customer care and it additionally gives the best approach to create client commitment and effectiveness by decrease of cost by for these service. Chat bots can be available at any time whenever required , thus can deal with a large number of individuals one after another confronted to achieve this author proposes an algorithm named AdaBoost M1 which utilizes the base classifier DecisionStump(AdaBoost_DS) yet the recreation result shows that the proposed calculation outflanks the current detecting procedure.In the paper, "Bots Acting Like Humans: Understanding and Preventing Harm" by Florian Daniel and Cinzia Cappiello et.al elaborated that Bots are algorithmically determined substances that demonstration like people in discussions through Twitter, on Facebook, in visits or Q&A locales. This paper contemplates how they may affect discussions, the proposed system gives a scientific classification of damages that might be caused due to cyber crimes, and the proposed system details about how to forestall hurt by examining when misuses happens. Even online bots are duplicating thus spoiling their quality in broad daylight and while providing private communications, most

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associated clients still don't have the information, abilities, or comprehension to make an effective procedure to stay aware of the conceivable unintended results of these data bleach. This paper speaks to a first endeavor at characterizing and demonstrates a reasonable structure that may establish the framework for what we could call bot morals. The scientific categorization of damages got from the those models shows that bots may indeed cause harm, readily or unwillingly and the proposed system determines the activities from the conditions that may make them wrong and focuses how to improve and ensure effective communications with individuals.

In the following paper" Autonomic Author Identification in Internet Relay Chat (IRC) " by Sicong Shao et.al [3] , the Internet Relay Chat (IRC) channels are generally used to transfer messages and data among malevolent clients engaged with cybercrimes. the authors proposes an autonomic creator distinguishing proof strategy dependent on character profile and investigation of IRC messages. The IRC channels utilizes autonomic bots and afterward make a character profile for each focused creators. This methodology shows that character examination for creator are discover and this is a distinguishing proof as a proficient methodology, the disadvantages is that On the other hand, it very well may be misused for the underground digital criminal works. The secrecy of the Internet administrations, particularly in the web based life, gives opportunity to the clients for secure communication. It is exceptionally wanted to have the option to recognize the mysterious people spreading vindictive programming instruments or cybercriminals.

In the paper," Ticketing Chatbot Service using Serverless NLP Technology", by Eko Handoyo,M.Arfan,Yosua Alvin Adi Soetrisno, elaborated on Personal assistant using a human operator needed some time to process single request such as ticket booking, ordering something, and get services. One request can contain many queries for some information provided on the internet. The contribution of this research is to conduct some scenario that happening in ordering tickets. This research conduct that chatbot can help acts as customer service, based on the conducted scenario and show an F-measure score of 89.65% ticketing chatbot show that can respond well and give direction but need a more sophisticated algorithm to overcome all occurrence in the user request. Classification of intent in term of the sentence needs to be more fluent to consider confidence rate Specific domain chatbot can redefine chat experienced with the automated response and also some CUI response that guided the user.

In the paper," problem solving Chatbot for data Structures", by Ankil shah, Bhargav jain, Bhavin Agrawal, Saurabh jain, Simon shim proposed Intelligent chatbot, might be a framework which may act with people and answers inquiries on an accurate area. The test is to make a framework which can fit human cerebrum. For the most part, the mind stores the memory during a confined way over the cerebrum with the help of vegetative cell as resistance a concentrated way in document framework. There territory unit present moment and recollecting stockpiling with entirely unexpected situation thus finding the easiest possible way bolstered client inclination.The authors have prepared a model with very surprising methodologies and estimated precision for consistent in solving the datas obtained.The

unexpected parameters which may impact the instructing of the modelare identified. Externalization of suggested information during an information Management System misuse Chat Bots which are solved and brought into consideration with the help of proposed system discussed by the author.

III. PROPOSED SYSTEM

The main idea of this paper is to propose a system that works as an assistant to the potential banker by working as a mobile friendly customer service that can perform all operations which is originally dependent on an employee of the bank, which is subject to timings, delay, bias, and so on. The steps involved in building this chatbot are as follows:
Build a user-friendly mobile application that acts as a docker for the chatbot andcreate a Natural Language Processing framework that understands the user voice, processes the converted text, and retrieves information based on the query. Analyze user behavior pattern so as to provide quick suggestions to the customer.
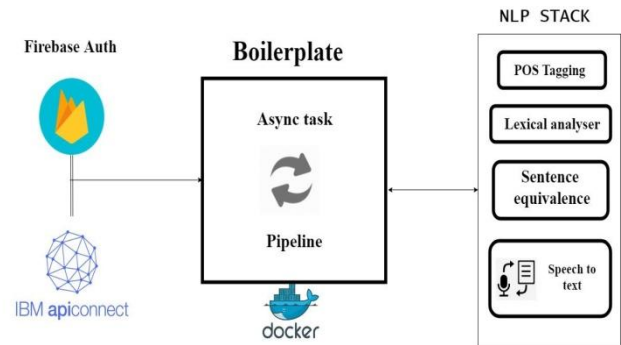

Fig1: Functional flow of the proposed system for Chatbot Operations

A.User Authentication for Bank Connectivity

The objective of the chatbot is to authenticate and perform operations for each user separately. The authentication process is done in two stages, namely registering and logging each user and then accessing their banking information based on user specific input. The first step is done by using firebase Auth, open sourced by google for quick access. The customer has to register using their registered email ID. The second stage is done using the Teller API, which is used to retrieve banking information via JSON files. To manage the APIs and filter the JSON information, we use API connect by IBM.

B. Building NLP Model using POS Tagging Operations

To build the NLP model, we need to create a vocabulary for feature extraction, and this is performed using N-Gram. It is imperative that the model can recognize multiple synonyms and its respective meaning directly by using POS tagging mechanisms defined using IBM API. The NLP code is written using Bidirectional LSTM and Tensorflow API

C. Sentiment Analysis and Classification

Sentiment analysis is a field-oriented task. Most popular applications of sentiment analysis include movie and product reviews. Most of such sentiment analyzers are open source but the main issue is that such analyzers are trained with different corpuses. The presence of such analyzers for bankingis heavily neededto improve customer retention and satisfaction margins.

D. Feature Extraction

Feature extraction is done using the Bag of Words model. The issue found with text data is that it is quite clumsy, and most ML algorithms prefer well defined, fixed-length inputs and outputs. Since these algorithms cannot work with text directly, they need to be converted into a of numerical values. This is also done using the bag of words model.

Bag of words (BoW) representation: The Bag of words model is popularly used for feature extraction in natural language processing (NLP) . The BoW representation describes the occurrences of words in an article or a document. It builds a vocabulary of known words and determining the existence of such known words. Initially, all of the unique words are identified and used to design the vocabulary. Now, since the aim is to vectorize the text, the best way to go about, would be to design a vector of length equal to that of the number of unique words and employ a scoring method for each sentence using period as a delimiter. Obviously, the simplest method of scoring would be to assign 1 for the presence of the word and 0 if not. This vectorization process can be done using the Count Vectorizer class available in scikit-learn. The result would be multiple sparse matrices containing larger numbers of 0 counts. In order to battle memory constraints, simple data cleaning techniques can be employed such as stemming and stop word removal.
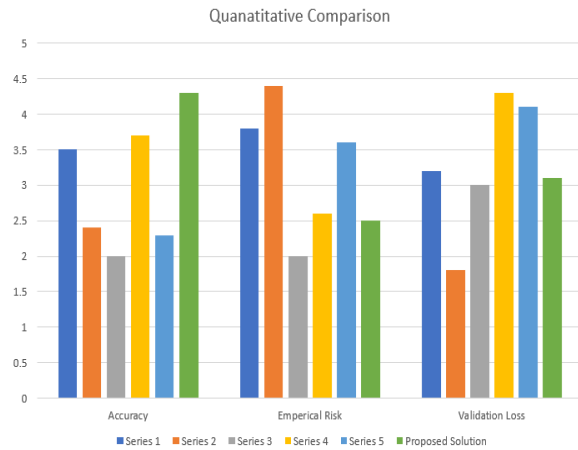
IV. MODEL TRAINING AND DOCKER

The features extracted using the proposed method for the human annotated are fed as input to the classifier and trained using several algorithms. The accuracies for the different machine learning algorithms is discussed in the following sections. The algorithm with the most promising performance is chosen. The classifier is created to differentiate the various responses of users pertaining to their banking needs and requirements.

Considering the fact that we have different tech stacks and the communication between the interface and the text-based model is paramount between users. We use docker to store an image which hosts the NLP model for easy access. The most important task in this is to perform Async Task reconstruction, which re-runs the chatbot instances for each login and logout sequence.
The docker pipeline is interface in the application in order to interface the user and the model. The model is to be built in such a way that the pipeline can transmit real time data.

V. RESULT AND DISCUSSION

For comparison, we have taken six existing models from the literature survey and have taken three comparison metrics namely Accuracy during training, Empirical risk, which defines the amount of error faced during training the data, and the amount of loss we incur during validation testing. Based on the results obtained, we can see that we incur more empirical risk compared to an existing model, but the overall accuracy is much better. We also face a prominent loss during validation phase, but can easily be overcome y increasing data sets.
Based on the conclusions received, it is noted that models based on character embedding may take up more computation as compared to word embedding. This is mainly attributed to the size of the vocabulary.
Another characteristic is that when running a model in docker, the optimization field increases as the load is handled virtually rather than a physical dependency.

VI. CONCLUSION

The proposed application has a good success rate in terms of understanding the requirements of the banker and, with continuous input, can be trained in real time in the docker image to improve it's accuracy for each individual, which can result in automated tasks specifically for nonpayment operations. For future work, we plan to expand the datasets to include further operations, which currently only personalized bankers can perform, say, creating a joint checking account.
We also plan to perform edge deployment using OpenVino, so that we can optimize the algorithm to perform dense based operations

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