

# Virtual Businessman

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**Abstract** - In this competitive world, to grow economically, people need a side-business. By using social media platforms like Whatsapp, Facebook, a first copy businessman can reach to a lot of customers easily. The businessman spends too much time in communication with customers. We are describing here a brilliant idea to automate this side business of first-copy products. This paper gives detailed information about the entities involved in the system and the working of each entity. In this paper, we are giving the design of Virtual Businessman and an algorithm to handle customer queries.

**Key Words:** First Copy Business, Virtual Businessman, Chatbot, Naive Bayes Classification, WhatsApp web, Selenium Webdriver.

## 1. INTRODUCTION

In the world of competition, to sustain economically there is a need for a side business. These days it is very common to approach to use social media platforms such as WhatsApp, Facebook, Instagram for doing business to earn a little extra income. One of such businesses is the business of First Copy Products.

In this business, there are three main entities involved- Seller, Businessman, and Customer. Businessman creates a group of customers on WhatsApp and he acts as the middle man between seller and customers. He sends the details of products received from the seller to customers through WhatsApp group. Customers ask questions about the products to the seller by chatting on WhatsApp. Once the customer wishes to buy a certain product then the businessman asks the seller to deliver the product to the customer on the provided address. The flow of payment goes from customer to businessman and then from businessman to seller with businessman earning some profit out of it.

The main problem in this business is that a businessman needs to invest a lot of time. To solve this problem, we are proposing a system which will automate the work of the businessman. Our system will be intended to perform the task of interacting with the customers on WhatsApp on behalf of businessman, so the main task is to build a chatbot which will interact with customers so fluently that it will have a human touch.

## 2. LITERATURE SURVEY

The research done by us was fully focused on the machine learning algorithms which are needed to process customer's

messages and generating the reply. We came across many research papers written on implementation of chatbot and Natural Language Processing involved in it. Most of the chatbots are based on Naive Bayes' concepts [1][3][4]. Similar to our Virtual Businessman there is a Virtual Teacher who answers the queries of students by using Bayesian Classification [1]. Query text is preprocessed and keywords are extracted from the query to find the sentiment [1]. According to the sentiment of the query, answer having the highest probability is selected from answer dataset [1]. In a similar way, customer's queries can be treated. Text is preprocessed by using techniques like removing stop words, lexical parsing and stemming [1][2][4]. The number of keywords increases as the size of dataset increases. To reduce this higher dimensionality, methods like feature extraction and greedy search are helpful. Greedy Search increases the accuracy of Bayesian classification [4].

In case of simple Bayesian classification techniques, one of the biggest problems is they cannot keep the context of the conversation but was only able to respond from input to input. We can solve this problem by using Recurrent Neural Network. LSTM is used to keep the context of the conversation. The classifier will be able to more accurately classify the queries by taking context into consideration [2]. Words from the preprocessed dataset are converted into word vectors to analyze them using Neural Network. LSTM learns long term dependencies of sequence inputs, thus they remember information for long periods of time. The system shown here uses LSTM to keep the context of the conversation. LSTM is handled by using the Forget gate and Input gate [2].

## 3. DESIGN

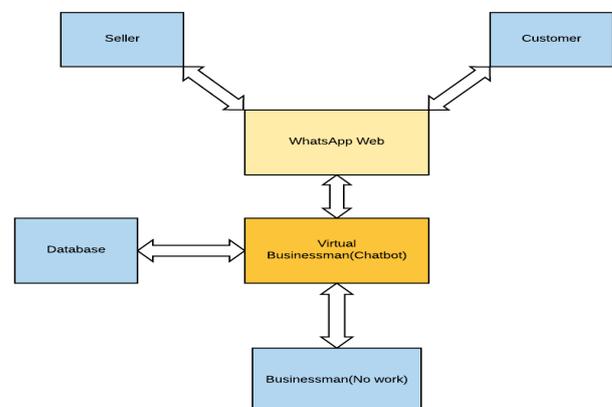


Fig-1 : Design of System

As shown above, our system consists of 6 entities :

- i. Seller
- ii. Customer
- iii. Businessman
- iv. Virtual Businessman
- v. WhatsApp
- vi. Database

This business starts with the seller sending information of products to the businessman on WhatsApp. This product information is stored in the database. The database also maintains the customer's information. Our system automatically forwards product information including images to the customer's group. The customer then can see the product information on the WhatsApp group. Customer can ask queries about the product on that group which will be replied automatically by the Virtual Businessman. Virtual Businessman analyzes each message by the customer and generates the reply. When the customer orders the particular product, Virtual Businessman retrieves that customer's information from the database and place the order after confirmation. This order confirmation is given to the seller, the product gets shipped to the particular address provided by customer and payment for the same is done by Cash On Delivery process. In this course of time customer can ask about the confirmation of order and delivery process, Virtual Businessman replies to the queries of the customer.

#### 4. METHODOLOGY

The methodology about the automation of the first copy business through WhatsApp is explained using machine learning algorithms and natural language processing.

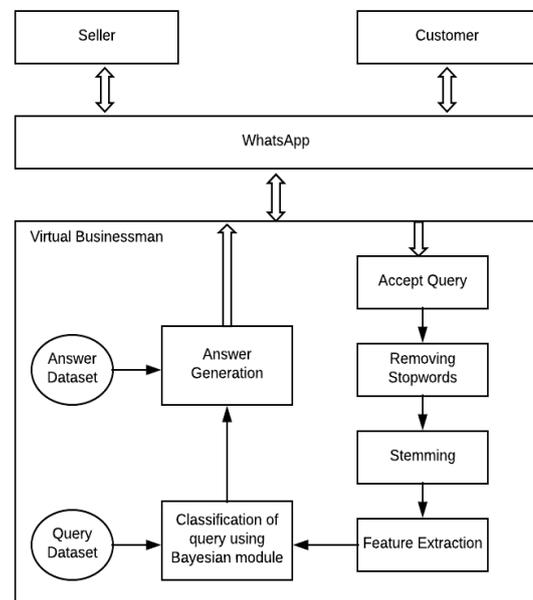
##### 4.1 WhatsApp Automation



WhatsApp Web (web.whatsapp.com) is used to make access to the businessman's WhatsApp account. Virtual Businessman retrieves all the messages received from the seller and customers to the businessman by browser automation. Selenium WebDriver is used for performing browser automation of WhatsApp Web. The script written in Selenium WebDriver crawls the WhatsApp Web and provides customer messages and seller messages to the virtual businessman for handling them.

The product's information is delivered to the customer's WhatsApp group with the help of selenium web driver. The product information contains the product image and description in the form of text. To identify customer reply to the respective product image we are using an image link which is unique for all images. It is the property of WhatsApp image link that identifies the image for which the query is generated. So, it uses that image link as unique id and whatever query is generated it maps it with that unique-id of image and forwards that message to the chatbot. To automate the WhatsApp web we used selenium library and selenium web driver which helps to automate the process. By executing the selenium code accordingly, WhatsApp web will be launched.

##### 4.2 Chatbot



Virtual Businessman is an Artificial Intelligent chatbot system which will do the task of handling the customer's message. For the particular customer message, our chatbot generates an appropriate response with the help of the database. A chatbot is trained on the dataset for handling the customer's message. Training involves -

### A. Preprocessing of the dataset -

Dataset of customer's query and sentiment of their messages are provided for the learning of the chatbot. As this data is textual data, it is preprocessed to extract useful information from it. This can be done in the following steps-

#### i. Removal of Stopwords -

A stop word is a commonly used word (such as 'the', 'a', 'an', 'in') that a system has been programmed to ignore while preprocessing on the dataset. We do not want these words to take up space, or taking up the valuable processing time. For this, we can remove them easily, by storing a list of words that you consider to stop words. NLTK (Natural Language Toolkit) in python has a list of stopwords stored in 16 different languages which are there in the nltk\_data directory.

#### ii. Stemming -

In linguistic morphology and information retrieval, stemming is the process of reducing inflected (or sometimes derived) words to their word stem, base or root form. Stemming is the process of reducing a word to its word stem that affixes to suffixes and prefixes or to the roots of words known as a lemma. Stemming is important in natural language understanding (NLU) and natural language processing (NLP). For example, the word "running" will be converted to "run".

### B. Feature Extraction -

The feature means the impactful words which decide the meaning of the message. The 1-grams and 2-grams are extracted from Preprocessed Dataset.

### C. Machine learning algorithm to train chatbot for classifying sentiment-

Based upon the presence of features the sentiment of user message is identified and a machine learning algorithm identifies the relationship between them and then trains chatbot accordingly. The message can be classified into various categories such as price ask, price compliment, price negotiate, delivery ask, delivery negotiate, delivery compliment, feature ask, product compliment, order cancel, payment ask, payment check to identify the sentiment of the user.

### D. Machine learning algorithm to train chatbot to generate a response -

After identifying the sentiment of the message, the answer for the customer query is generated by a machine learning algorithm with the help of the database. A chatbot is trained for generating appropriate responses by machine learning algorithms.

## 5. ALGORITHM

Algorithm for handling customer queries -

1. Classifying customer message in one of the categories.
2. If the category is Price Negotiate  
Return the reply which will say no to the negotiation.
3. If a category is Order Cancellation  
Return reply which will say no to the cancellation.
4. If a category is Delivery Check or Delivery Compliment
  - i. If the message contains words like 'when', 'day', 'date', 'time' etc.  
Then,  
Return the message according to the delivery date stored in order table in the database.
  - ii. If the message contains words for the compliment about delivery like 'good', 'bad', 'awesome', 'late', 'early', 'very late' etc.  
Then,  
Return apology or gratitude message according to the positive or negative sentiment of words.
5. If the category is Price Ask or Price Compliment
  - i. If the message contains words like 'what', 'tell', 'what is', 'how much', 'what's', etc.  
Then,  
Retrieve the price of the product from the product table in the database and return.
  - ii. If the message contains words for a compliment about the price of the product like 'good', 'bad', 'more', 'less', 'affordable', 'cheap' etc.  
Then,  
Return apology or gratitude message according to the positive or negative sentiment of words.
6. If the category is Feature Ask or Product Compliment
  - i. If the message contains words like 'what is', 'tell', 'give', 'enlist', 'what's', '?', 'is it', etc.  
Then,
    - a. If the message contains words like 'color', 'shade', 'color', 'other colors', etc.  
Then,  
Retrieve color of the product from the product table in the database and return.
    - b. If the message contains words like 'size', 'large', 'small', 'medium' etc.

Then,

Retrieve size of the product from the product table in the database and return.

- c. If the message contains words like 'enlist', 'all', 'features', 'info', 'information' etc.

Then,

Retrieve all the information of that product from the product table in the database and return.

- ii. If the message contains words for the compliment

about the product or its features like 'good', 'bad', 'attractive', 'very', 'awesome', etc.

Then,

Return apology or gratitude message according to the positive or negative sentiment of words.

7. If the customer wants to buy the product his message will contain words like 'book', 'order', 'want', 'place', 'buy', etc.

Then,

Return the message asking for the confirmation and delivery address of the customer. After receiving the address make an entry in the order table.

All these 7 steps will be executed continuously for each message from the customer. Simultaneously our system will check for the new products from seller and images will be forwarded to the customer's group. At the end of the day, entries in the order table will be sent to the Seller as a WhatsApp message.

## 6. CHALLENGES

- End customer and seller should not feel that they are dealing with an intelligent bot. They should always feel that they are chatting with a human.
- Conversational language is very rich in structure. It is a big challenge to handle ambiguities and context of the conversation.
- There aren't much available introductory resources for new learners to Neural networks and deep learning.

## 7. CONCLUSION

Virtual Businessman will be a blessing to First Copy product businessman as we are designing an AI bot, which will replace all the manual work of a businessman who is doing First Copy Business and this will be an additional income source for the businessman with no investment of time. It will reduce the overhead of the businessman by minimizing time and efforts.

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