VIRTUAL ASSISTANT

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Abstract: -

During a Google event Sundar Pichai (CEO of Google) gave a demo of their new project Google Duplex[1] and how it is going to work in backend. He asked to make a reservation in a salon through Google Duplex, so what it did was it made a call in the back like a human and made the reservation. Similar is the function of Google Assistant which is virtual assistant developed by Google. But In this scenario Google is designing the system for each application, and this actually limits the growth of the assistant. To resolve this problem, it is important for designing a system in which everyone is contributing to make the experience with virtual assistant better. This paper suggests an approach to overcome this problem and design a better and secure system for google assistant.

Literature Survey: -

As per Jenn Marston almost 90 percent of costumers want to interact with businesses by text, sidestepping voice interaction. There are many services like Guestfriend which allows any business to easily create their own chatbot to answer the same basic questions most customers ask, so automated assistance is going to become more mainstream for all business owners. On internal Slack channel, The Spoon publisher Mike Wolf chimed in on this potential virtual assistant arms race, writing: *Today it's* quite easy to get a seat at a restaurant, or a decent restaurant. But what if people used virtual assistant to do a high volume of calls/searches to make sure they have the best seat at the best time at the best restaurants? Or to get tickets for a concert? Are we essentially aiming for people to remove any inefficiencies in a world. Eventually the efficiency of chatbot will encourage others to use chatbots. The service provider could create their own chatbots to interact with virtual assistant. Also, nowadays various machine learning algorithms are reported in literature survey [7-12] for internet communications applications for efficient and fast classification process.

1] Introduction: -

Currently Google is working on its new project Google Duplex which allows users to make a reservation for a restaurant through virtual assistant. What it does in background is make an actual call to the restaurant and interact in human voice and makes the reservation. It does so by the use of AI-based human-sounding voice. It is also expected to be used to speed up other transactions like paying for movie tickets online [2]. The problem is that if google needs to add another application to it like order something online, it will again have to train the model for the same. Even in Google Assistant for most of the queries it shows the google search, which breaks the interaction. This paper guides us through a system which helps to improve overall interaction of user with virtual assistant. To achieve this what can be done is create a

centralized system which is just responsible for connecting the user with the best service provider for query. For example, if the user wants to make a reservation at a restaurant the centralized system will connect the user to Zomato or Swiggy's chatbot in the backend and they'll handle the query.

The project has been divided into the steps mentioned below:

1. Designing the centralized system using classification algorithm
2. Designing Chatbots for each of the service provider
3. Making connection between them
4. Designing the UI for virtual Assistant

2] Proposed Work:

1. Creation of Database:- To design the centralized system, the queries need to be used to train the classification model. For database of the prototype 100 queries for each chatbots were created manually as they were not available as of now. The most common queries of the service provider were considered while designing the database.

2. Classification Model: For classification LDA (latent Dirichlet allocation) model is used. Following are the steps of design. As shown in fig 2.1 firstly model is trained and for that, the first step is preprocessing in which the query is divided into words and stop words(word which are used as connectors and does not hold any significance in the meaning of the sentence) are removed. Later in lemmatizing and stemming the words are replaced by their parent root word and frequency of words is counted for a specific service provider with respect to others. Then the probability of each word for each service provider is taken and the results are stored in csv file. When the query is received from user similar steps are taken and after getting the root word the probability of each word is pulled from the already created file and the most correlated chatbot is selected on the basis of total probability of sentence and later the ip address of the service provider is sent back.

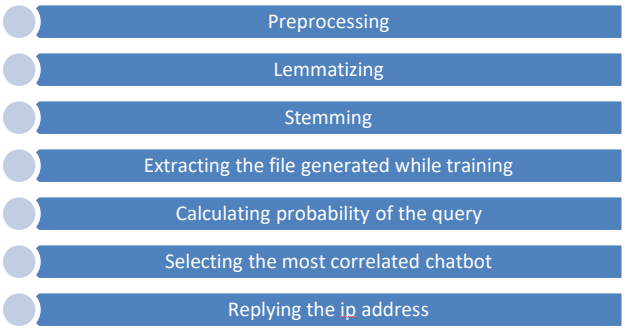

Fig 2.1: Steps of classification model

LDA Model: In LDA, each document can be viewed as a mixture of various topics where each document is considered to have a set of topics that are assigned to it via LDA. This is similar to probabilistic latent semantic analysis (pLSA) just that in LDA the topic distribution it is assumed it has sparse Dirichlet prior. The sparse Dirichlet priors encode the intuition that a document just covers a small set of topics and even in these topics only a small set of words are frequently used which can assumed to hold the summary of the document. Practically, this results in a better disambiguation of words and a more accurate assignment of documents to topics. LDA is a super set of the pLSA model, which is an equivalent of LDA under a uniform Dirichlet prior distribution.[4] In shown fig 2.2 M represents the no of documents, N the no of words in document, α *and* β the parameter of Dirichlet prior, z is topic for a specific word and w is the word. W is grayed out representing that the words are observable variables and others are latent variables. As per original paper proposed the sparse Dirichlet prior can be used to model the relation between topic and word on the basis of word frequency[6].

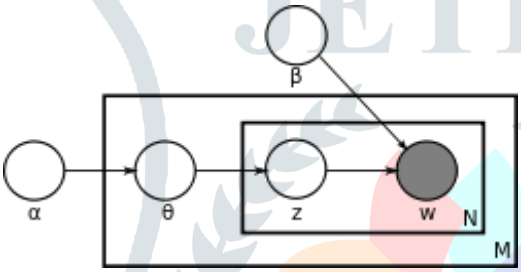

Fig 2.2: LDA model plate notation

3. Network design: The common platform, chatbots and the LDA model pass information using a network. This network is designed by using socket programming technique [5]. Connection between the user and centralized system are made and as per the query the centralized system connects the user with service provider's chatbot. In the query slow shown in fig 2.3, the query by user is received by virtual assistant, which makes an connection with centralized server and then gets the IP address of the service provider which is assumed to provide the solution. Later the query is sent to the service provider which returns the reply for the same, and this reply is returned to user.

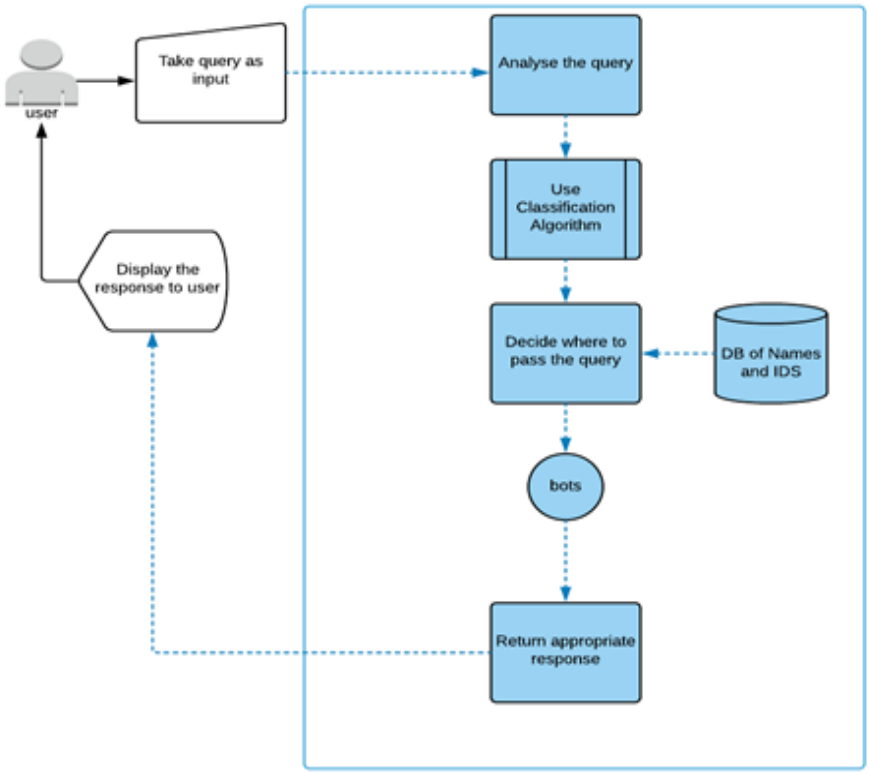

Fig 2.3: flow diagram of query

3] Results and Analysis:

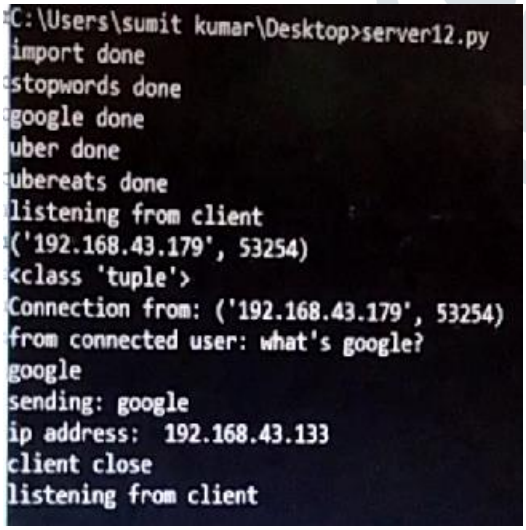

Fig 3.1: Screen of Centralized systems server

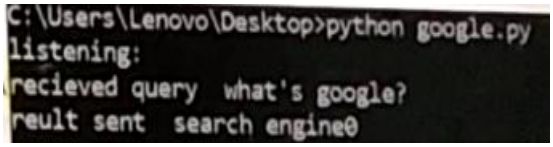

Fig 3.2: Screen of Service providers server

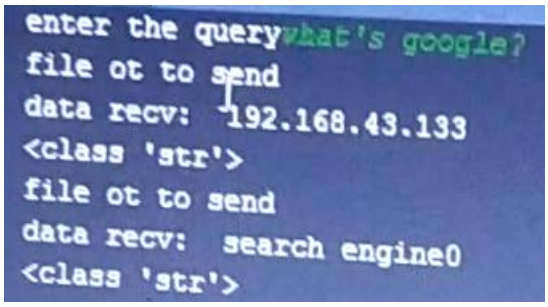

Fig 3.3: Virtual Assistant backend

As shown in fig 3.1, firstly all the imports of library are done. Later the preprocessed files are generated and the server starts to wait for the connection from client. Later it shows a connection with '192.168.43.179' is formed and it process the query and gets the most suitable service provider using LDA model. It later returns the IP address of the service provider in this case of google(name is just given to represent information chatbot, it has nothing to do with the company). The returned ip address of service provider can also be seen in fig 3.3, then the virtual assistant makes a connection with the this ip address and sends the same query to it. As in fig 3.2 the service provider takes the query and return the result with an integer at end. This integer represents the status of transaction, 0 for completed, 1 for incomplete, 2 for not found, 3 for error. The result is then received by virtual assistant and the connection is maintained with the service provider or closed on the basis of status returned by service provider.

5] Result/Performance analysis: The centralized server can interact with 5 users simultaneously but can the process the result for just one at a time, others will be connected to centralized server and will be on hold. It takes 2sec for the virtual assistant to display the result. The accuracy can not be measured unbiasedly as no such system or database exist as of now.

4] Conclusion: -

This system proposed can be used to improve user experience with virtual assistant and also make it safer as the user will not be sharing its details with Google assistant but with the service provider directly. It also makes sure that the interaction with user goes without interruption as the service provider will let the assistant know whether the conversation is over or not. With the use of this users can even make transactions with their bank as they'll be sharing data with just bank itself.

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