A Project Report

on

E-Negotiator Chatbot for E-Commerce Platform

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requirement for the award of the degree of

Bachelor of Computer Applications

Under The Supervision of
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1. CANDIDATE'S DECLARATION

We hereby certify that the work which is being presented in the project, entitled **"E-NEGOTIATOR CHATBOT FOR E-COMMERCE PLATFORM"** in partial fulfillment of the requirements for the award of the Bachelor of Technology submitted in the School of Computing Science and Engineering of Galgotias University, Greater Noida, is an original work carried out during the period of Feb 2022 to May and 2022, under the supervision of Ms. Swati Sharma Assistant Professor, Department of Computer Science and Engineering/Computer Application and Information and Science, of School of Computing Science and Engineering, Galgotias University, Greater Noida

The matter presented in the project has not been submitted by us for the award of any other degree of this or any other places.

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This is to certify that the above statement made by the candidates is correct to the best of my knowledge.

Mrs. Swati Sharma

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CERTIFICATE

The Final Project Viva-Voce examination of **18SCSE1010734 – SHIVANSH SRIVASTAVA, 18SCSE1010149 – YASHSHRI SHARMA** has been held on 14-May-2022 and his/her work is recommended for the award of Bachelor of Technology.

Signature of Examiner(s) **Signature of Supervisor(s)**

Signature of Project Coordinator **Signature of Dean**

Date: May 2022

Place: Greater Noida

Abstract

Chatbots are emerging as a helpful and strong tool for customer satisfaction and ample resources for the e-commerce platform serving to the customer saves a large sum of money and time. Integration of chatbots in the existing-commerce platforms helps such platforms to boost their sales.

From buying groceries to making major business deals negotiation acts as a key component. Our Price Negotiator Chat Bot System would automates and aids online selling and negotiation based on the price of the product. Satisfying customers is one of the major concerns for all the online e-commerce applications and such chatbots will be of great help to then to deal with their major concern of customer satisfaction as customers need not wait for a long time to get a reply from the customer service executives to rectify their queries.

Our chatbot project is built with Microsoft Bot Framework and will be featuring E-commerce platform capabilities via LUIS, Text Analytics, Azure Search, and Moltin.

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Acronyms

B.Tech.	Bachelor of Technology
M.Tech.	Master of Technology
BCA	Bachelor of Computer Applications
MCA	Master of Computer Applications
B.Sc. (CS)	Bachelor of Science in Computer Science
M.Sc. (CS)	Master of Science in Computer Science
SCSE	School of Computing Science and Engineering
CUSM	Custom
NLU	Natural Language Understanding
HTTP	Hypertext Transfer Protocol
JSON	JavaScript Object Notation
SVM	Support Vector Machine
NLP	Natural language Processing
LUIS	Language Understanding
ML	Machine Language
API	Application Programming Interface
DBMS	Database Management system

CHAPTER-1

INTRODUCTION

1.1 INTRODUCTION

Shopping has long been considered a refreshment by many. Shopping online became a recreational activity in life. The reason for developing a web-based online shopping system is many everyone walking down the street for shopping has some difficulties. Also, some people are so much busy and not able to go out shopping, Some don't like to shop in-crowd.

An online shopping system is a virtual store on the Internet where customers can browse the product and select the product of interest. Negotiation is a combination of both, linguistic and reasoning problems. Negotiation is the process of exchanging the highest likelihood of satisfying the needs of both parties. Negotiation covers many aspects of our lives have led to extensive research in the area of automated negotiators [1].

The E- Negotiator Chabot helps the user to solve queries and provides a negotiation mode if dissatisfied with the price. Such a system will help the users to freely interact with the software and upload their product-related queries and budget and get the response related to the query. Just like retail and logistics companies use data to plot the most efficient route to deliver goods. Negotiation is a combination of both, linguistic and reasoning problems.

It requires an intention for something which needs to be verbalized. Dialogue rollout is a concept defined by FAIR researchers for developing long-term planning dialogue agents. Chatbots can solve most customer queries without the interference of customer executives. Thus, if a chatbot is able to implement negotiation then e-commerce websites will attract a lot of new consumers because of the features.

In this project, a chatterbot or chatbot aims to make a conversation between both humans and machines and design and development of an intelligent voice recognition chatbot for e-negotiation.

Agent-based automated negotiation can give a flexible instead of a fixed price in e-commerce and can maximize the payoffs of both buyer and seller. It can be seen as an ideal and efficient mechanism for business. After discussing the negotiation in e-commerce and intelligent agent technology, state-of-the-art overviews are given of agent-based automated negotiation, specifically three main approaches for automated negotiation: the decision theory, the game theory, and the negotiation analysis. And then, give a view of some famous models.

Finally, we point out that automated negotiation is still in its infant stage because there are still some difficulties in this field. The first is the ontology issue, the second is agents' strategies and the third is a Communication protocol. Electronic negotiations are becoming an important research subject in the area of electronic commerce. Decision analysis and especially multi attributive utility theory play an important role in the support of electronic negotiations. The preferences are usually represented as a utility function on the set of alternatives such that the user prefers an alternative exactly when it has a higher utility.

1.2 PROPOSED METHODOLOGY

A. Getting the query from the user: The user selects the product that he/she wants to buy, gets some doubts related to the product, and as well as feels that the price of the product is out of their budget. Users then select the option to negotiate and clarify the queries related to the product with the AI chat-bot of that e-commerce site. The user can chat with the e-commerce bot and input the queries they have without the concern or involvement of any customer executive.

B. Dialogue rollout: Chatbots can solve most of the customer queries without the interference of customer executives. Since it is a combination of both linguistic and reasoning problems, hence it requires an intention for something, which needs to be verbalized. Dialogue rollout is a concept for developing long-term planning dialogue agents. This will aim to make a conversation between both humans and machines as well as design and development of eCommerce site.

It will help to create a link between the user and the bot and also a dialogue performs a task that can represent part of or a complete conversational thread.

C. Sentiment Analyzer: After a link between the user and the chatbot has been created then comes the process of identification of the queries that the user is trying to reach for. For this process, we first use the method of sentiment analyzer. In this process the words that are present in the query sentences asked by the user are broken down differently and then it's analyzed for the repetition of the word, the sentiment of the word, the task aims with respect to each word, etc. After the sentence is broken into parts the bot then tries to identify the user's intention by using this process and then presents the solution accordingly without the involvement of any business executives. After the words are broken then from those words the machine selects tag words.

D. Natural Language Processing (NLP): After the words in the queries are analyzed and the sentiment behind the sentence is known then comes the process to present the solution based on the analysis which might be most helpful to the user. For this process, we use the method of NLP, for this process admin feed some knowledge or data sets to the machine so that the machine can identify the sentences and take a decision itself as a response to answer a query. Then by using the tag word from the query, the system gives the response with the help of Natural Language Processing (NLP).

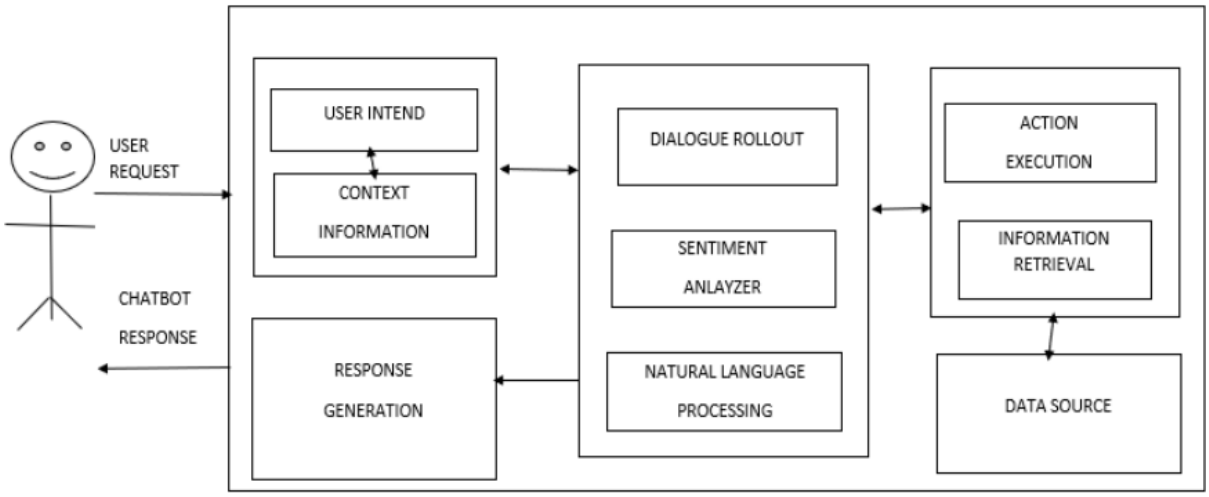


Figure 1. Workflow Diagram

1.3 FORMULATION OF PROBLEM

Successful experience of the human traditional negotiation is a valuable learning resource for automatic negotiation. An automated negotiation model can learn from past experience in negotiation, and reason, and give a reasonable choice of negotiations on a new strategy.

Negotiation is a discussion aimed at solving transaction conflicts and making better deals between trading entities in the commerce world.

Negotiation is a major part of real-life transactions. From major business deals to buying vegetables it acts as one of key the elements of cracking the deal. If implemented correctly in the rapidly growing E-commerce field it can increase the quality of the customer service. Customer satisfaction is the major concern for all the web-based applications and chatbots help them work with this major concern as customers do not need to wait for customer executives to solve their queries. Chatbots can solve most customer queries without the interference of customer executives.

Thus, if a chatbot is able to implement negotiation then e-commerce websites will attract a lot of new consumers because of the features. Chatbots are mainly used to provide conversation between both humans and machines. Admin feeds some knowledge to the machine so that the machine can identify the sentences and take a decision itself as a response to answer a question [2].

Negotiation is the process of exchange that provides the highest likelihood of satisfying the needs of both parties. Negotiation covers many aspects of our lives and has led to extensive research in the area of automated negotiators [3].

The E- Negotiator Chabot helps the user to solve queries and provides a negotiation mode if dissatisfied with the price. Such a system will help the users to freely interact with the software and upload their product-related queries and budget and get the response related to the query. Just like retail and logistics companies use data to plot the most efficient route to deliver goods. Weare providing the Negotiation mode in the proposed system so that users can use this particular model if S/he is not happy with the price. When it comes to shopping negotiation is a major component that impacts the deal. The process of satisfying the requirements of two or more parties in presence is

called E-commerce negotiation which is a decision-making process of limited information and conflicting preferences.

Undergraduate students mostly utilize the shopping mall to procure essential and everyday items of urgent need. (e-shopping mall currently lacks an online inventory service that allows students who patronize the shop to check the current stock availability of the items they wish to buy before visiting the store in person to purchase these items. (is the deficit is a real cause of exhaustion and anger on the students' part because of the long distance between the undergraduate hostels where students reside and the shopping mall. Students often embark on a long journey to the store but have their hopes dashed when the items they seek are either unavailable or out of stock.

(is work attempts to overcome this ongoing challenge by creating a chatbot for (e chatbot's purpose is to have a smart, accurate, and real-time conversation with the students. In this way, students can chat with the bot to inquire about particular items they seek to purchase and pay online for the items before visiting the mall. (e chatbot will be accessible via portable mobile devices or computers, which students can log in to anywhere and anytime on campus, thereby providing a 24- an hour online service.

1.4TOOLS AND TECHNOLOGY USED

The work will alleviate the discomfort currently existing when Covenant University members travel down to source for out-of-stock items or unavailable items. (e aim of this work is the design and implementation of a chatbot for Covenant University Shopping Mall.

(e block diagram for the University Chatbot System is shown in Figure 1. (is work will help create smart comfort and an efficient online presence for Covenant University students using a technology-oriented method, in this case, a chatbot for the website of Covenant University Shopping Mall. (e work involves the following:

(1) Designing a web page where the chatbot will be deployed using React. (is will serve as the front-end of the chatbot

(2) (e development of the chatbot with deep Natural Language Processing (NLP) and datasets

(3) (e development of a database of items currently stocked by the shopping mall

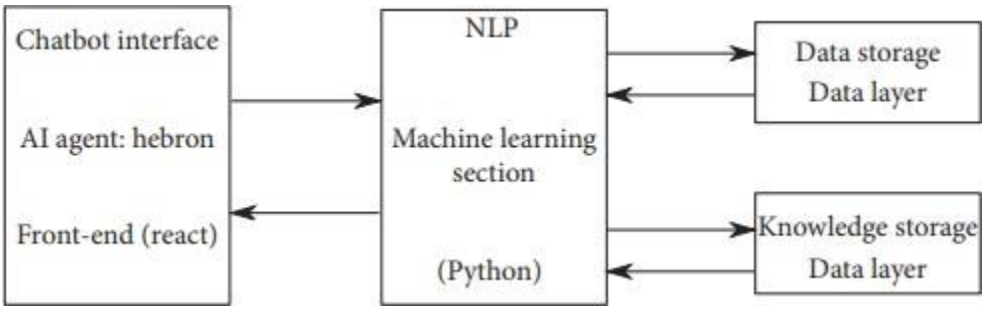


Figure 2: Block diagram for the University Chatbot System.

(4) **Introduction of administrator** privileges which can be updated by an assigned staff to update the current list of items and the number of stocks for each item.

(5) **System testing to ascertain the proper functionality** of the developed chatbot, alongside, user testing by a focus group to provide constructive feedback on the developed chatbot (e-paper is organized as follows.

Section 1 presents a brief overview of the project. A comprehensive review of relevant pieces of literature relating to the e-commerce chatbot is discussed in
Section 2.
Section 3 is the system design, where the actual design of the developed chatbot and its capabilities are presented. (e results and user testing data are presented in **Section 4**.
Section 5 is the concluding chapter, where a conclusion and relevant recommendations are stated.

CHAPTER-2

LITERATURE SURVEY

General Environment for Negotiation with Intelligent multi-purpose Usage Simulation, this system enables alleviation of the difficulties in the design process of generally automated negotiators. GENIUS is freely available for participants to develop and test their agents. Its easy-to-use agent skeleton makes it a suitable platform for negotiating agent development. The first step toward moving the problem of automated negotiation toward natural language interfaces was provided by Inon Zuckerman [4].

The paper explained how the current state-of-the-art automated negotiator would perform when paired against the chat-based interface. This paper extended the GENIUS negotiation system. A chatbot for selling physical and digital goods was introduced by Amir Reza Asadi [5]. This chatbot is implemented for telegram and uses its API. This chatbot is basically designed for order taking with minimal user input and suggested for target markets that customers have little knowledge of about it. [6] presents a brief review of applications that are used AIMLchatbot for their conversational service.

These applications are related to cultural heritage, e-learning, e-government, web base model, dialog model, semantic analysis framework, interaction framework, humorist expert, network management, and adaptive modular architecture. Such applications can help people by providing useful services but also interact with customers and provide solutions to their queries through AIML chatbots instead of human beings.

KBAgent [7] More recent applications include i.e. negotiation history from other users will be used as a knowledge base for general modeling which will be used while negotiating by the automated negotiating agent. Experiments conducted with people show that the KB Agent negotiates efficiently with people and even achieves better utility values than another automated negotiator, shown to be efficient in negotiations with people. The paper gives general opponent modeling and proposes offers using a concession method and accepting offers using a sophisticated threshold. The paper shows that KBAgent can achieve significantly higher utility values than the human players.

A chatbot is an automated AI software program that allows for human-bot interaction. (see conversations can be implemented through text interfaces and voice interfaces. Besides, chatbots are embedded AI features that accompany websites and messenger applications and, in some instances, serve as standalone bots. Chatbots have several synonyms such as ChatterBot, Chat Robot, talk bot, Bot, IM bot, and virtual assistants. (ey can be ontology or pattern-based [1].
Businesses are increasingly using artificial intelligence in conjunction with chatbots to interact with customers to provide a more personalized service experience for customers. Examples of such organizations include Lyft, Fandango, Spotify, Sephora, MasterCard, Staples, and (e Wall Street Journal [2–4]. In this work, a chatbot will be implemented to solve an e-commerce problem within an academic environment, specifically Covenant University, Ota.

(therefore, the goal of this literature review is to study the application of chatbots in various contexts. In the section that follows, studies related to the application of chatbots in e-commerce and non-e-commerce contexts are examined to identify a gap concerning the concept of chatbots within the literature. (e review of the literature reveals that several authors have contributed significantly to the development of chatbots primary among whom are Allison [5], Sanchez [6], Goel [7], Weizenbaum [8], Colby [9], and Wallace [10]. (e review of the literature shows that chatbots were initially developed as chitchat systems [8–10] and task-completion systems within non-e-commerce settings.

For example, the chatbot ELIZA was developed using simple pattern matching and a template-based response to emulate the conversational style of a non-directional psychotherapist [11]. (e chatbot PARRY was designed to behave like a paranoid person [12].
Also known as Artificial Linguistic Internet Computer Entity, ALICE engages in conversations by applying flexible pattern matching rules to the users' input. [13].
(e chatbot Jabberwacky [13] can learn and develop new responses to its users through previous interactions with its users, which made it special during its time of reign [14].
In 2011, the open-domain question-answering (QA) system, tagged Watson, beat the two highest-ranked players in a nationally televised two-game Jeopardy match [15]. With the release of intelligent personal assistant Siri by Apple in 2011 and then Cortana by Microsoft and more recently social chatbots such as Microsoft's Xiaoice in the current social media age, the scope of chatbots as conversational systems has been extended to cover a wide range of domains including e-commerce [12, 16]. Text-based chatbots are bots whose primary mode of communication is through texting or messaging.
(ey also come with additional features such as images, videos, and quick replies [17, 18]. Humans are sometimes unable to tell the difference between a text-based chatbot conversation and a human conversation during real-time conversations. However, methodologies, such as CAPTCHA, keyword detection, and dialogue correlation [19] are used to unravel this. Furthermore, Mori et al.
[20] suggest that text-based chatbots meet the reasonable answer criteria but lack emotions and attitude, which can be easily identified in human conversation. In light of advanced virtual assistants like Cortana and Siri, text-based messaging services are "cheap, fast, democratic and popular" and, especially for young people, the preferred way of communication [21].

Angga et al. [22] propose a chatbot design with an avatar (3D) and voice interaction elements to make the conversation more intelligible. Kraus et al. [23] investigated the factors for customers' satisfaction in voice commerce and e-commerce. In the study, four factors were considered, which led to the author's generation of four hypotheses. (see factors include Recommendation Complexity, Recommendation Personalization, Convenience, and Transaction Process Efficiency.

A survey was conducted with 178 consumers and a structural equation model was designed for statistical hypotheses testing. NLP explores how computers can understand and manipulate natural language text or speech to do useful things [23]. Ontology-based chatbots can also be implanted on e-commerce websites, according to Vegesna et al. [24]. (e authors propose that the ontology-based chatbot will satisfy the user in terms of solid replies and a more natural and interesting conversation. Unlike ontology-based chatbots, pattern-based chatbots have preprogrammed responses, which makes their conversation unnatural [25].

Nwankwo [26] demonstrates how chatbots work in an academic context by designing an academic chatbot to assist tertiary institutions' academic advising bodies in Nigeria. Subramanian et al. [27] developed a chatbot that serves as a tutor for learners, the learners being software engineers in this context. Haller and Rebecca [28], on the other hand, implemented a chatbot as a historical figure, where the bot contains a lot of information about the life and personality of the simulated person so that the bot can act in accordance with its requested character.

Chatbots have a beneficial role in healthcare, such as support, motivation, coaching patients, and organizing administrative tasks [29]. However, there are concerns about the inability of chatbots to sympathize with the patients and give knowledgeable advice in expert medical areas. Chatbots have been applied in the e-commerce industry.

A study [30] highlighted the practical benefits of using AI in e-commerce, as seen in Amazon's case where using AI has led to improved productivity, upgrading of clients' online purchasing skills, and a positive impact on the company's revenues. Kaczorowska-Spychalska [31] similarly provides insights into how chatbots have influenced marketing with respect to e-commerce. (e findings show that chatbots have the highest degree of customer acceptance in the e-commerce sector. In addition, chatbots are seen as the future digital imitator of humans by the year 2050 [31].

(e author suggests that, with these alarming figures, the conversational level of chatbots needs to be improved, specifically increasing the machine learning level ability of the bots and implementing chatbots with an all-in-one technology e.g., NLP, ontology-based, and pattern-based chatbots. Khandala et al.

[32] extend discussions on chatbots by implementing a ChatterBot as a negotiator for e-commerce websites. Angelov and Lazarova [33] developed a distributed chatbot system for the supply chain management. Bhawiyuga et al. [34] explain how an e-commerce chatbot can generate automatic responses to customers who want to enquire about products and services. (e authors argue that while a business may operate 24 hours a day, seven days a week, it is implausible that its employees will be available around the clock. Cui et al. [35], on the other hand, created a virtual assistant called "SuperAgent," which is an open-domain chatbot that can be implemented in web browsers like Microsoft Edge and Google Chrome. In the study, SuperAgent is represented as a customer service chatbot that leverages a huge scale and freely accessible e-commerce datasets. Gupta et al.

[36] also implemented a chatbot on an e-commerce website. In their study, Steinbauer, et al. [37] implemented and integrated a chatbot component into an existing Customer-Relationship-Management (CRM) system of a mid-sized company in Austria. Boger [38] develops ¨ a chatbot prototype that assists its users in choosing laptops and acts as a sales recommender. Joshi et al. [39] also proposed a chat-based automated system–"CartBot" for online shopping.

It is also known as a personalized assistant that understands its users' needs based on the users' likes and preferences. Nursery and Subhiyakto [40] demonstrated the use of chatbots as sales assistants by building a chatbot in an e-commerce system that carries out basic conversations concerning every product's remaining stock orders and payments. Reshmi and Balakrishnan [41] sought to further develop chatbots' intelligence by integrating big data into a chatbot framework. (e big data served as the chatbot's knowledge base or database, alongside the AIML knowledge base Villegas et al.

[42] developed a system that engages students on campus in active learning. With this, the system will be able to use AI [43, 44] to make decisions that contribute to each student's needs in conjunction with big data.

From the preceding sections, it will be observed that the chatbots developed thus far have a limited measure of intelligence. (this is because chatbots are primarily pattern-based; therefore when the user starts asking questions beyond the bot's knowledge scope, the bot becomes clueless.

There is also a consensus among several scholars concerning the need to improve upon the AI capabilities and data sets of chatbots [24, 25, 35, 41]—a gap this study seeks to fill. In the light of this identified gap, the main question to be examined in this study is as follows: how can chatbots be made more intelligent? (is the question, which is yet to be investigated in chatbot literature, forms the interrogation basis hereinafter. From the review of literature, the following chatbot applications have been used, namely, Telegram bot, Chatfuel, Alexa, and DialogFlow.ai.

Given the limited AI capabilities of these software programs, we propose implementing the e-commerce datasets with machine learning techniques and database structures during the pilot phase of smart shopping using the CUSM chatbot as a case study. (e CUSM chatbot will be implemented using React.js for the chatbot UI combined with Python opensource libraries where Python functions as a DBMS for the messaging backend. (e backend consists of the machine learning section and database layers, which work together to create more content and structure for Hebron.

(see methods stand a better chance of overcoming the earlier identified weaknesses of chatbots' limited AI capabilities. Also, some of the methods to be used for the CUSM chatbot were not implemented in the studies reviewed above. (e review demonstrated the application of chatbots in a wide range of contexts, which can be broadly grouped into two, namely, e-commerce and non-e-commerce contexts. Concerning non-e-commerce contexts, chatbots were implemented in academic and medical settings.

Chatbot applications in the academic field included tutor bots for contextual learning [27], historical figures [28], virtual level advisers in the tertiary academic sector of Nigeria [26], and library assistants [5], while chatbots were deployed as online medical shopping assistants in the medical context.

With respect to the e-commerce context, chatbots were implemented as recommenders [1, 31, 38], marketers [1, 31], negotiator agents [32], supply chain agents [24, 33], customer relationship managers [1, 34–37], and sales assistants [38–40].

Studies examining artificial intelligence-based chatbots were also reviewed. (e review of chatbot studies undertaken thus far in this section reveals that pattern-based chatbots have limited intelligence. Scholars have suggested that the AI abilities and datasets of chatbots need to be improved upon.

Based on this identified gap, my proposed project aims to improve the limited intelligence of chatbots. To implement the work, methodologies that will be utilized are React.js to build the chatbot front-end and admin login page, Spacy and React.ai for the NLP section and training of the chatbot, and e-commerce datasets for the chatbot data layer coupled with MySQL to help manage and build the data structure in which the e-commerce datasets will be stored. In the next section, the methodologies for implementing the work are described

CHAPTER-3

FUNCTIONALITY/WORKING OF PROJECT

SYSTEM DESCRIPTION

The main focus of the project is to develop a modular chatbot architecture so that accuracy can be improved, and new features can be added easily. In order to do that [10] microservice architecture was chosen. Instead of creating a larger system, several smaller components were developed which are connected with each other. It improves modularity and makes refactoring easier. The main system consists of 5 major components, Figure 1 shows the system structure.

A. NLU Engine

The Natural Language Understanding engine is one of the major parts of the system. It is an HTTP server that takes text as input and returns intent, entities, and confidence about its prediction as JSON string. Figure 2 shows a sample response.

B. Recommendation Engine

The purpose of the recommendation engine is to find the products that users are more interested to purchase. The recommendation engine selects products based on what types of products users browse for, price range, user gender, previous purchase, important occasions for the user, etc.

C. Adaptive Pricing Engine

The adaptive pricing engine generates real-time discounts or deals for users. It collects product information from the recommendation engine, based on user interest and history, and provides discounts and deals to the user. The system is based on a fuzzy engine and rules are based on [11] a blog post was written by Evan Prodromou.

D. Bot Engine

The Bot Engine is the core platform of this system. It is connected with the NLU Engine and Adaptive Pricing Engine. The bot engine receives input from users and classifies user input using the NLU engine. Then using a routing engine it routes the user request to the specific controller which handles the request and creates a response for the user. The bot engine can also receive signals from the Recommendation Engine and Adaptive Pricing Engine, based on which it can generate a response for the user.

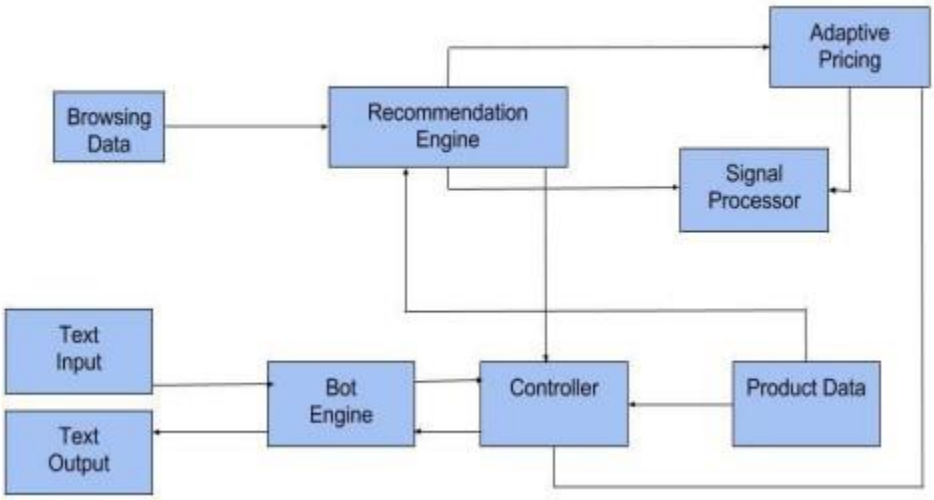


Figure 3: System architecture of the sales bot


```
{
  "text": "show me chinese restaurants",
  "intent": "restaurant_search",
  "entities": [
    {
      "start": 8,
      "end": 15,
      "value": "chinese",
      "entity": "cuisine"
    }
  ]
}
```


Figure 4: JSON response from the NLU Engine

The backbone of the bot engine is a bot framework that has 5 major components, Figure 3 shows the architecture of the bot framework.

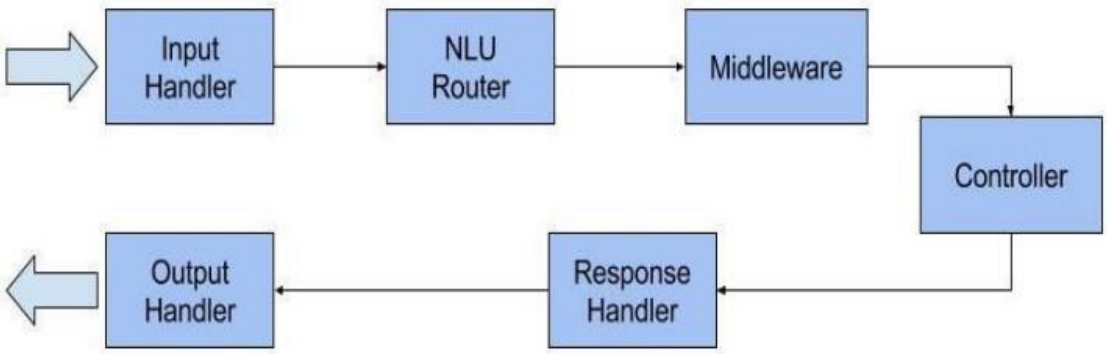


Figure 5: Architecture of the chatbot framework

A. Input Handler

The input handler receives input from multiple platforms (like Facebook, slack, telegram, WebSocket, etc.) and processes it for the NLU router.

B. NLU Router

The NLU router collects user input and classifies input data using NLU Engine. Based on the classified input, it executes the controller

C. Middleware

The middlewares are wrapper over controllers, it can prepend or append features and modify controller response.

D. Response Handler

The response handler generates a response based on demographic. The controller selects the response type and based on user data, user sentiment, and response type the Response Handler generates the response.

E. output Handler

F. Like the Input Handle the Output Handler prepares the response data for the user platform and delivers the response. Apart from all these platforms, the system also has a visual platform to train the NLU Engine.

This platform is based on Django, VueJs, and MySQL. It is a single page application that serves all the frontend login and the views as a single file whenever the user browses the site, it reduces server-side calls, improves performance, and provides a smooth experience. Users can handle intents, texts, entities, and entity synonyms easily using the platform.

Figures 6. a and 6. b show the platform.

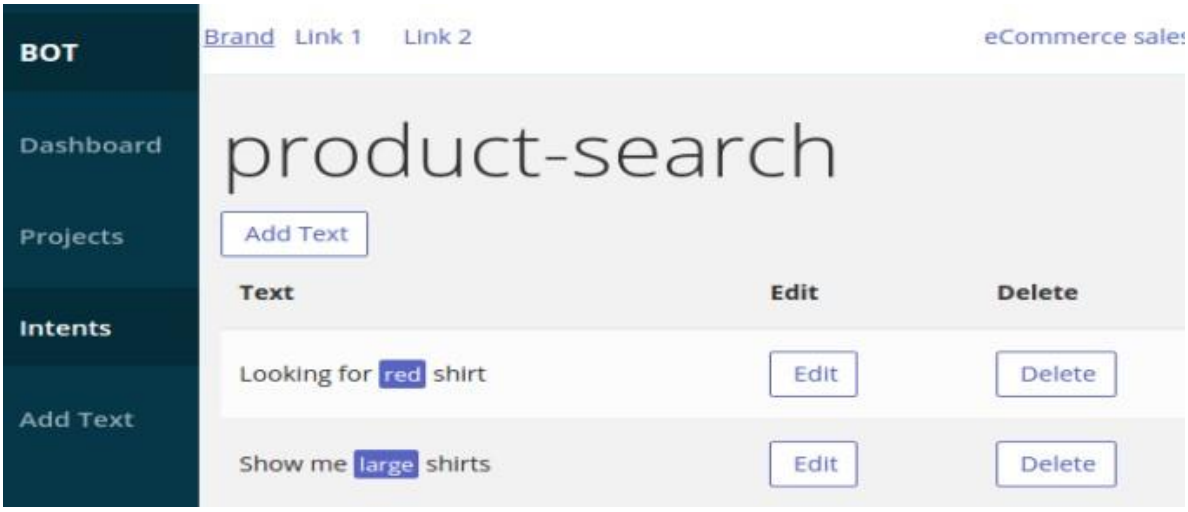


Figure 6 . a: Intent text list with tagged entities

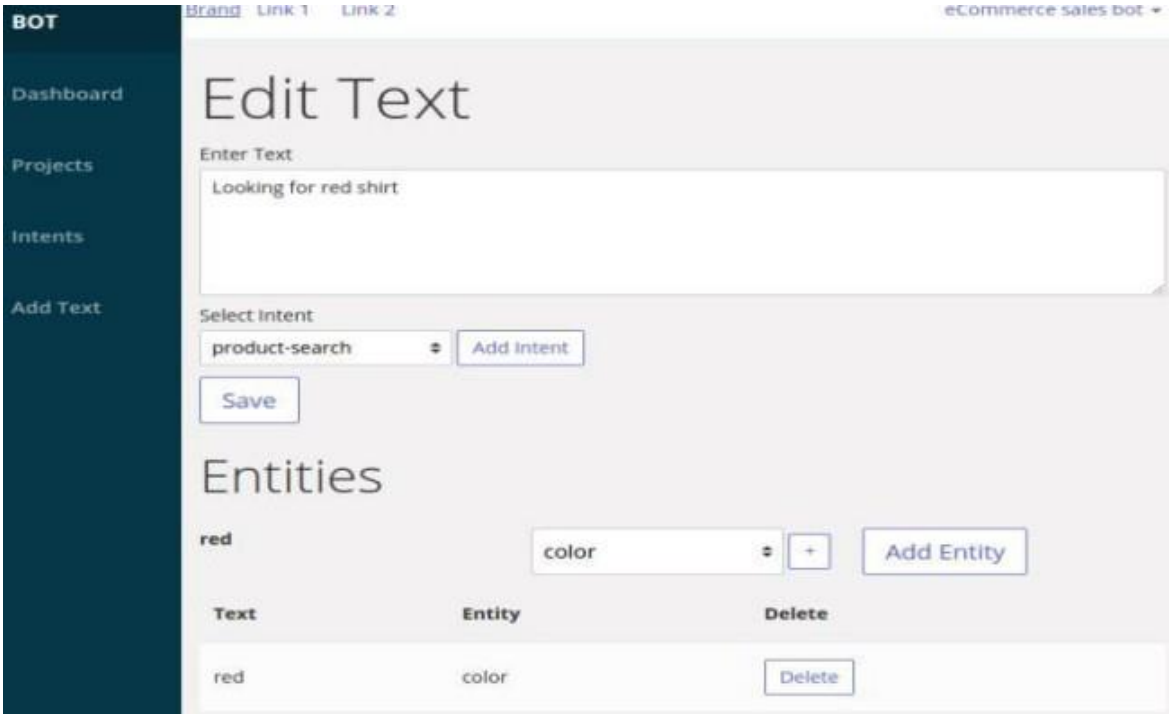


Figure 6 . b: Text management with entity tagging

Whenever the user uses the system, firstly they need to mention their query. From the query, the system can extract the tag word. And then the question tag system gives the response to the user. The system can give the response to the user product queries. The user has to type the product type and budget. The chatbot will search for the most appropriate products as per the user's budget.

Once the products are found to match users' search queries, then the list is returned. The user selects a product and starts
a discussion on the product with a chatbot. The agent begins by proposing a full offer, FA, as its anchor.

FA is chosen by selecting the values for V with the highest value within the agent's search cluster. It then takes an offer from the user and compares it with the minimum price.

If it is greater than the minimum price then it accepts the deal else it uses the negotiation formula to offer a new reduced price to the user. If the new reduced price is less than the minimum value then the chatbot offers the minimum value to the customer which he can accept or reject.

Algorithm:

1. START
2. Authenticate User
3. Take query as input from the user and apply SVM
4. Load common questionaries
5. Take budget of customer
6. Display the list of products in the user budget
7. The user will select a product
8. If the user wants to negotiate:

a. Compare customer offered price with min price of product

b. If it’s greater than min price then apply formula:

Difference=max_price-offered_price

percentage=(Difference*randomNum) %100

nextPrice=prevNegoPrice-percentage

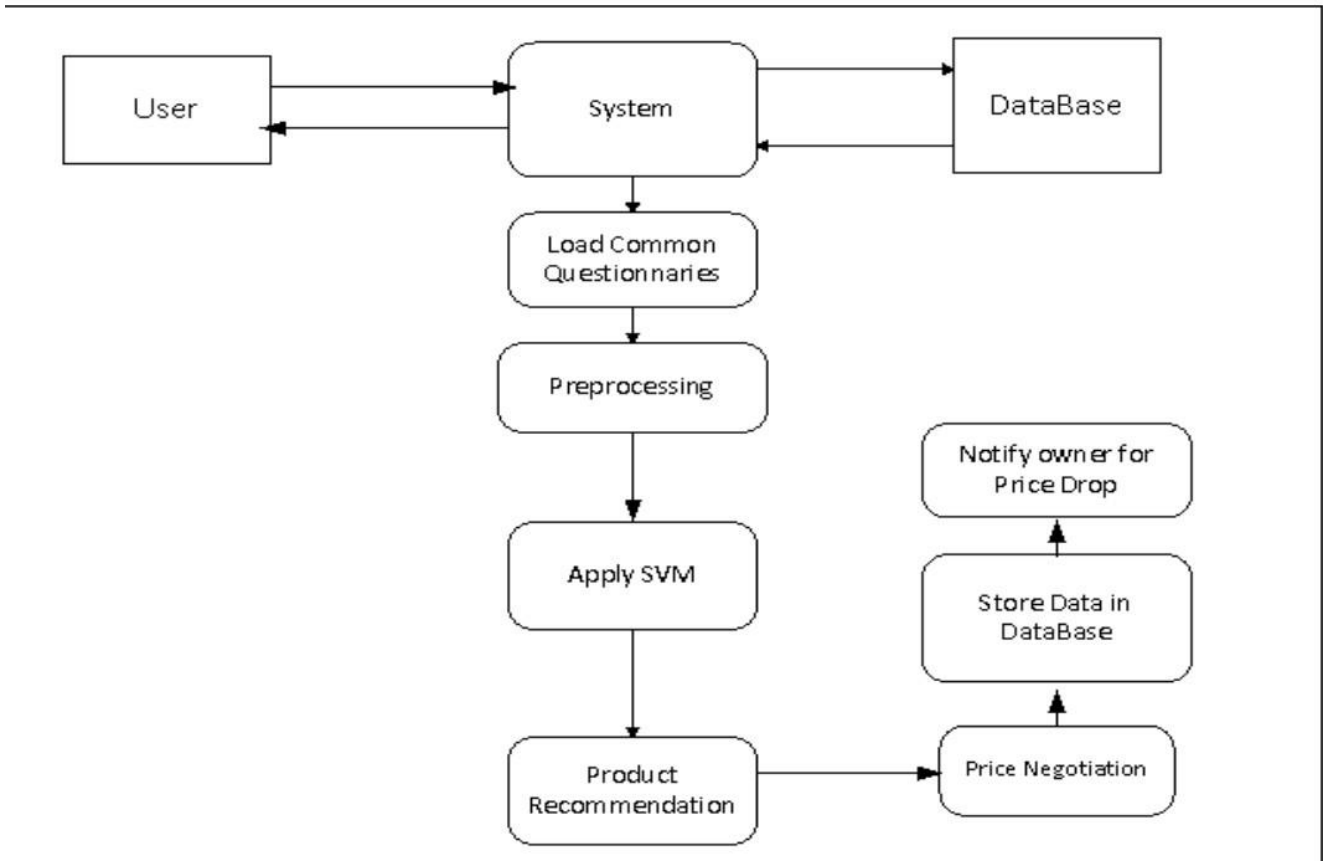
c. If nextPrice<Min_price then return Min_price

d. else return next price as new offer

9.If the user accepts the offer finish the deal

10.Repeat from step 2

11.STOP



The figure shows the architecture of the proposed system. Firstly, the system can load the data having questionnaires dataset related to the welcome messages, and negotiation messages. While using the system user needs to ask a query. Then using the tag word from the query system gives the response with the help of Natural Language Processing. If the user is not satisfied with the production budget then the user selects a product and starts a discussion on negotiation on the product with a chatbot.
Following algorithms are used in the implementation:

3.1 Support Vector Machine Classification Algorithm:

The support vector machine (SVM) proposed by Vapnik and Cortes has been successfully applied for gender classification problems by many researchers. An SVM classifier is a linear classifier where the separating hyperplane is chosen to minimize the expected classification error of the unseen test patterns. SVM is a strong classifier that can identify two classes. SVM classifies the test image to the class which has the maximum distance to the closest point in the training. SVM training algorithm built a model that predicts whether the test image falls into this class or another. SVM requires a huge amount of training data to select an affective decision boundary and computational cost is very high even if we restrict ourselves to single pose (frontal) detection. The SVM is a learning algorithm for classification. It tries to find the optimal separating hyperplane such that the expected classification error for unseen patterns is minimized. For linearly non-separable data the input is mapped to a high-dimensional feature space where they can be separated by a hyperplane. This projection into high-dimensional feature space is efficiently performed by using kernels. More precisely, given a set of training samples and the corresponding decision values -1, 1 the SVM aims to find the best separating hyperplane given by the equation WTx+b that maximizes the distance between the two classes.

3.2 NLP (Natural language Processing):

Natural Language Processing, or NLP for short, is broadly defined as a branch of Artificial Intelligence that helps computers understand, interpret and manipulate human language. NLP draws from many disciplines, including computer science and computational linguistics, in its pursuit to fill the gap between human communication and computer understanding. It refers to the way humans communicate with each other. We want a computer to communicate with users on their terms; we would not force users to learn a new language. This is particularly important for casual users and those users, such as managers and children, who have neither the time nor the inclination to learn new interaction skills. Many of the problems of AI arise in a very clear and explicit form in natural language processing and, thus, it is a good domain in which to experiment with general theories. So, we are using NLP in our project.

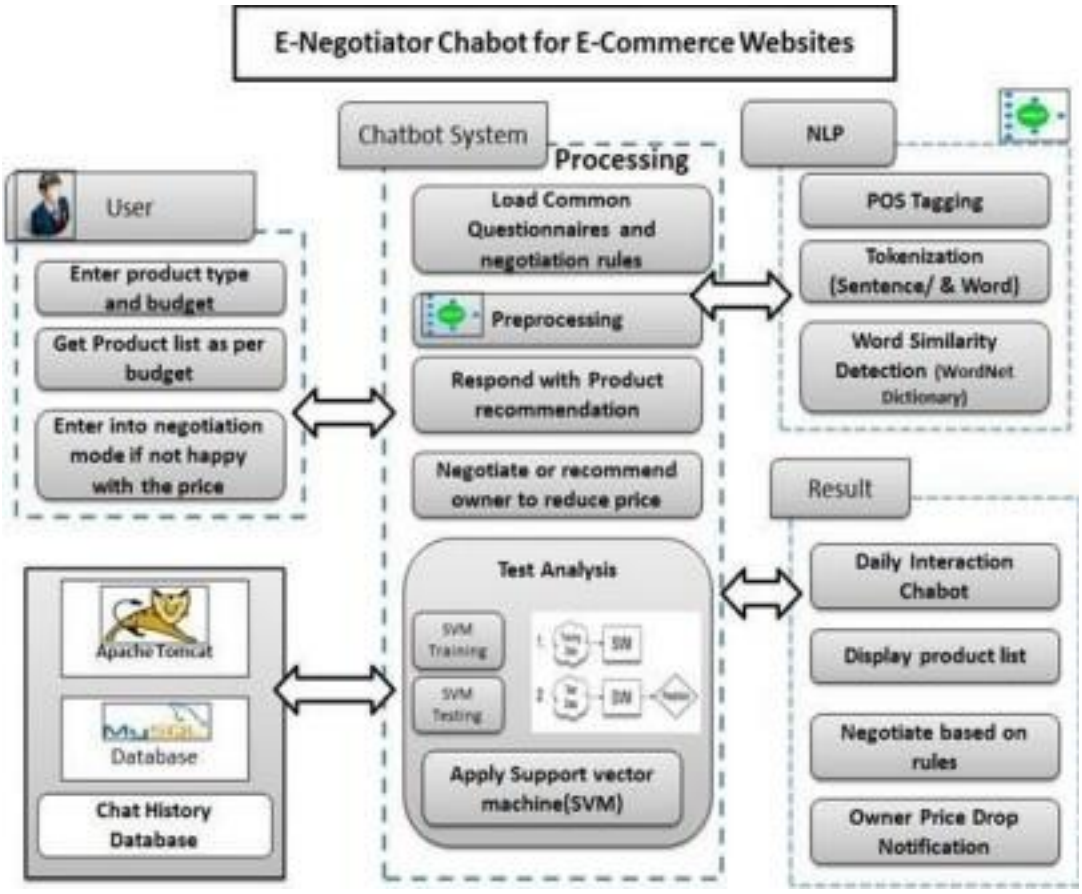
3.3 Porter stemming algorithm (or 'Porter stemmer'):

It is a process for removing the commoner morphological and inflexional endings from words in English. for example, the Porter algorithm reduces, play, played, plays, and playing to the stem play. Following are the steps of this algorithm:

Gets rid of plurals and -ed or -ing suffixes

Turns terminal y to I when there is another vowel in the stem

- Maps double suffixes to single ones: -nation, -national, etc.
- Deals with suffixes, -full, -ness, etc.
- Takes off -ant, hence, etc



Description: Whenever the user uses the system, firstly they need to mention their query. From the query, the system can extract the tag word. And then the question tag system gives the response to the user. The system can give the response to the user product queries. The user has to type the product type and budget. The chatbot will search for the most appropriate products as per the user's budget. Once the products are found to match users' search queries, then the list is returned. The user selects a product and starts a discussion on the product with a chatbot. The agent begins by proposing a full offer, FA, as its anchor. FA is chosen by selecting the values for V with the highest value within the agent's search cluster. It then takes the offer from the user and compares it with the minimum price. If it is greater than the minimum price then it accepts the deal else it uses the negotiation formula to offer a new reduced price to the user. If a new reduced price is less than the minimum value then the chatbot offers the minimum value to the customer which he can accept or reject.

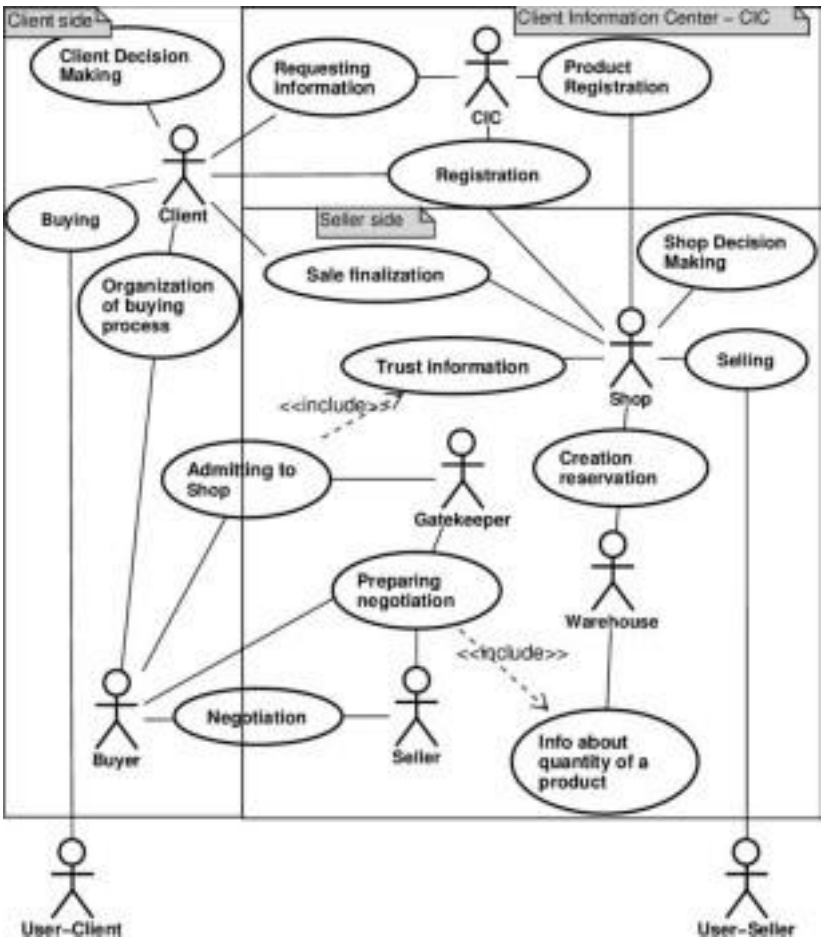


Figure 7: Use case diagram

Description: The above figure shows the Use case diagram of the proposed system. Firstly, the system can load the data having questionnaires dataset related to the welcome messages, and negotiation messages. While using the system user needs to ask a query. Then using the tag word from the query system gives the response with the help of Natural Language Processing. If the user is not satisfied with the production budget then the user selects a product and starts a discussion on negotiation on the product with a chatbot.

3.4 Module Description

3.4.1 Language Understanding (LUIS):

Language Understanding (LUIS) is a cloud-based conversational AI service that applies custom machine-learning intelligence to a user's conversational, natural language text to predict overall meaning, and pull out relevant, detailed information. LUIS provides access through its custom portal, APIs, and SDK client libraries.
For first-time users, follow these steps to sign in to the LUIS portal To get started, you cantryaLUIS prebuilt domain app.

What does LUIS Offer
Simplicity: LUIS offloads you from the need for in-house AI expertise or any prior machine learning knowledge. With only a few clicks you can build your own conversational application. You can build your custom application by following one of our quickstarts, or you can use one of our prebuilt domain apps.
Security, Privacy, and Compliance: Backed by Azure infrastructure, LUIS offers enterprise-grade security, privacy, and compliance. Your data remains yours; you can delete your data at any time. Your data is encrypted while it's in storage. Learn more about this here. Integration: easily integrate your LUIS app with other Microsoft services like Microsoft Bot framework, QnA Maker, and Speech service.

3.4.2 LUIS Scenarios
Build an enterprise-grade conversational bot: This reference architecture describes how to build an enterprise-grade conversational bot (chatbot) using the Azure Bot Framework. Commerce Chatbot: Together, the Azure Bot Service and Language Understanding service enable developers to create conversational interfaces for various scenarios like banking, travel, and entertainment.
Controlling IoT devices using a Voice Assistant: Create seamless conversational interfaces with all of your internet-accessible devices-from your connected television or fridge to the devices' interconnected power plant.
Application Development life cycle

3.4.3 LUIS app development life cycle

Plan: Identify the scenarios that users might use your application for. Define the actions and relevant information that needs to be recognized.
Build: Use your authoring resource to develop your app. Start by defining intents and entities. Then, add training utterances for each intent.
Test and Improve: Start testing your model with other utterances to get a sense of how the app behaves, and you can decide if any improvement is needed. You can improve your application by following these best practices.
Publish: Deploy your app for prediction and query the endpoint using your prediction resource. Learn more about authoring and prediction resources here.
Connect: Connect to other services such as Microsoft Bot framework, QnA Maker, and Speech service.
Refine: Review endpoint utterances to improve your application with real-life examples

Figure 8: LUIS app development life cycle

3.5 SYSTEM DESIGN

In this chapter, the processes involved in designing the chatbot for CUSM, namely, the chatbot's architecture, its individual components, and the data that goes through the chatbot system, will be explained in detail. In addition, the minimum hardware requirements, target users, and software requirements will also be discussed.

3.5.1. Functional and Nonfunctional Requirements.

This system's functional requirements are in two phases: the Covenant University Community phase and the Covenant University Shopping Mall Administrators' phase.

In the Covenant University Community phase, they shall be able to chat with Hebron (chatbot), request items available in the shopping mall, pay for items via the chatbot platform, have a visual representation of the item they want to buy, and know the price of the items they are enquiring about or wish to purchase.

In the Covenant University Shopping Mall Administrators phase, they shall be able to log in via the administrators' portal, update the chatbot database with the current items in the shopping mall, and get a list of users who have paid for items.

Nonfunctional requirements include the following:

(1) Security: unauthorized users should have no access to the system

(2) Usability: the proposed system should be easy for the user to operate, enter data, and interpret the output
(3) Scalability: the system should perform adequately at all times regardless of updates
(4) Compatibility: the proposed system should be compatible with all web browsers

3.5.2. Minimum Hardware Requirements.

Minimum hardware requirements refer to the computer's physical features required to implement the chatbot. (e features are as follows: at least 250 GB HDD, 4 GB RAM, and at least Intel Pentium Dual-Core.

3.5.3. Software Requirements.

(these are the computer programs and procedures required to implement the chatbot.
Table 1 indicates the minimum software requirements.

3.5.4 Target Users.

CUSTOM chatbot's primary target users are the Covenant University Community, particularly the students because they make up most of the Covenant University Community.

In addition, the students are the most frequent users of the shopping mall and will, therefore, appreciate the implementation of an online customer service feature.

Table 1: Software Requirements illustration.

Requirements	Software
Operating system	Microsoft Windows
DBMS	MySQL
Programming languages used	Python and JavaScript
Development tool	Visual Studio IDE

3.5.5. Chatbot Interface.

(e chatbot interface is developed using React.js, a front-end framework for building single-page web applications. Also, React.js helps in developing responsive web pages. (is the presentation layer where users (students/staff) can fully interact with Hebron (chatbot) and get correct and up-to-date responses. Hebron is the official customer care service for CUSM. Here, the user can ask the bot questions concerning current products available, the current prices of the products sold in the shopping mall, and the closing and opening times of CUSM and pay for the items the user desires to purchase via CUSM's payment platform.

3.5.6. Message Backend.

(e-message backend consists of the ML section and data layer. It will be developed using Python and SQL. Python is a high-level language that is easy to understand. It also supports ML and AI. SQL is a domain-specific language that is applied to programming and managing relational database management systems. In this case, it will help in managing the e-commerce datasets stored in a DBMS (MySQL). MySQL is a web database manager.

3.5.7. ML Section.

(e ML section will be developed using an open-source Python library and API, Spacy, and Recast.ai. For the first ML part of Hebron, Spacy is the NLP feature that will help Hebron understand and translate the large volume of texts (data type) it will encounter during its conversations with its target users [45], especially in the grammatical structuring of every sentence Hebron will encounter. (is will also aid Hebron's deep learning process toward NLP. Recast.ai, on the other hand, is the API used to train Hebron with subdivisions such as the user's intents with preprogrammed expressions under every intent and skills conversational flow of the chatbot.

Recast.ai will also help to connect Hebron to the external DBMS and create a webhook to the chatbot interface.

(1) Spacy.

The major features of Spacy are its tokenization feature, lemmatization feature, and linguistic annotations feature.

(2) Tokenization Feature.

This feature helps to break down texts or sentences into words. (e tokenized result is as follows: the sentence is broken down into whitespace characters that can be placed horizontally or vertically.

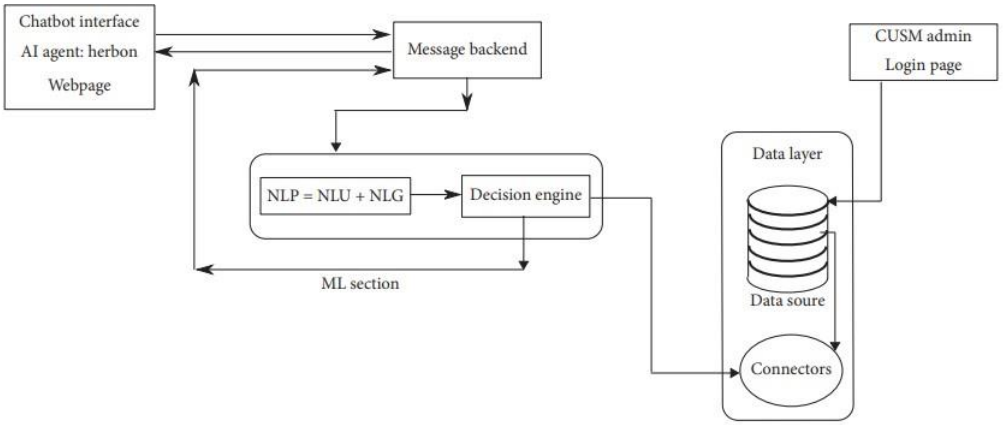


FIGURE 2: The architecture of the CUSM chatbot.

TABLE 2: Tokenized result.

0	1	2	3	4	5	6	7	8	9	10
Windows	will	be	acquiring	a	UK	startup	for	$	2	Million

a tokenizer then processes the sentence from left to right as shown in Table 2.
It then applies its exception rules where prefixes, suffixes, and infixes are considered and split into tokens.

(3) Lemmatization Feature.

The features enable the base form of words to be derived. For example, word 8 tables, lemma 8 table; word 8 standing, lemma 8 stand; word 8 understood, lemma 8 understand. (4) Linguistic Annotation Feature. (is a feature that gives an insight into the sentence's grammatical structure. It further explains the parts of speech for each token or word. Every word has been grammatically defined.

From Table 2, "Windows" has been identified as a proper noun, and "buying" has been identified as a verb. In a nutshell, this is how the grammatical structure of each word in a sentence is determined. (5) Recast.ai. (is API, which is also NLP enabled, will be used to create, train, and monitor the conversational progress of Hebron. Furthermore, it has a webhook feature that will let Hebron go live and be present on the chatbot user interface.

Training Hebron can be referred to as giving Hebron a brain to understand its creation purpose. (e foundation of Hebron's brain can be derived from a term called intents.
An intent is a box of sentences or expressions that all have the same meaning. When a user sends a message to Hebron, the algorithm embedded within the API compares the user's input to the

expressions housed within Hebron's intents.

It picks the intent with the highest similarity rate to the user's input and then selects a suitable reply for Hebron to give to the user. (e reply to various intents is embedded within the intents.

To further expand the knowledge base of Hebron, the API has a feature that accommodates external data. (is external data is in the e-commerce datasets, which can be accessed from the admin login portal and DBMS. Hebron undergoes a lot of supervised learning during its training process, where monitoring its conversational progress finds expression. In other words, Recast.ai is what gives Hebron its brain and defines its skillset.

Data Layer.

Developed using MySQL, the data layer gives a structure to the e-commerce datasets that the chatbot will use to answer product-related questions. (is structure, which is in the form of tables, will help the administrator (s) of CUSM put the relevant information in the right place. (e structure is subdivided as follows:

(1) User
(2) Store
(3) Purchases

(1) User. A table hosting the information in terms of the usernames (in the form of "e-mail address") and passwords of the administrators for CUSM will be stored here.

(2) Store. A table is created to store the products' names, price of the products, quantity of the products, and a short description of the products.

(3) Purchases. A table is created to store the purchases made on the CUSM chatbot via a pay stack plugin. In other words, the table created is a table of online purchases.

CUSTOM Admin Login Page.

(e admin persons in the shopping mall will frequently have to update the chatbot with the shopping mall's current products and prices. (is will enable the chatbot to give current and correct information to its users. (e page will be developed using JavaScript for the front-end and MySQL for the database backend. Section 4 will exhibit figures showing

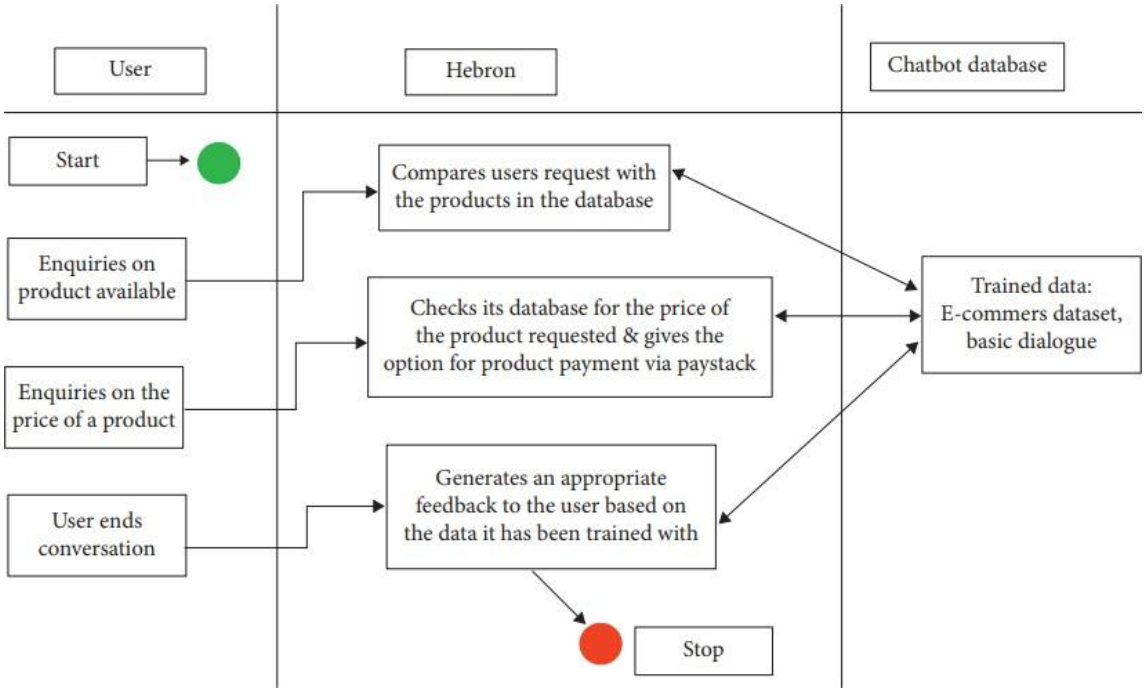


Figure 9: Activity diagram for inquiries.

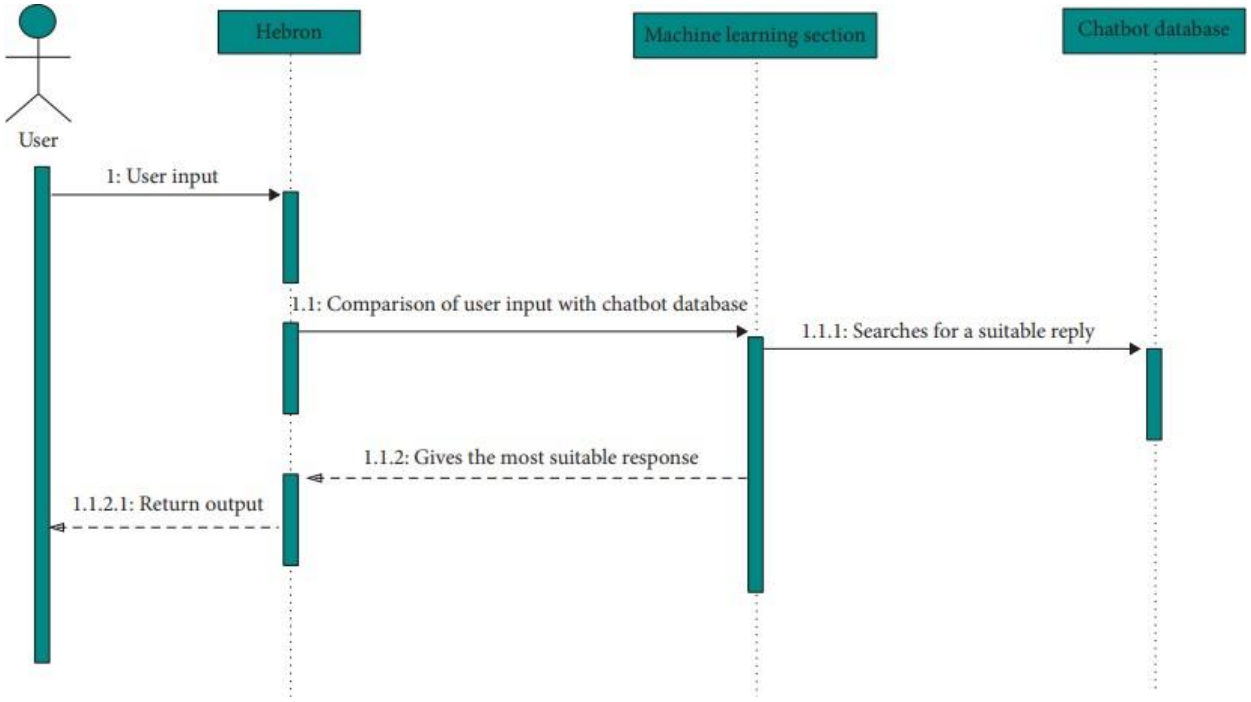


Figure 10: Overall sequence diagram for CUSM chatbot

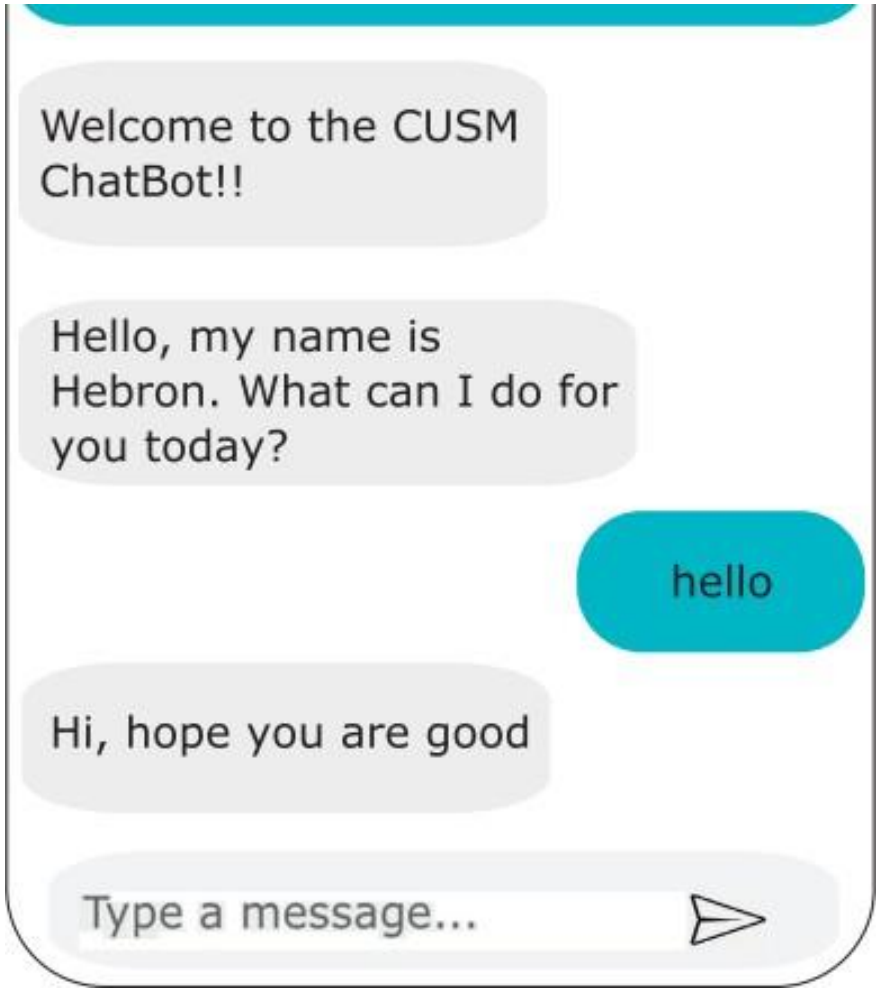
database page looks like from the backend and how products are stored or modified. In addition, every ID number is a unique key. (implies that once a number has been used by a product, that number cannot be used again by another product. Furthermore, even if that product is deleted, it will not be

assigned the same ID number it initially had.

3.6. SystemModeling.

A Sequence Diagram would be used to portray the system activities. (e activity diagram for the inquiry of products, availability of products alongside the requested product's price, and purchase where necessary is shown in Figure 3. Also, the overall sequence diagram of the CUSM chatbot is illustrated in Figure 4.

As shown in Figure 4, the modeling of the system serves as the foundation for the implementation of the chatbot for the CUSM web application. (is section explained in detail how the CUSM chatbot system will be developed. (is was achieved by describing the system units that make up the system and explaining how the units would interact with each other to realize the chatbot system. In addition, block diagrams and UML diagrams were used in describing the design of the system. In the section that follows, the testing and implementation of the chatbot system are presented.

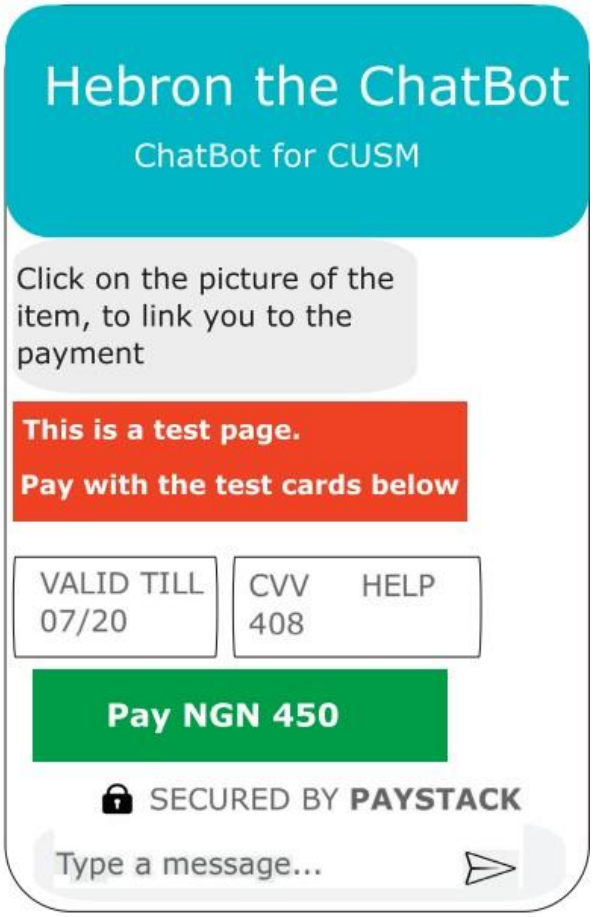


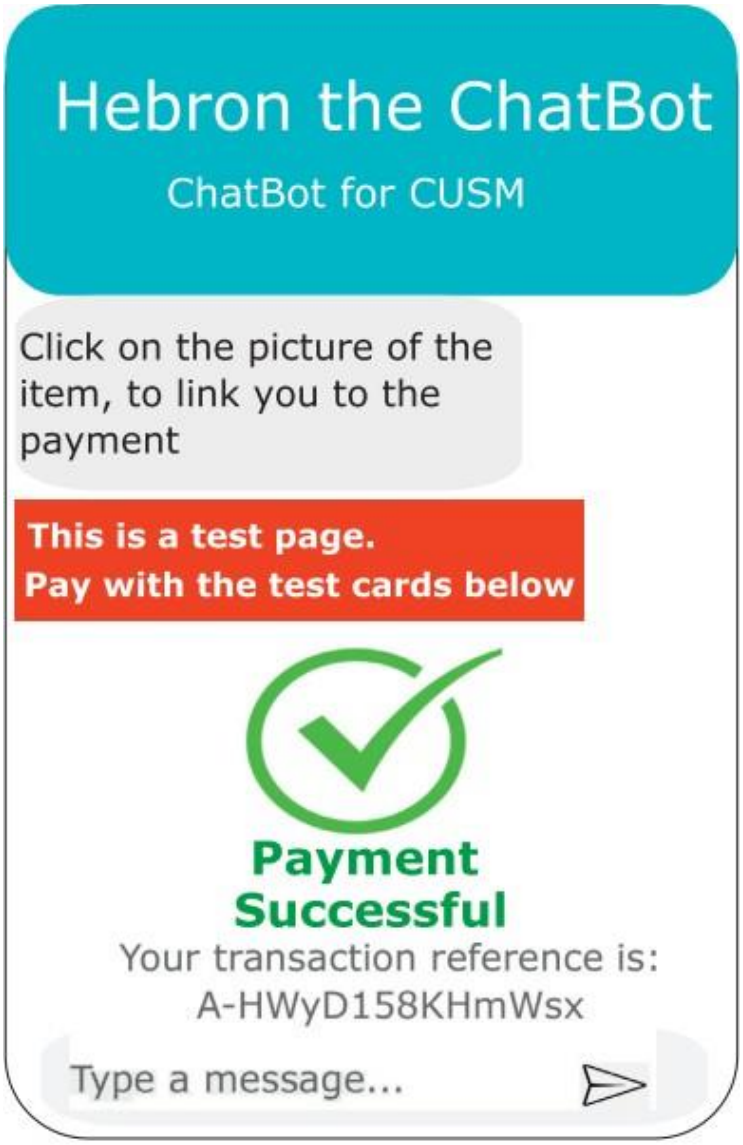

Hebron the ChatBot
ChatBot for CUSM
coco beverage
do you have milo and how much is milo
MILO
milo at N450
coco beverage
Type a message...

(b)


Hebron the ChatBot
ChatBot for CUSM
MILO
how can I pay for milo?
Click on the picture of the item, to link you to the payment
Type a message...

(b)


Hebron the ChatBot
ChatBot for CUSM
Click on the picture of the item, to link you to the payment
This is a test page.
Pay with the test cards below
VALID TILL
07/20
CVV
408
HELP
Pay NGN 450
SECURED BY PAYSTACK
Type a message...



(d)

Figure 11: (a) Chatbot interface. (b) The user requests items from a chatbot. (c) User paying for an item via chatbot. (d) Successful Payment

CHAPTER-4

Results and Discussion

The Chabot system has two user interfaces and two sections, namely, the Admin section and User section. (e chatbot system is a web application that is further divided into two parts:

(i)front-end: it consists of the chatbot and Admin web pages

(ii)backend: it consists of the database and machine learning section that keeps the entire system functionality

4.1. Chatbot Page.

Figure 6(a) shows the chatbot interface where the user-to-chatbot interaction occurs. chatbot interface is where users (students or staff) can fully interact with the chatbot Hebron and get correct and up-to-date responses.

Hebron is the official customer care service for CUSM where the user gets to ask the bot questions concerning current products available, the current prices of the products sold in the shopping mall, and closing and opening times of CUSM and pay for items via CUSM's payment platform.

Figure 7(b) shows the user requesting the availability of an item and its price. Figures 7(c) and 7(d) show the payment process.

4.2. CUSTOM Admin Login Page and Admin Portal.

The admin persons in the shopping mall will frequently have to update the chatbot with the shopping mall's current products and prices. (is will enable the chatbot to give current and correct information to users. (therefore, only the shopping mall's administrative employees have access to the CUSM portal, and the admin persons' authentication will be done via the CUSM Admin Login Page.

Admin Portal, on the other hand, is where the e-commerce items are saved, updated, added to, and subtracted from. (is shown in Figures 11(a) and 11(b).

4.3. Database Section.

Developed using MySQL, the data layer gives a structure to the e-commerce datasets that the chatbot will use to answer product-related questions. (is structure, which is in the form of tables, will help the administrator(s) of CUSM put the relevant information in the right place. (e structure is subdivided as follows:

(1) User
(2) Store
(3) Purchases

(1) User. Figure 11(a) shows a table hosting the information in terms of the usernames (in the form of "e-mail address") and the administrators' passwords for CUSM.

(2) Store. Figure 12(b) shows a table created to store the products' names, price of the products, the quantity of the products, and a short description of the products.
(3) Purchases. Figure 12(c) shows a table created to store the purchases made on the CUSM chatbot via a pay stack

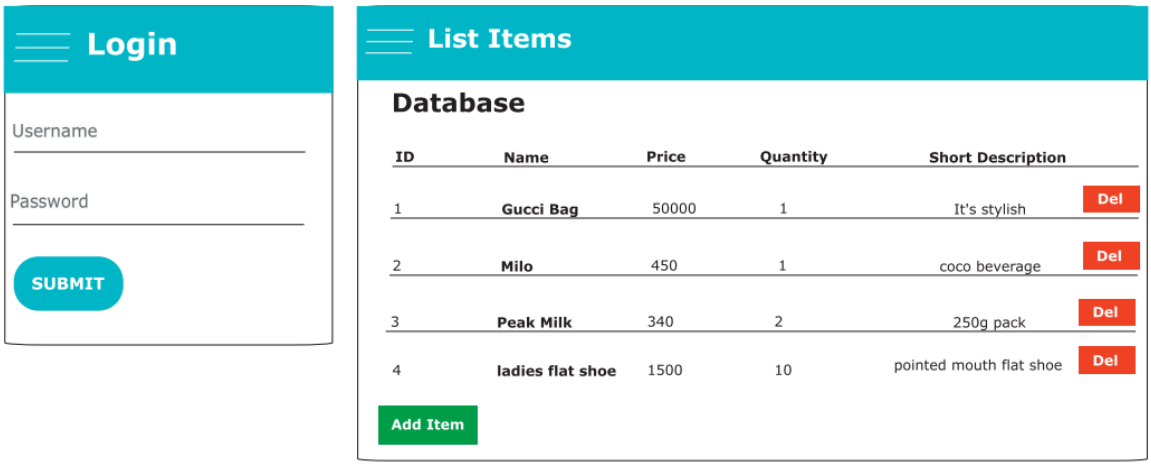


Figure 12: (a) Admin login page. (b) Admin portal.

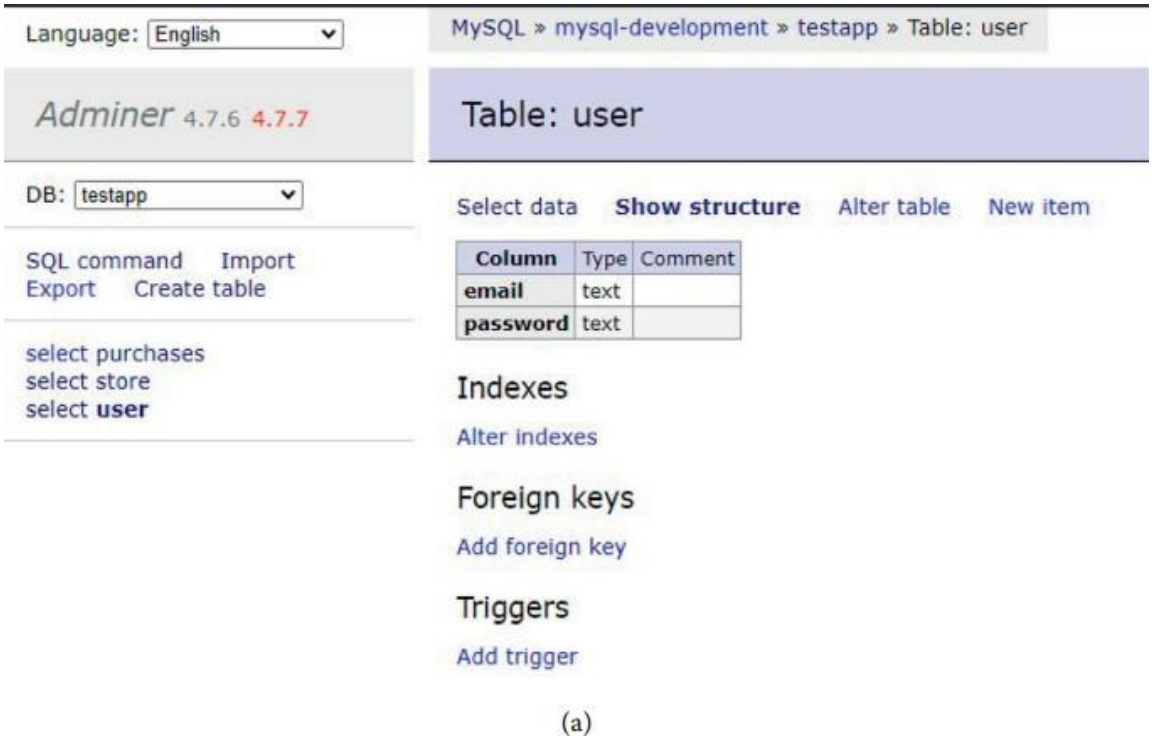


Figure 8: Continued.

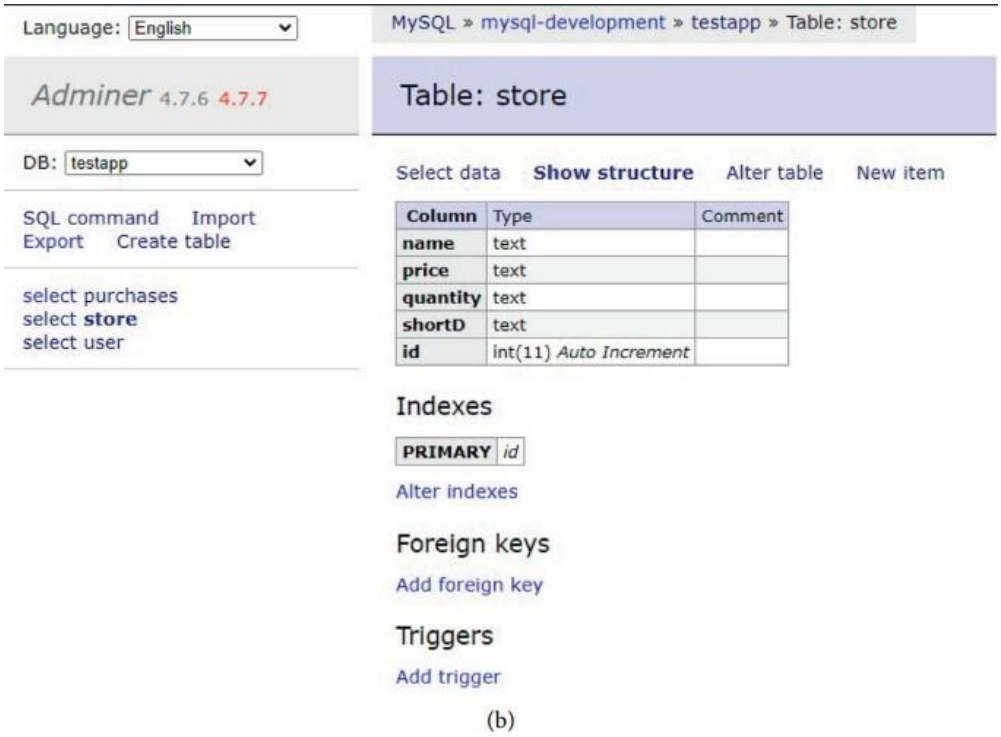


Figure 13: (a) Database structure table for admin users. (b) Database structure table for store items. (c) Database structure table for purchases made.

plugin. In other words, the table created is a table of online purchases.

4.4. Testing.

Some of the basic software testing methods deployed are functionality, interface, database, compatibility, unit, and pilot tests to test the chatbot web application system.

4.4.1. Functionality Testing.

(e system was tested for functionality as it was being built to ensure that it performs as required. For the front-end section, the user interface was tested for proper responses. Testing the data processing part of the chatbot system involved observing the output data to ensure that they met the specified requirements.

Figures 9(a) and 9(b) show the terminal used as a testing tool for the backend and results.

4.4.2. Interface Testing.

Particular areas were considered at the interface testing stage, namely:

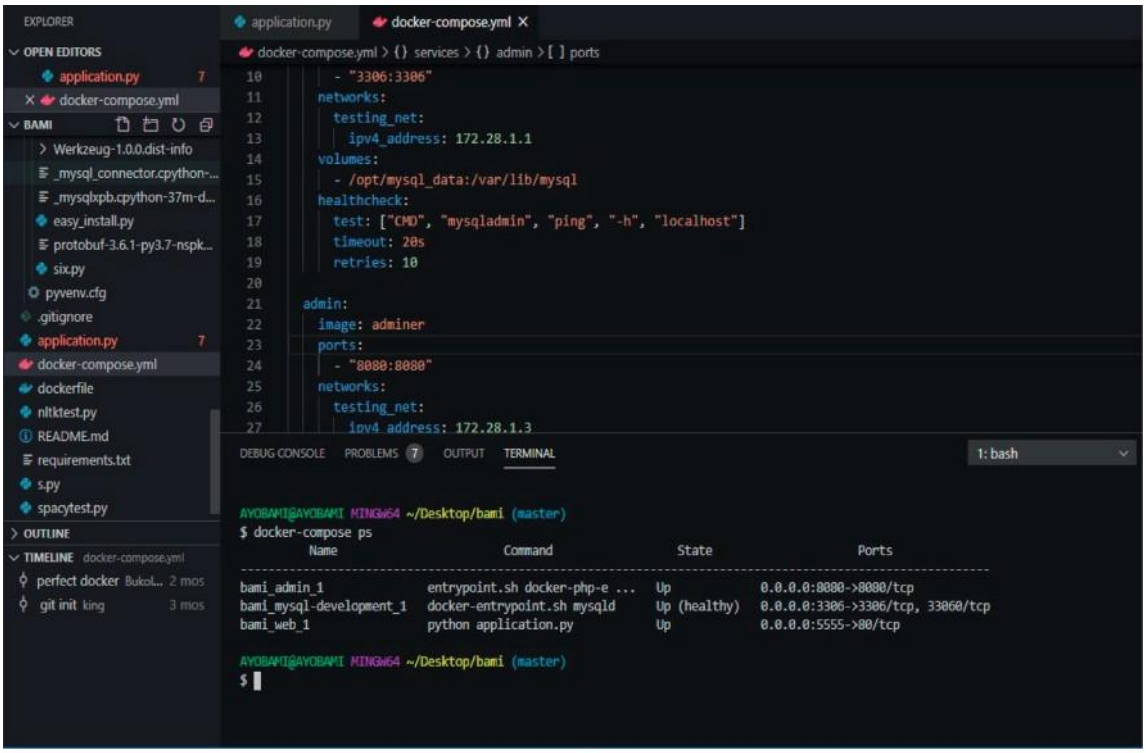
(1) Web application:

Tests were carried out to ensure that requests were sent correctly to the messaging backend. (e client side's output was Web Server.

the webserver was monitored to ensure that all requests were handled properly without service denial seen in Figure 9

(2) Database server:

Inspections were carried out to ensure that all queries to the database gave the expected results



(a)

(b)

Figure 14: (a) Backend testing and result. (b) Backend testing and result.

4.4.3. Database Testing.

the database is a very critical part of a web application. Assessments were carried out to ensure data integrity while creating, updating, or deleting data in the database and the correct display of data retrieved from the database on the web application.

4.4.4. Compatibility Testing.

(is the stage where the web application was tested for browser compatibility. (e main browsers used for the test were Google Chrome, Mozilla Firefox, and Internet Explorer. (is test ensured that the web application was displayed correctly in all of the above-stated web browsers.

4.4.5. Unit Testing.

Individual units of software developed were tested to validate that each branch of the software performs as designed.

4.4.6. Pilot Testing.

Pilot testing is a vital part of any web-based project, and it is usually carried out by the tester or a small focus group. In this testing stage, the locally hosted web application was shown to many people to test the chatbot and ensure that all buttons and system functionalities on the site were visible and working correctly.

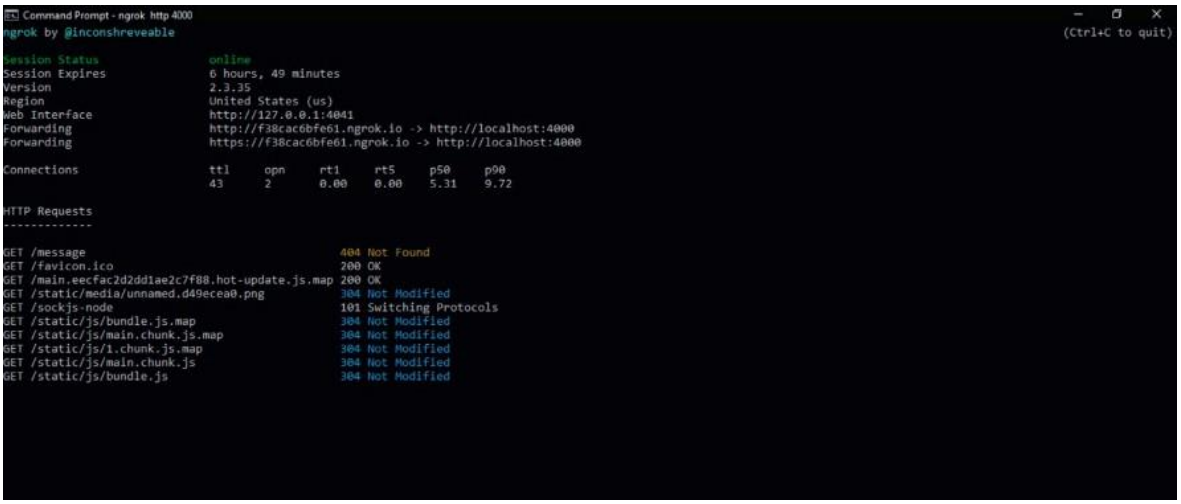
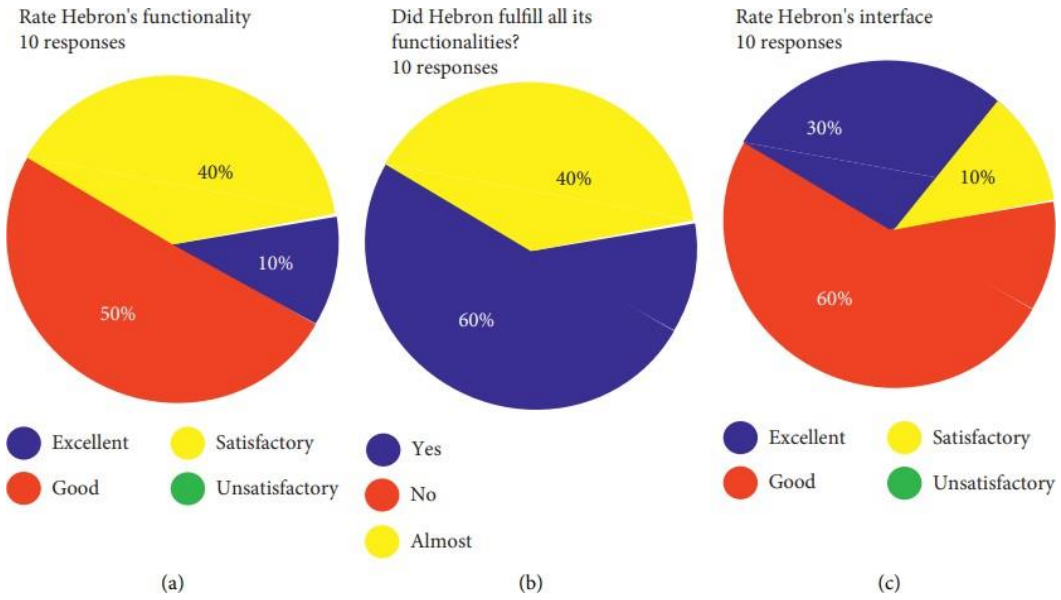


Figure 15: Web server monitoring.



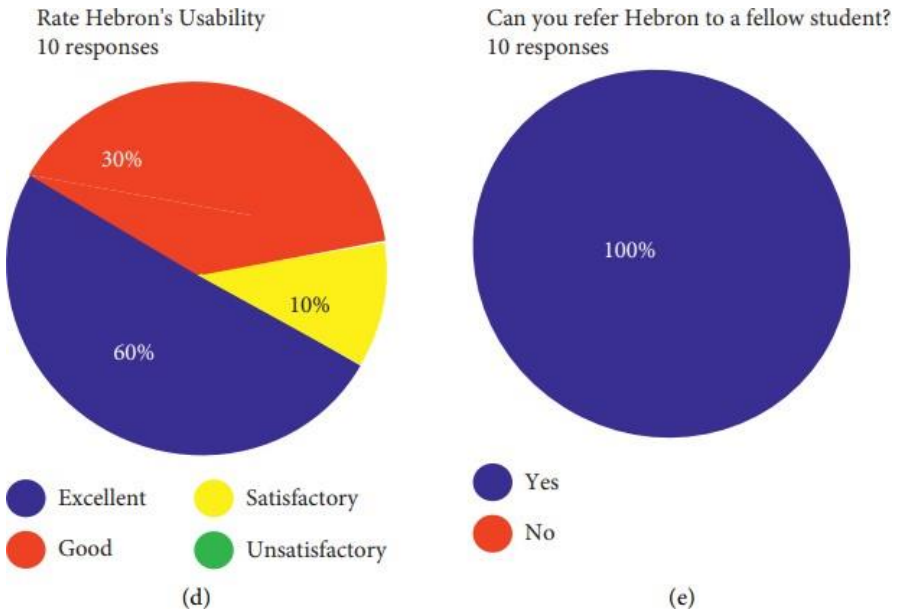


Figure 16: (a) shows that about 50% of users thought that Hebron's functionality was good and satisfactory. (b) suggests that Hebron fulfilled about 60% of its functionality. (c) shows that 60% of users rated Hebron's interface as good. (d) Usability Rating. (e) shows that all the testers (100%) thought that Hebron was highly recommendable.

4.5. RESULTS.

A survey was conducted using questionnaires to gather results from students on their overall perception of the chatbot. (e questionnaire was divided into three sections.

The first section contained basic demographic questions such as Name, Gender, and Programme, while the second section contained the web application test criteria, namely, functionality, usability, and interface.

Respondents were asked to evaluate the three web application parameters on a scale of 1 to 5, with 1 representing a low or unsatisfactory score and 5 indicating a highly satisfactory score. (e third section sought to inquire from the students about their overall perception of the chatbot application and recommend it to their fellow students.

A total number of 10 students participated in the survey, specifically five females and five males. Based on the responses gathered from the testers, the results in Figure 10 were obtained. Concerning this section, the various modules of the CUSM chatbot web application were presented.

It also discussed the ways in which the modules of the web application were examined. (e chatbot system was also implemented based on the design outlined in Section 3, and the results of the chatbot implementation were presented and discussed.

In figure-11 we can see that the negotiation happens, first, the bot shows us the price of the product and then give us two options to buy a product or discuss. If we select the discuss option then the bot negotiates with the user and reduces the price at a certain level the price reduction is according to the negotiation formula. At last, if we enter the price less than the actual minimum price of the product then the discussion will end.

Fig -17: Chatbot Negotiation

Our process of negotiation is faster and more efficient because we are using algorithms like support vector machines, natural language processing, and word matching which gives better performance and accuracy if we consider accuracy in percentage then the negotiation output is 95% to 97% accurate.

CHAPTER-5

CONCLUSION AND FUTURE SCOPE

5.1 Conclusion

ChatBots have indeed proven themselves as a powerful tool for customer satisfaction and an unmatched resource for the enterprises helping them save a lot of time and money. To date, different automated negotiation agents have been developed.

Negotiation starts when the supplier and customer have different expectations about price. Here we represent an E Negotiator chatbot for commercial websites which can help the users to get the product online according to their budget. In the future, this chatbot can be integrated with major websites with a little modification. More language processing might be implemented to increase the efficiency of the chatbot. The flexible service-based architecture will be highly desirable for future extensions.

Negotiation is the term where the interaction or discussion between two parties results to get a mutual solution that is beneficial for both parties. Negotiation starts the when supplier and customer have different expectations about price. Here we represent an E Negotiator chatbot for commercial websites which can help the users to get the product online according to their budget. Here users can directly interact with the system and get the response related to the query. We are using NLP to understand the user query and give an appropriate answer.

Prior to this research, pattern-based chatbots had a questionable level of intelligence. Although Hebron is pattern-based, it has a high learning rate, which means that it learns immediately from any e-commerce item that is added to its database. Furthermore, it responds quickly and well to new training phrases added to its database.

5.2 Future scope

The achieved the aim of this work is the design and implementation of a chatbot for Covenant University Shopping Mall. (e chatbot's purpose is to have a smart, accurate, and real-time conversation with the students. In this way, students chat with the bot to inquire about particular items they seek to purchase and pay online for the items before they visit the mall. (e chatbot is accessible via portable mobile devices or computers, which students can log in to anywhere and anytime on campus, thereby providing a 24-hour online service. (is research will alleviate the discomfort experienced by members of the Covenant University Community when they travel down to CUSM to source for items only to find that the desired items are either out of stock or unavailable.

It is recommended that more features can be added to the chatbot, such as the delivery of paid items to student halls of residence; more training phrases can be added to the chatbot to give the chatbot a better social outlook; addition of items to the chatbot database can be made automated,

for instance, adding a barcode reader option to the chatbot. It would also be expedient to test the chatbot with larger datasets.

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