



# DEVELOPMENT OF THE NATURAL LANGUAGE PROCESSING-BASED CHATBOT FOR SHOPPRITE SHOPPING MALL.

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**Abstract:** Software-as-a-service (SaaS) solutions are frequently used to create chatbots, giving users the option to interact with them via desktop computers, mobile phones, and tablets. To increase customer accessibility, a chatbot is being developed for customers. The user can choose their own convenient language because the device offers text or audio support. This project's goal was to develop a chatbot for the Shopprite Shopping Mall. The chatbot's goal is to converse with the client in a clever, accurate, and timely manner using natural language processing. Customers can use this feature to communicate with the bot and ask questions about specific things they want to buy and the price before visiting the mall. Customers can access the chatbot from portable mobile devices or laptops at any time, making it possible to offer a round-the-clock online service. The discomfort customers feel when they visit the Shopprite shopping mall to look for things only to discover that they are either unavailable or out of stock will be lessened by the results of this study. The following methodologies were used to carry out the work: React.js to create the chatbot's front-end and admin login page; Spacy and React.ai to train the chatbot's NLP section and E-commerce datasets for the chatbot and MySQL to manage and create the data structure that will house the e-commerce datasets. It is recommended that new capabilities be added to the chatbot, such as the delivery of purchased things to a customer's home, more training phrases to give the chatbot a better social outlook, automated item addition to the chatbot database, and even adding a barcode reader option. Testing the chatbot using a bigger dataset would also be helpful.

**Key Words:** E-commerce, Chatbot, Natural language processing and Artificial intelligence.

## I. INTRODUCTION

Customers can buy for a variety of goods at the supermarket-like Shopprite shopping center, including food and other necessities. Customers shop in the mall to buy necessities and everyday goods that they urgently need. Shopprite does not currently offer an online inventory service that enables clients to check the current stock availability of the items they want to buy before physically visiting the store to make the purchase. Due to the great distance between their homes and the shopping mall, this shortfall is a genuine source of issues and outrage for the clients. When the things a customer is looking for are either unavailable or out of stock, it is common for them to make the long trip to the store only to have their expectations shattered. This project develops a Shopprite chatbot in an effort to address this persistent issue.

The goal of the chatbot is to converse with the consumer in a knowledgeable, precise, and timely manner. Customers can use this feature to communicate with the bot to learn more about certain things they want to buy and make payments online before visiting the mall. Customers will be able to access the chatbot from portable mobile devices or desktops at home at any time, making it possible to offer a 24-hour online service. The inconvenience that customers currently experience when they travel to the supplier in search of unavailable or out-of-stock items will be reduced by this approach. This project's goal is to create and deploy a chatbot for Shopprite Shopping Mall Using datasets and Natural Language Processing (NLP), which will

- Help complete a buyer's purchase.
- Offer product recommendations.
- Offer customer support.



## II. LITERATURE REVIEW

### Chatbot

A chatbot is a computer program that simulates text-based human conversations by generating responses based on input. These programs are made to imitate interpersonal interactions.[7] Government, non-profit, and private entities all utilize chatbots, but primarily business and corporate ones. Their duties may include customer assistance, product recommendations, product inquiries, and personal assistant duties.[8].

A chatbot is an automated AI program that enables communication between humans and bots. Text and speech interfaces can also be used to implement these dialogues. Additionally, chatbots are integrated AI components that run alongside websites and messaging services and, in some cases, act as independent bots. There are many names for chatbots, including ChatterBot, Chat Robot, talk bots, IM bots, and virtual assistants. They may be pattern-based or ontology-based. [8]

Software-as-a-service (SaaS) solutions are frequently used to create chatbots, giving users the option to interact with them via desktop or mobile computers, smartphones, and tablets. [12].

### Types of Chatbots

The two main chatbot types are

- **pattern-based** chatbots and
- **AI-based** AI chatbots.

### Pattern Match Based Chatbot

The earliest chatbots to use pattern matching for text classification and answer reproduction were the early ones. The first chatbot of this type was ELIZA, which was introduced in 1966. The chatbots' responses are predictable, repetitious, and devoid of human interaction since they are programmed to follow conversation decision trees. Typically, when a user answers a question posed by a bot, one of the given options is chosen. [10]. For the discussion to continue, it must also contain a precise keyword that exactly matches what the bot has been trained on. Only when the user's input matches exactly what the chatbot has been programmed to answer, Such chatbots are accurate only when the user's input is exactly what the bot has been trained to answer. Because pattern-based chatbots do not keep track of previous responses, a discussion can quickly come to a standstill. [18].

### AI-Based Chatbot

These chatbots are significantly more effective since they make use of ML's understanding, contextualization, and prediction capabilities in addition to matching output with user input. To efficiently maximize the job of sales professionals, customer support agents, and personal assistants, today's chatbots are deployed. AI-based chatbots

use historical data from actual user responses to train their algorithms.[11]. They are better able to automatically engage in conversation without explicit training since they can grasp the context of a communication. As a result, they may be progressively enhanced through constant user feedback.[10]

The pattern-based chatbot is more primitive, while the AI-based chatbot is more advanced and sophisticated. [3]

Chatbots can be further classified into smaller groups using different the following parameters:

- Open-domain and closed-domain chatbots - those that can respond appropriately, discussing general topics or are focused on a particular knowledge domain.
- Chat-based and task-based chatbots - those that talk to a user or help them perform a task.
- Chatbots developed using open-source and closed platforms - those that are created using open-source or proprietary code.
- Interpersonal, intrapersonal, and inter-agent chatbots - the chatbots that get and pass information without close sentimental proximity to the user; the users' companions that understand them as another person would do; and the chatbots that can communicate seamlessly with one another.
- Chatbots developed using rule-based, retrieval-based, and generative models - the chatbot we earlier called pattern-based, it chooses the response based on a fixed predefined set of rules; the chatbot that uses APIs to retrieve answers from other resources; and the chatbot that uses ML and deep learning to dynamically produce responses based on the previous user inputs. [6].

NLP based chatbot layers

### First Layer

The chatbot's front-end web application is this one. It offers the necessary means for people and the chatbot to connect. Customers can type in and post their enquiries and also view the responses obtained from a chatbot assistance service using an embedded visual container that is installed as a "widget" on the main application's HTML web page.

### Second Layer

The chatbot assistant engine is the next layer. It offers the fundamental capability for accepting text message inquiries as requests from a particular web application at the first tier, processing those requests through natural language processing, and generating judgments regarding suggestions for the appropriate responses to those queries.[12]. The natural language processing engine (NLP), which analyzes text messages received, the decision-making process, which generates various suggestions for answers, and the semantic knowledge database (SK-DB), which is used to store the linguistic semantic data on the corpus of "useful" concepts,



on which the NLP-engine and decision-making process primarily rely, are also included in this layer.[8].

**Natural Language Processing**

Natural language processing (NLP) is a subfield of computer science that uses computational methods to learn, comprehend, and create material in human language. NLP can serve a variety of purposes, including facilitating communication between people, as in machine translation, and between people and machines, as in conversational bots. In order to forecast a suitable answer for customers, text mining and natural language processing are frequently employed in customer care applications. This greatly reduces reliance on call center operations.[7]. The chatbot must translate unstructured conversational human language into structured data that computers can understand in order to comprehend user input. The procedure known as natural language understanding (NLU) enables this interpretation.[11]. NLP investigates how computers can comprehend and modify natural language text or speech in order to accomplish valuable tasks. AI-based chatbots can also be implanted on e-commerce website.[18].

In chatbots for IT customer care, AI and NLP have become a new frontier. The significance of these apps becomes apparent when no technicians are in charge of the customer service office because of the end of their shift or their absence from the office.[14].

In this study, a chatbot will be used to address an e-commerce issue in a specific environment—the Shoprite shopping center. The purpose of this literature review is to investigate the use of chatbots in diverse scenarios. In the section that follows, studies pertaining to chatbot

applications and their applications in e-commerce and non-e-commerce settings are analyzed in order to identify a gap in the literature about the concept of chatbots. The review of the literature reveals that various authors, most notably the following, have made substantial contributions to the creation of chat bots. are Siddharth[17], Angela[18], Pham[14], Goel[10], Angelov[9], Reshmi[8]. The review of chatbot studies conducted shows that pattern-based chatbots have preprogrammed replies and low intelligence, which makes discussion with them unnatural. The AI capabilities and databases of chatbots need to be upgraded, according to academics. My suggested study, which is based on this observed gap, intends to enhance the limited intelligence of chatbots by using AI-based improvements, which would satisfy the customers in terms of reliable responses and a more authentic and enjoyable chat. The following methodologies were used to carry out the work: React.js to create the chatbot's front-end and admin login page; Spacy and React.ai to train the chatbot's NLP section and e-commerce datasets for the chatbot and MySQL to manage and create the data structure that will house the e-commerce datasets

**III. SYSTEM DESIGN**

The study took into account the steps taken in building the chatbot for the Shoprite shopping center, including the chatbot's architecture, its component parts, the data that passes through the chatbot system, intended users, minimum hardware requirements, and software specifications were also listed.

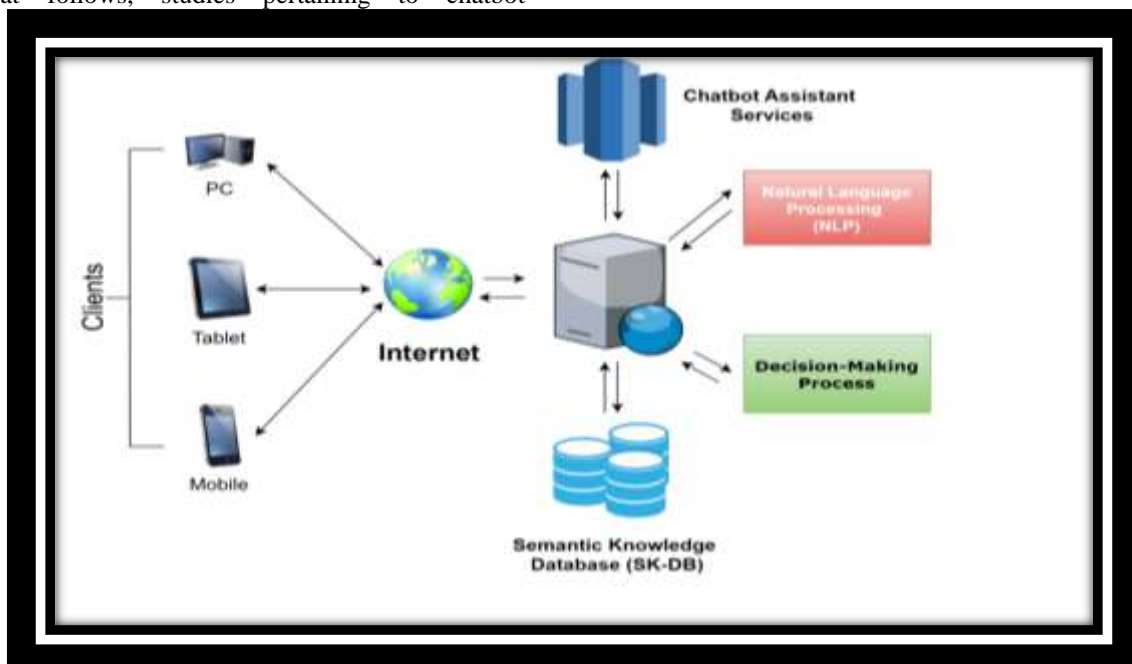


FIG 1



## System Requirement

### A. Functional Requirement

- (1) On the chatbot, the customer types in their request.
- (2) The chatbot sends the plain text to the NLP engine when a consumer messages it to enquire if a product is available and how much it costs.
- (3) The NLP engine transforms the customer's text message into structured data using natural language processing and NLU. In order to extract the message's intents and entities, spacy and React.ai NLP models are used in this situation.
- (4) The chatbot transfers the information that was gathered—including the product name and quantity (together with the intents and entities—to the decision-making engine.
- (5) The decision-making model generates a smart decision based on prior actions and outcomes. Taken. (In order to decide, it calls the database.)
- (6) The Chatbot will translate the decision data into text.

### B. Nonfunctional requirements include the following:

- (1) Chatbots should be able to communicate effectively through a variety of platforms, such as websites viewed on laptops or mobile devices.
- (2) Accuracy: A developer-created testing set will be used to assess the overall accuracy of the web API's answer.
- (3) Availability: All users will have access to the system around-the-clock.

(4) Security: The system shouldn't permit access from unauthorized people.

(5) Usability: The suggested system should be simple to use, input data into, and analyze the results the output.

### Hardware Requirements.

The hardware requirements refer to the computer's physical features required to implement the chatbot. The features are as follows:

- 250 GB HDD
- 4 GB RAM, and
- Intel Pentium Dual-Core. 3.3.

### Software Requirements.

These are the computer programs and procedures required to implement the chatbot.

They are

- Operating system: Microsoft windows
- DBMS: MySQL
- Programming language: python
- Development tools: Visual studio IDE

### Target Users

The shopprite shopping mall chatbot's primary target users are the customers that wants to make order and makes payment for a product .

## Output Screenshot



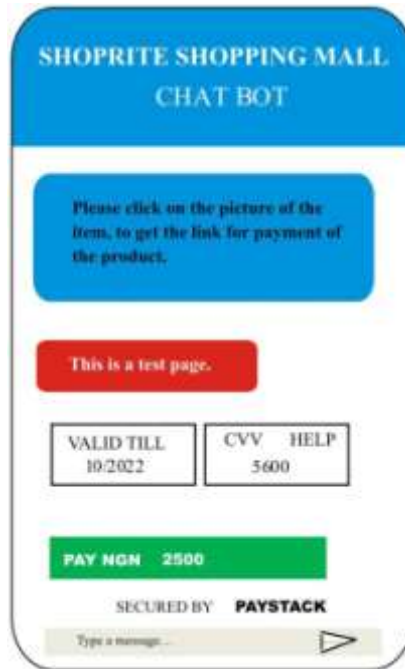
**Fig:2(a)**



**Fig:2(b)**



**Fig:2(c)**



**Fig:2(d)**



**Fig:2(e)**



**Login**

Username

Password

**Fig 3(a)**

<span style="font-size: 1.2em;">☰</span> <b>List Items</b>					
<b>Database</b>					
ID	Name	Price	Quantity	Product Description	
1	Shaw	5000	1	Lady's wear	<input style="background-color: #e67e22; color: white; padding: 2px 5px; border: none;" type="button" value="Del"/>
2	Biscuit	1000	2	Cabin	<input style="background-color: #e67e22; color: white; padding: 2px 5px; border: none;" type="button" value="Del"/>
3	Milo	2000	4	Coco beverage	<input style="background-color: #e67e22; color: white; padding: 2px 5px; border: none;" type="button" value="Del"/>
4	Milk	1000	6	Peak milk	<input style="background-color: #e67e22; color: white; padding: 2px 5px; border: none;" type="button" value="Del"/>
5	Coco drink	1000	7	Fruit Juice	<input style="background-color: #e67e22; color: white; padding: 2px 5px; border: none;" type="button" value="Del"/>
6	Bags	500	8	Gucci bag	<input style="background-color: #e67e22; color: white; padding: 2px 5px; border: none;" type="button" value="Del"/>
7	Perfumes	700	9	Smart	<input style="background-color: #e67e22; color: white; padding: 2px 5px; border: none;" type="button" value="Del"/>
8	Books	300	1	Long	<input style="background-color: #e67e22; color: white; padding: 2px 5px; border: none;" type="button" value="Del"/>
9	Pen	200	2	Red pen	<input style="background-color: #e67e22; color: white; padding: 2px 5px; border: none;" type="button" value="Del"/>
10	Table water	500	3	7-up	<input style="background-color: #e67e22; color: white; padding: 2px 5px; border: none;" type="button" value="Del"/>
<input style="background-color: #27ae60; color: white; padding: 5px 15px; border: none; margin-left: 10px;" type="button" value="Add Item"/>					

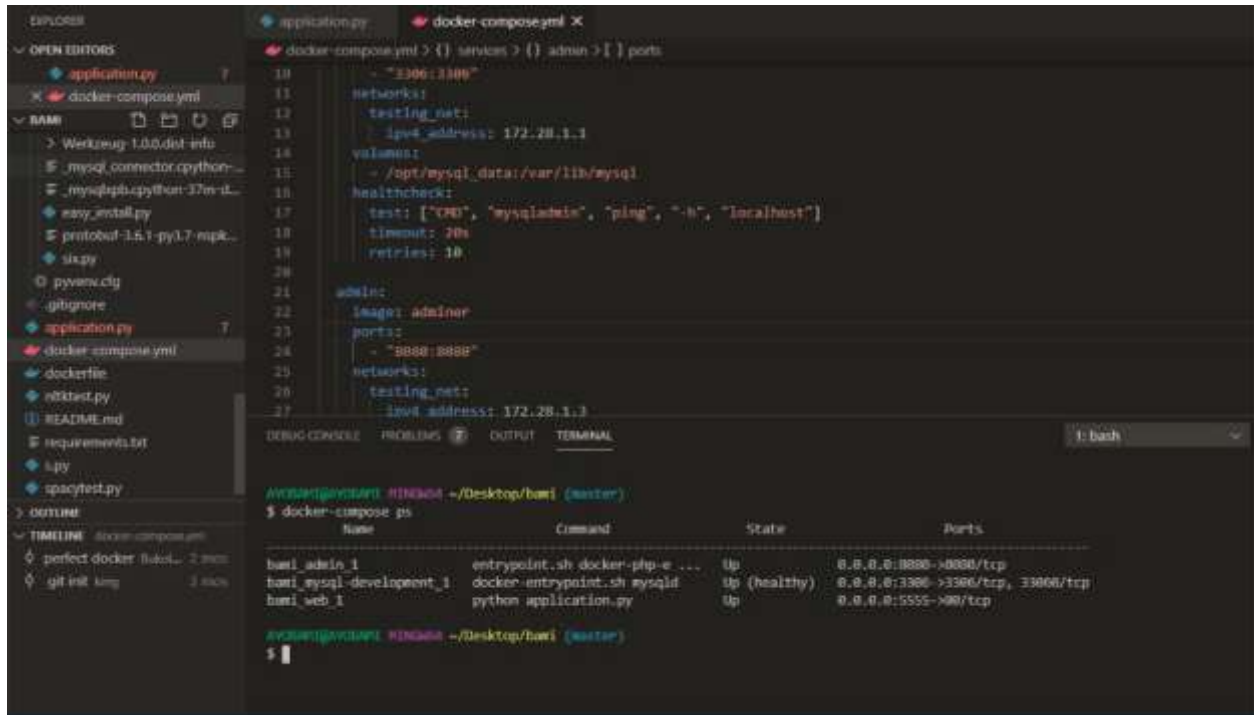


Fig 4(a)

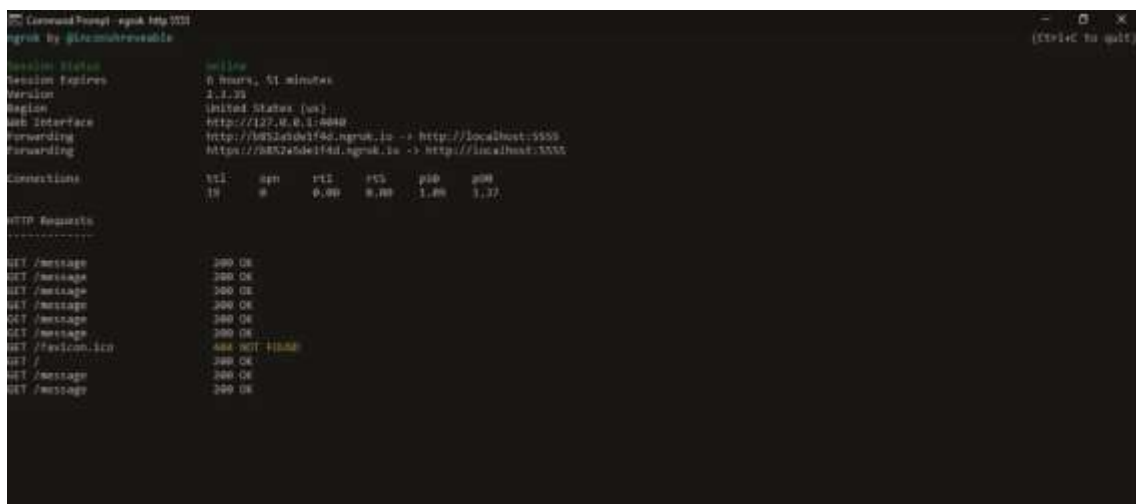


Fig 4 (b)

#### IV. RESULTS

##### • Chatbot

The chatbot interface in Figure 2(a) is where clients engage with the chatbot. The customer has the opportunity to ask the bot questions about the currently available products, the prices of the goods sold in the shopping center, the mall's opening and closing hours, and its payment system. Figure 2(b) shows the user asking for information on an item's availability and price. The payment process is shown in Figures 2(c) and 2(d).

##### • Shopprite shopping mall Admin Login Page and Admin Portal.

The administrators of the mall will frequently need to update the Shopprite chatbot with the latest inventory and pricing. This will allow the chatbot to provide users with accurate and up-to-date information. The shopping portal is only accessible to the administrative staff members of the mall, and they must log in via the Admin Login Page. On the other hand, the shopping mall product items are saved, updated, added to, and subtracted from using the Admin Portal. Figure 3(a) and Figure 3 (b) illustrate this.





- **Database Section.**

Was developed using MySQL, the data layer gives a structure to the shopprite datasets that the chatbot will use to answer product-related questions.

- **Testing section.**

Fig 4a and 4b shows the terminal used as a testing tool for the backend result

## V. CONCLUSION

Building chatbots requires careful consideration of natural language processing. The chatbot primarily uses NLP to properly and precisely interpret the user's purpose. The creation of a chatbot for the Shopprite Shopping Mall is the task's main objective. The chatbot's purpose is to have an intelligent, accurate, and in-the-moment discussion with the customer using natural language processing. To learn more about certain products they want to buy before visiting the mall, customers can chat with the bot in this way. Customers can log in to portable mobile devices or desktops to access the chatbot at anytime, anyplace, giving customers access to a 24-hour online service. Customers will no longer feel as uncomfortable when they visit the Shopprite shopping center to look for products only to discover that they are either unavailable or out of stock. In relation to many of the existing chatbot assistant services architectures, the chatbot architecture representation addressed in this research is far more straightforward. It is advised that new capabilities be added to the chatbot, such as the delivery of purchased things to a customer's home, more training phrases to give the chatbot a better social outlook, automated item addition to the chatbot database, and even adding a barcode reader option. Additionally, it would be useful to test the chatbot with larger datasets.

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