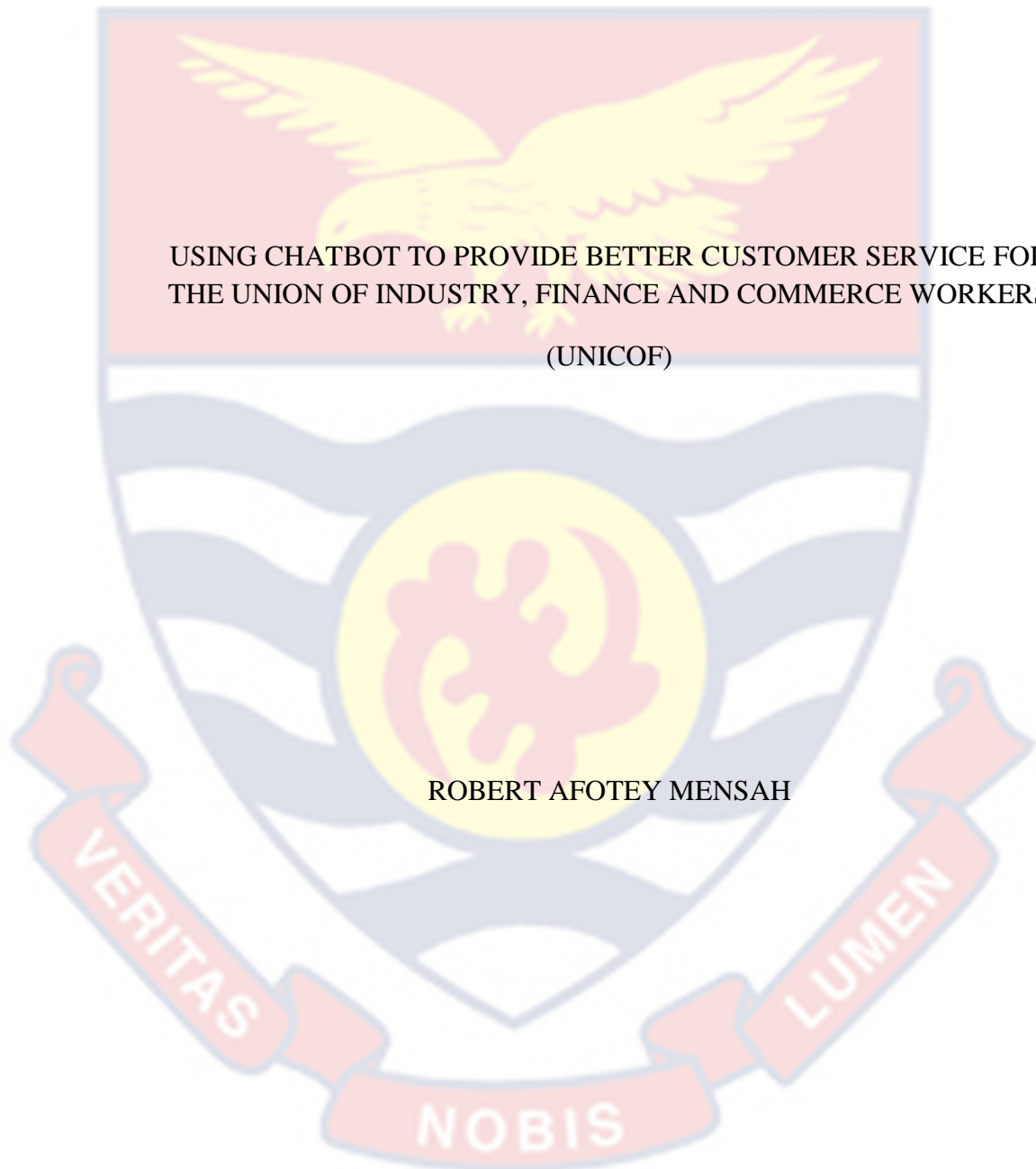UNIVERSITY OF CAPE COAST
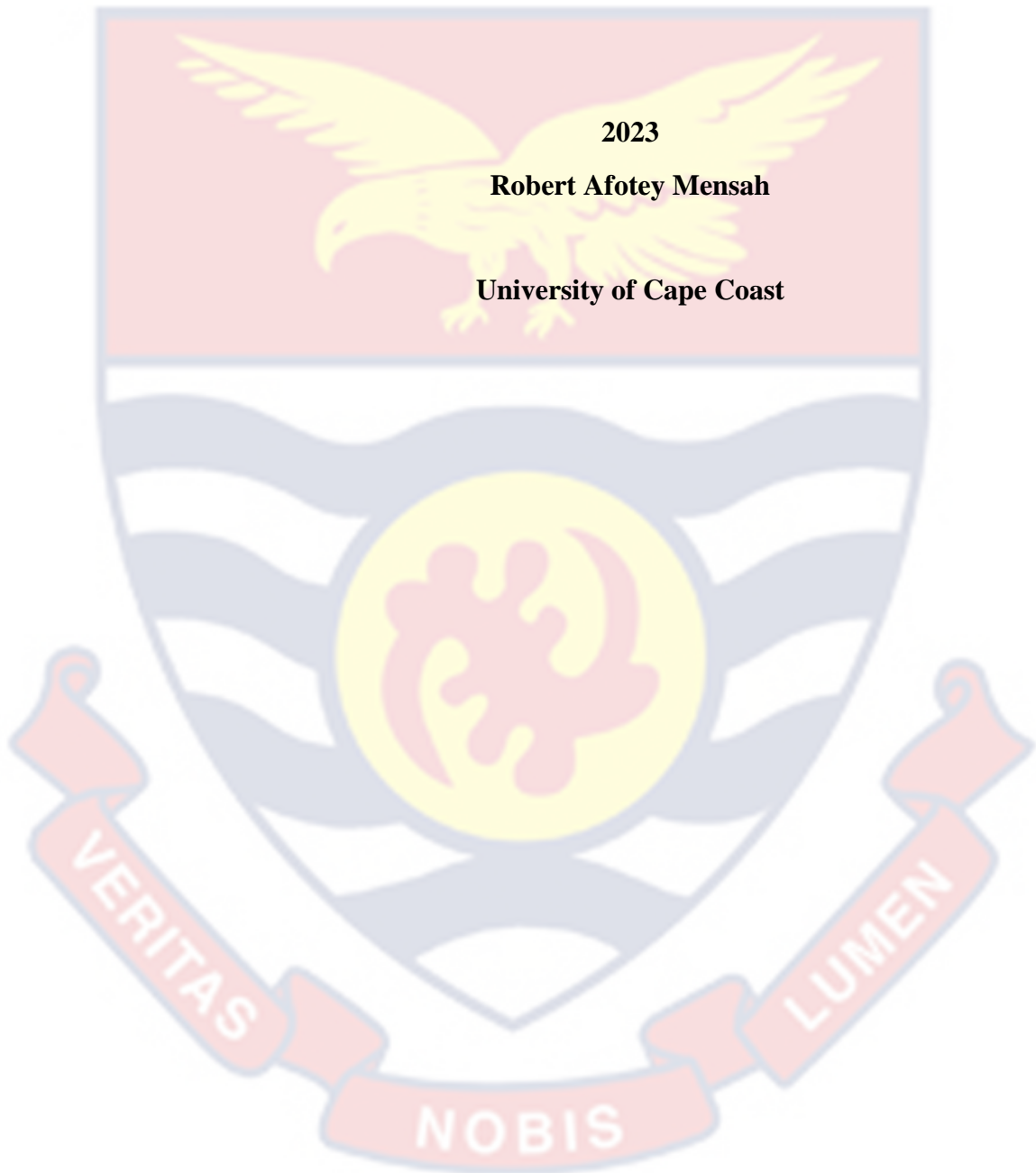
USING CHATBOT TO PROVIDE BETTER CUSTOMER SERVICE FOR
THE UNION OF INDUSTRY, FINANCE AND COMMERCE WORKERS

(UNICOF)

ROBERT AFOTEY MENSAH

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Robert Afotey Mensah

University of Cape Coast

UNIVERSITY OF CAPE COAST

USING CHATBOT TO PROVIDE BETTER CUSTOMER SERVICE FOR UNICOF

BY

ROBERT AFOTEY MENSAH

Dissertation submitted to the Department of Data Science And Economic Policy of the College of Humanities and legal Studies, University of Cape Coast in partial fulfilment of the requirements for the award of Master of Science degree in Data Science and Analysis

JANUARY, 2023

DECLARATION

Candidate's Declaration

I hereby declare that this dissertation is the result of my own original research and that no part of it has been presented for another degree in this university or elsewhere.

Candidate's Signature:.. Date:...........................

Name: Robert Afotey Mensah

Supervisors' Declaration

We hereby declare that the preparation and presentation of the thesis were supervised in accordance with the guidelines on supervision of thesis laid down by the University of Cape Coast.

Principal Supervisor's Signature:.................................. Date:.......................

Name: Dr. William Cantah

ABSTRACT

This dissertation presents the development and deployment of UNIBOT, a chatbot designed to enhance customer service within the Union of Industry, Commerce, and Finance Workers (UNICOF). This work is being done on the backdrop of rapid technological change and its influence on the corporate landscape and also the importance of customer engagement for business success. The research attempts to highlight the use of artificial intelligence and in this specific case chatbot to enhance the customer service experience.

The research methodology employed a text-based rule-based approach, utilizing Python and the Natural Language Toolkit (NLTK). A structured database, derived from UNICOF's website and staff input, formed the foundation for the UNIBOT's knowledge. In addition, tokenization, pre-processing, and sentence generation techniques were implemented. The methodology also explains the architecture design and implementation steps, encompassing tokenization, greeting functions, and query responses of the UNIBOT.

Results confirm the successful execution and testing of UNIBOT, evidencing its ability to effectively respond to user inquiries. Conversations with UNIBOT reflect informative and accurate responses interactions ranging from greetings to specific questions about UNICOF. However, challenges arising from the lack of specific frequently asked questions (FAQ) data and website integration are acknowledged.

In conclusion, this project attained its objective of creating UNIBOT to enhance customer service. UNIBOT successfully addresses user queries, offering fundamental information about UNICOF. Overall, this dissertation sheds light on the promising role of chatbots in improving customer service, effectively implementing UNIBOT within the operational context of UNICOF.

ACKNOWLEDGMENT

I wish to thank all lectures and staff of the School of Business, University of Cape Coast, for various roles in making this dream a reality. Special thanks to my supervisor for his support to conclude this research work.

DEDICATION

To my immediate family and friends for encouraging me to complete this programme.

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CHAPTER ONE

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INTRODUCTION

Background to the Study

The world of work is constantly changing at a fast rate and technology is the driving force behind this change. From the introduction of steam engines to the emergence of computer, the corporate world is always searching for ways to make capital more profitable whiles working smart. Enterprises keeps adopting new ways of production, markets expansion and profitability. On the average effective public services, productivity, new jobs and various other opportunities have been created by technology.

At the heart of all these, customer engagement/service has proven to be a vital area to invest if one wants to stay ahead of the market. Customer service is now a crucial discriminator between organisations and a profit-generating

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force in its own right. Often enough, customer expectations and business success are closely related.

According to a customer experience trend report conducted in 2020, (Zendesk, 2020);

- A total of sixty four percent of business leaders interviewed asserted that customer service positively impacts on company growth.

- The report also shows that sixty percent of the business leaders agreed that good services help retain customers.

- In the line of the ability to cross-sell forty seven percent indicated an increase.

To keep a consistent level of customer interactions, the use of technology is being employed by businesses. The use of Artificial Intelligence (AI) applications is gradually becoming a popular step to deal with the issue of customer interaction and the excesses thereof. The Chatbot or the Chatter Bot is one of the AI applications helping shape the world of work with regards to customer interaction.

Chatbot, also called Chatter Bot is a software which is developed with the help of Artificial Intelligence (AI) applications and makes it possible for human beings to interact with digital devices as though they were communicating with another human being. The program stimulates conversation between a user (Customer) and a computer (real-life conversational partner). The Chatbot can provide various services like, provide information, customer support, make bookings and much more.

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Chatbots employ machine learning, an AI capability that allows robots/bots to become smarter over time as they are used. The chatbots use digital instant messenger to communicate and give feedback to people and can be integrated into various application and websites.

The idea of Chatbots is not a recent occurrence, however in recent years popularity among users and businesses alike has been rising steadily. The Artificial Intelligence industry is continuously growing and have become a necessity in various industries.

In 1966, Joseph Weizenbaum invented the first chatbot known as "Eliza". Eliza was created to identify keywords within sentences and subsequently match them against a list of pre-programmed responses (Salecha, 2016). The development of ELIZA marked a significant milestone in the history of chatbots and their application in human-computer interaction.

"Parry" was the next AI chatbot, created in 1972 by a psychologist named Kenneth Colby, to imitate a schizophrenic patient. Parry was designed to work with assumptions, attributions and emotional responses (Ina, 2022).

In 1988, Rollo Carpenter also invented a chatbot which uses an AI technique called "contextual pattern matching" and was used to entertain people by stimulating a natural human conversation. The chatbot was named "Jabberwacky".

Between 1992 and 1995 two AI chatbot were introduced, namely "Dr. Sbaitso" and the Artificial Linquistic Internet Computer Entity (Alice).

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Creative Labs created Dr. Sbaito whiles ALICE was created by Richard Wallace (Ina, 2022).

In recent times AI chatbots like Siri, Google Assistant, Cortana and Alexa has been developed. These recent chatbot are more like intelligent personal assistants that execute duties normally done by human Personal Assistants, for example schedule reminders, send emails and texts. In addition, their human interactions have greatly improved.

There are numerous types of chatbots currently being utilised across various sectors, be it finance, hospitality, manufacturing, etc, however the following are the popular ones (6 Types of Chatbots - Which Is Best for Your Business? | Engati, n.d.);

- Menu/button chatbot
- Keyword recognition-based chatbot
- Machine Learning chatbot
- Hybrid models
- Voice bot

As discussed earlier, these intelligent programs or application are rapidly being introduced by businesses as a means of cost reduction in the areas of human resource and time management. It is estimated that chatbots can cut down the cost of customer interaction by as much as 30%. It is therefore by no accident that most of the A-list enterprises have adopted some sort of chatbot for certain accepts of their operations.

UNICOF like any other modern-day institution must leverage of some of these advantages stated to enhance operations. The implementation of a chatbot like UNIBOT also aligns with UNICOF's goals of efficient service delivery, member engagement, and cost-effective operations. By enhancing customer service, improving accessibility to information, and demonstrating adaptability to technology, UNICOF can establish itself as a forward-looking and member-centric organization.

Statement of Problem

Customer engagement is very crucial to the survival and growth of any business. The ease of accessibility of information, the quality of interaction and other basic services have resulted in either making or breaking organisations. According to IBM (2021), there is an approximate yearly expenditure exceeding $1.3 trillion directed towards addressing new customer inquiries.

However, the problem we face today is that even though quality customer services is essential for growth, the increasing cost of human resource, coupled with the unpredictability of human behaviours are limitations that hinder customer service experiences (Lemon & Verhoef, 2016).

The Union of Industry, Commerce and Finance Workers (UNICOF) is a trade union organisation affiliated to the Trades Union Congress (TUC) Ghana. The Union currently has over two thousand members across the country and across three sectors, namely the finance, commerce and industry. One major feedback that has been received from most members is the issue of information flow. The Union has tried to meet this challenge by creating a website to give members and the general public a summary about what the

organisation is about, however retrieving information from the website is a source of worry for most that have accessed it, since it is barely updated and difficult to navigate. The website also has a section with an online form which allows users to send a short message to the organisation if the need arises. Even though this attempts to solve the problem, it has its own limitations. The form is linked to the email of the Head of Administration and depending on his schedule responses are delayed.

The Union also has a direct line or hotline through which inquiries could be made but because it is managed by a staff who doubles as the front desk officer, the issue of availability and consistency also comes in. The staff assigned to this role works an eight-hour shift with a one-hour break in between. Consequently, during periods when this staff member is not available, individuals, including members and those seeking information, may experience delays in receiving the assistance they require.

The issue of human inconsistence also comes in, where depending on the mood of the front desk officer, members or prospective members maybe not receive the appropriate customer service that they deserve.

Having noted all the challenges with customer service in the context as stated above, the project is expected to create an environment where some basic information would be available to the general public, especially members of the Union, in a manner that is readily available and consistent, in this case with the help of a chatbot.

Purpose of the Study and Objectives

The primary purpose of this study is to develop and implement a chatbot, named UNIBOT, within the Union of Industry, Commerce, and Finance Workers (UNICOF), with the aim of enhancing customer service and communication. The study seeks to address the challenges of costly and inconsistent customer service by leveraging chatbot technology to provide timely, accurate, and consistent responses to user queries.

Key Objectives:

- Cost Reduction and Efficiency: The study aims to demonstrate how the integration of a chatbot can effectively reduce the costs associated with customer interactions by handling routine inquiries, freeing human resources for more complex tasks.

- Improvement of Customer Service: By offering users immediate and consistent responses to their queries, the study intends to enhance the overall customer service experience, ensuring that members and the public receive accurate information promptly.

- Consistency and Accuracy: The study seeks to establish the chatbot as a reliable source of information by ensuring that responses are consistent and accurate across interactions, eliminating variations that can arise due to human factors.

- Availability: The study aims to showcase the chatbot's 24/7 availability, allowing users to access information and assistance at any time, thus accommodating diverse schedules and time zones.

- Engagement and Interaction: The study aims to create a dynamic and interactive experience for users, fostering engagement and connection with UNICOF through meaningful conversations facilitated by the chatbot.

- Database Access: The study seeks to demonstrate how the chatbot can access relevant information from UNICOF's database, providing users with up-to-date and relevant information about the organization's operations and services.

- Technological Advancement: By implementing the chatbot, the study highlights UNICOF's commitment to staying technologically current, showcasing its adaptability to changing trends in customer service and communication.

- User Feedback and Improvement: The study aims to gather user feedback on their experience with the chatbot, providing insights that can inform future enhancements and improvements to the technology.

Overall, the purpose of the study is to showcase the practical benefits of introducing a chatbot to UNICOF's operations, emphasizing its potential to revolutionize customer service, streamline communication, and improve the overall member experience.

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CHAPTER TWO

LITERATURE REVIEW

Introduction

This section provides an in-depth exploration of previous research and studies related to chatbot implementation and its impact on customer service and communication. It starts by tracing the historical development of chatbots and then emphasizes the significance of effective customer service in modern organizations. Different types of chatbots and their functionalities are discussed, highlighting their potential benefits such as cost reduction, scalability, and consistent responses. The review also examines potential challenges and ethical considerations associated with chatbot implementation. Overall, the literature review serves as a foundation for understanding the evolution, advantages, challenges, and ethical implications of integrating chatbots, setting the stage for examining their implementation within UNICOF.

The Concept of Customer Service

Customer service is undoubtedly one of the key strategies for business success, however it is dependent on how effective this strategic objective is rolled out. The experience that customers have actually enhances their loyalty to the organisation, which translates to financial gains. Customer service can be defined as the entire actions taken by an organisation which improves value to its products and services from the standpoint of users of that particular service (Erasmus, 2013).

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Lucas (2005:4) also describes customer service as the ability of well-informed, skilled and well-motivated employees to deliver products and services to their internal and external customers in such a way that it satisfies identified and unidentified needs of customers, and, eventually, results in positive word of mouth advertising and repeat business.

It is the interface that takes place between an entity from the company and the client and that it is not only for sales, but in all other roles in a business (Fogli, 2006:4).

Modern-day client has a wide variety of expectation in terms of the goods and services which service providers offer, it is therefore evident that in order to strive or excel in these business sphere businesses must reform from the traditional ways of customer satisfaction to a more technological and data driven approach. (Machando and Diggines, 2013) asserts that as the ultimate goal of any business is customer satisfaction and loyalty, it is essential for a business to live up to its customers' perceptions and expectations of customer service. According to Bovée & Thill (1992), quality and customer services present strong barrier against the competition, ensure customer loyalty; help to differentiate product and decrease marketing costs and increase company profit.

Effective customer service is not a onetime action but rather a process which consist of the information received by the customers to enable them make good decisions, how they are treated or assisted during the process of patronising the service and after the sale. The successful completion of this process may provide a certain level of loyalty from customers.

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Judging from our above discussions on the definitions of customer service, it is clear that customer service goes beyond the issues of sale. Customer expectations must be essentially met and possibly exceeded. Due to this, many businesses across different sectors are adopting strategies which include product differentiation, that is providing special and tailor-made services to remain relevant in their respective markets, a claim affirmed by Mathieu (2001), according to him, service is emerging as a key strategy, because it offers a strong competitive advantage through variation of opportunities even with the commodities market.

The attainment of excellent customer service must therefore not lie in the hands of only the service team but must be embedded in the organisation's philosophy and way of life. It must be regarded as a continuous process as stated above, with a strict business strategic plan which must be assessed periodically and updated as and when necessary to improve the general experience.

Good Customer Service and Its Relevance

Literature discussed above highlighted the various definitions of customer services and how it serves as the conduit between product/service producers and consumers. Good customer service and its relevance cannot be over stated, however most small to medium size enterprises have shelved this very important strategy and are investing in other areas like marketing and advertisement. Others just don't have the technical knowhow to provide these services.

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The Role of Artificial Intelligence (AI) And Chatbots in Customer Service

Several organisations are employing the use of artificial intelligence and especially chatbot to augment their processes. In Ghana, this phenomenon is fast catching up, organisations are leveraging on the use of chatbot on their website and other social media platforms to deal with issues of customer queries and also to improve on their real time interaction with their customer. Mero (2018), indicates that the transformation of customer service by the introduction of the chat services is based on trust and satisfaction.

Some examples in Ghana include, Enterprise Insurance Ghana, an insurance company in Ghana which has recently added a chatbot called "Babs" to their website. MTN Ghana has "Zigi", Absa Bank Ghana has "Abby" and UMB Bank Ghana has "Sika", all of which are chatbots incorporated into their website to assist customer gain information readily and improve the overall customer service experience.

In this segment, specific roles of AI or chatbots, often identified as conversational software agents (CAs), in augmenting customer relationships and experiences, along with their broader impact on businesses, will be elucidated.

A lot of businesses today have embraced the digital world and are conducting most of their transactions online. Small, medium and even some very large organisations are adopting the use of the electronic markets. The use of social media platforms and website are fast becoming to convenient ground for the modern-day business entities. evidently in a span of three years

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from 2016 to 2019, the estimated number of chatbots on Facebook Messenger rose from 100,000 to 300,000 (Johnson, 2018).

Research anticipates a clear positive correlation between the utilization of artificial intelligence (AI) and the job market. This is rooted in the understanding that many tasks formerly carried out by humans are poised to be assumed by AI technology (Frey & Osborne, 2017).

Conversational Software Agents (CAs), as a self-service technology, offer numerous cost-saving avenues (Gnewuch et al. 2017; Pavlikova et al. 2003), in addition to the hope of increasing service quality and enriching provider-customer experiences. Research proposes an average of $1.3 trillion reduction in business cost globally, relating to 265 billion customer service questions annually by 30% through the reduction of comeback times, giving staffs time for different work rather than answering routine questions (Reddy 2017b; Techlabs 2017).

Chatbots alone are expected to help business save more than $8 billion per year by 2022 in customer-supporting costs, a tremendous increase from the $20 million in estimated savings for 2017 (Reddy 2017a). CAs therefore brings to the table faster, easier and a cheaper way of customer support which is also always available. (Hopkins and Silverman 2016).

Research conducted by "Intercom" indicated that the organisation that took part in the survey increased their sales by a margin of 67 percent, when assisted by the chatbot.

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The following were also reason giving by the respondents for the increase in sales (Yin, S. 2023);

- On an average, the company deals with inquiries from users and provides answers faster, sometimes one third of the normal time.

- Also customer service satisfaction has also increased by an average of twenty four percent.

Businesses can also derive from the chatbots or AI's insight into the behaviour or pattern of customers, these very valuable information or data can prove to be important for the future of businesses (Yin, S. 2023).

The literature discussed above has given us enough evidence of the relevance of chatbots in the general improvement of the operations of various business.

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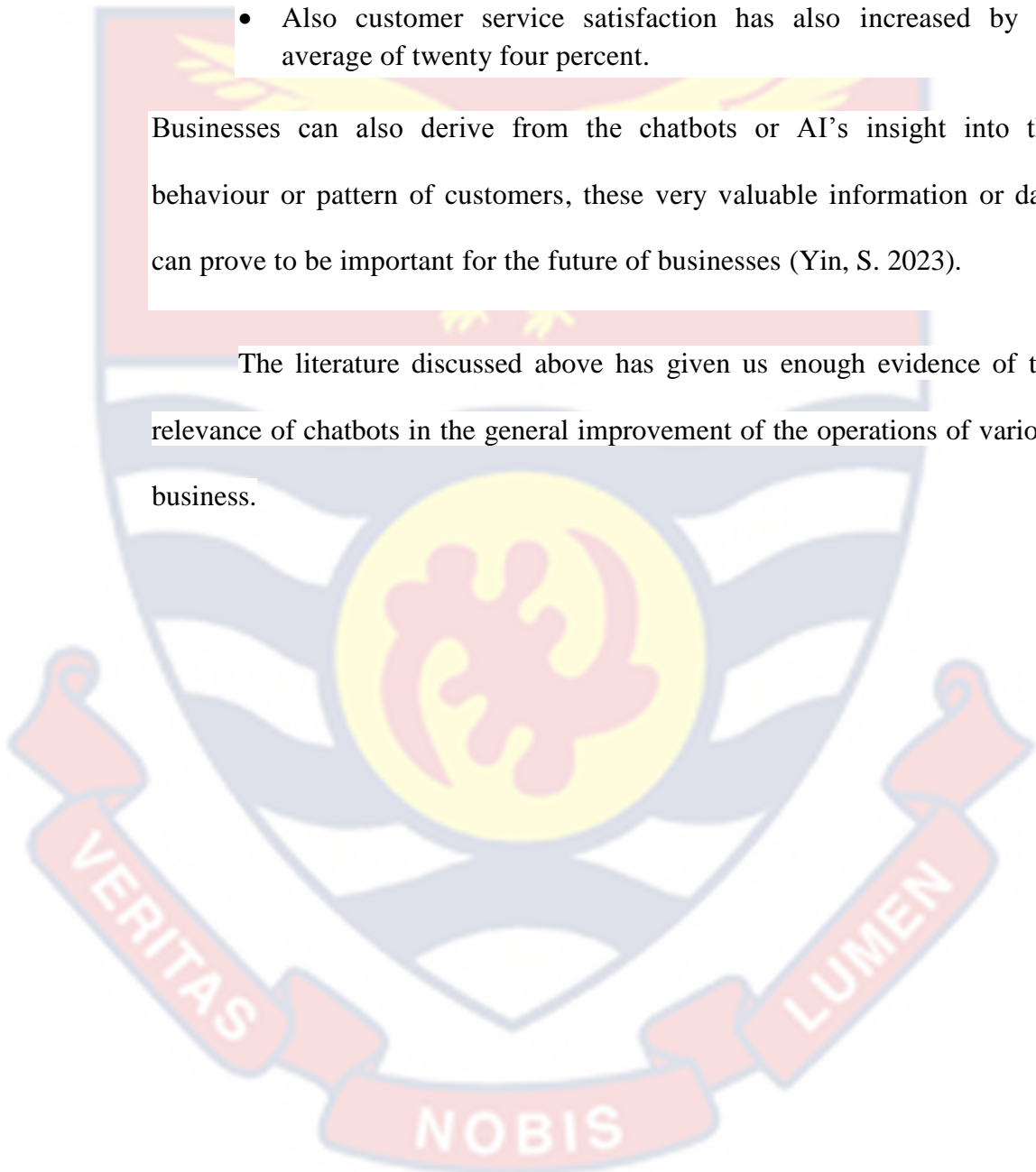
The table below complies a list of some uses of the chatbot in diverse industries;

Table 1: Examples of the Use of Chatbots

Industry	Example
Energy	BotTina by Wienenergie is used to answer queries by customers. Also BS Energy has a Chatbot for reading their meters.
Tourism	The Tauern Spa; A bot helps customers with their bookings. A bot, Serfaus-Fiss-Ladis gives users information on location and weather updates.
Finance	At Hypo Tirol Bank, customers can be assisted with information about card loss, account openings and other basic information on the Bank.
Education	University of Vienna uses the services of a Bot which helps students clarify issues about their student ID
Real estate	Hanse-Haus uses the Bot to arrange consultation appointments and answer other basic queries.
E-Commerce	Netto online shop, users can get answers online of products and other services.
Undertaker	Bestattungen Wien also has a chatbot which offers further information around funerals.

Source: (Stephanie, 2020)

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CHAPTER THREE

METHODOLOGY

Introduction

This section discusses how the UNIBOT was created from scratch. It details the types of chatbots, the various designs available and which one was used in this project. It also talks about the architecture that was employed, some assumptions, requirements.

Types of Chatbot

There are various types of chatbots across various sectors which perform diverse task, but for the purpose of this project I have group them into two broad categories;

- Text-based chatbots and voice based chatbots

A text-based chatbot interacts and communicates by using text or messaging, whereas the voice based on the other hand uses voice as its primary mode of communication. For this project the type used is the Text-Based Chatbot.

Chatbot Design

Chatbots are designed using these two approaches;

- Rule-based chatbot: Bot which communicates based on specific instructions on which it is created.
- Self-learning chatbot: Bot that learns how to communicate using the result of a machine learning model to learn and assess situations.

The project used the ruled-based model to design the chatbot.

Design Assumptions

The following were considered in designing the software,

- The application will only be accessed on the organisation's website
- It is assumed here that the user is a literate; can read and write.
- User has access to internet, which will be used to make a request to the chatbot.
- The user can only use English to communicate with the chatbot.
- The user will not use shorthand to communicate with the bot.
- The queries are only restricted to the organisation (UNICOF).

Design of Architecture

The chatbot architecture encompasses various components that collaborate to facilitate seamless user interaction. The following steps highlights the flow process of the chatbot.

1. Get Input from User: This is the component responsible for receiving input from the user. This input is restricted to text for the purpose of this research work.

2. Interface: The interface is the means through which users interact with the chatbot. It shields the users from the backend languages which might look complicated.

3. NLP Model (Natural Language Processing): The NLP model is a crucial part of the chatbot's architecture. The NLP model is responsible

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for tasks such as tokenization, part-of-speech tagging, entity recognition, and sentiment analysis.

4. Corpus: The corpus refers to the dataset or collection of text that the chatbot uses to learn and understand language patterns. At this stage series of information are highlighted by the chatbot for consideration.

5. Application Database: This database stores specific information relevant to the application or domain the chatbot is designed for. It contains data that the chatbot may need to access during conversations, such as user preferences, transaction history, or product details. This works hand-in-hand with the Corpus.

6. Process the Input: Once the input from the user is received, the chatbot processes it using the NLP model and logic adapters. The logic adapters contain rules, patterns, and algorithms that help the chatbot determine the appropriate response based on the input. The input is analyzed, and the logic adapters generate potential responses. The system then selects the response with the highest confidence value to provide as the final response to the user.

7. Returns the Response for the User: At this final stage, the chatbot sends the chosen response back to the user through the interface.

Below is a diagram of the general architecture of how the chatbot operates;

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Figure 1: The Architecture Design

```
                    ┌─────────────────────────┐
                    │   GET INPUT FROM USER    │
                    └─────────────────────────┘
                                 │
                                 ▼
                    ┌─────────────────────────┐
                    │        INTERFACE         │
                    └─────────────────────────┘
                                 │
                                 ▼
                    ┌─────────────────────────┐
                    │        NLP MODEL         │
                    └─────────────────────────┘
                      ↙                      ↖
          ┌──────────────┐          ┌──────────────────────┐
          │    CORPUS     │          │ APPLICATION DATABASE  │
          └──────────────┘          └──────────────────────┘
                      ↘                      ↙
          ┌──────────────────────────────────────────────┐
          │  PROCESS THE INPUT. RETURNS THE VALUE THAT     │
          │ GENERATED THE HIGHEST CONFIDENCE VALUE FROM THE│
          │              LOGIC ADAPTERS                    │
          └──────────────────────────────────────────────┘
                                 │
                                 ▼
          ┌──────────────────────────────────────────────┐
          │       RETURNS THE RESPONSE FOR THE USER        │
          └──────────────────────────────────────────────┘
```
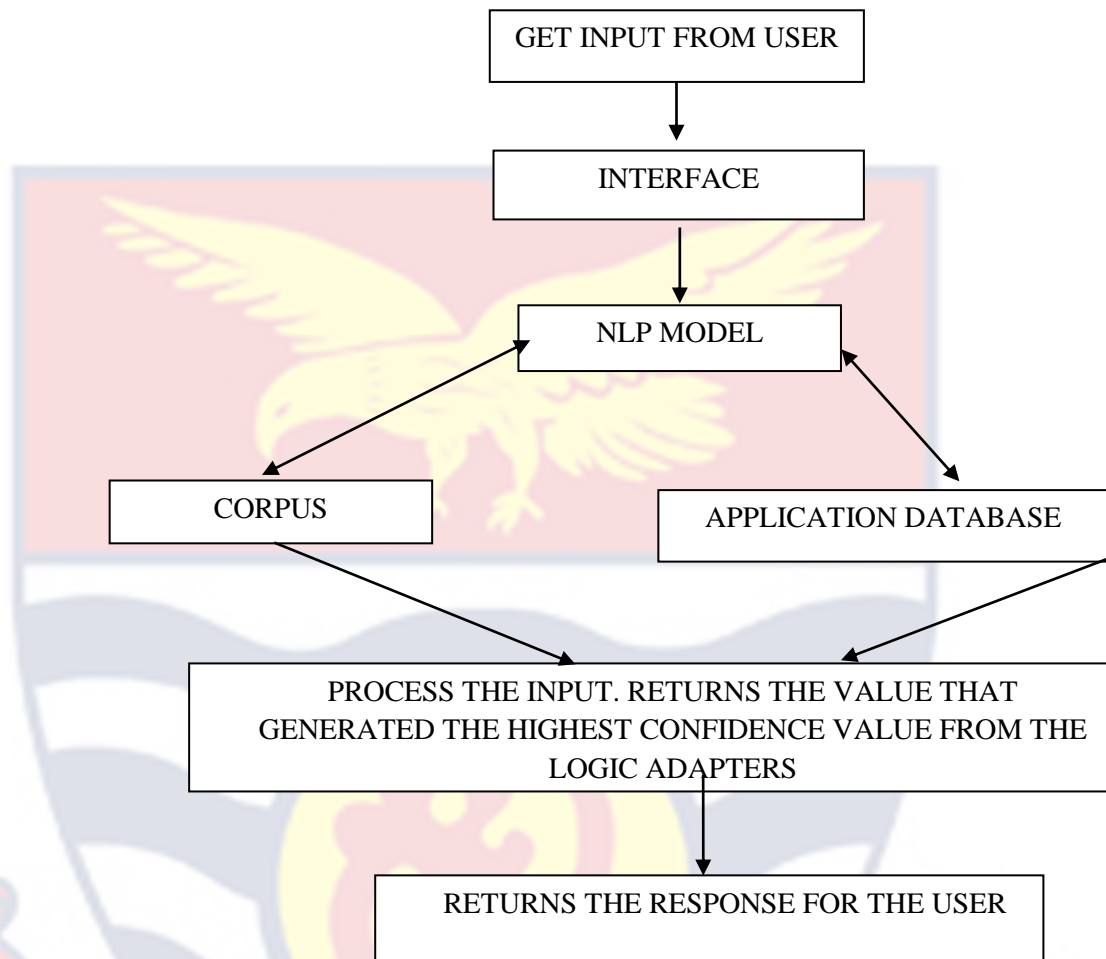
Languages And Libraries

Languages

The Python Natural Language Toolkit (NLTK) was used to perform all the back-end coding in this project. Python is a high-level interpreted programming language used widely in different projects such as web development, data science and Natural Language Processing projects (Andreas C. Müller and Sarah Guido. 2016).

Python was chosen for this project because it was the only machine learning and programming software that I was exposed to during my study, more so I found it relatively easier to learn to achieve the desired output. The

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project also made use of the Jupyter Notebook as the canvas for all the executable Python source codes.

Libraries

In order to get the Python Jupyter notebook to understand the commands various libraries must be installed and for this project the libraries which were installed and imported are listed in Table 2 below.

Table 2:List of Libraries Used and Their Uses

NO.	LIBRARY	USE
1	Io	The io module provides Python's main facilities for dealing with various types of I/O. (The Python Standard Library)
2	Random	Tis is used to generate random numbers. (The Python Standard Library)
3	String	Common string operations. (The Python Standard Library)
4	Warnings	This prompts the user of certain common things to note when working, this is normally not an error message. The Python Standard Library)
5	Numpy	Built-in mathematical functions for quick calculation and supports big matrices and multidimensional data. (etutorialspoint)
6	TfidfVectorizer	Uses an in-built python dictionary to link the common arguments to feature indices and hence figure out a word occurrence (sparse) matrix. (Nabagata Saha (2020))
7	Cosine_similarity	It evaluates the Tfidf which is a weight often used in data recovery or text withdrawal. It also assesses how significant a word is to a file in a corpus. (Nabagata Saha (2020))
8	Nltk	This platform is for creating codes in Python to work with data from human language for the application natural language processing. (Natural Language Toolkit)
9	wordNetLemmatizer	Lemmatization is the procedure of putting together different inflected forms of a word for investigation as a single item. (geeksforgeeks, 2022)

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Database/Corpus

This is the knowledge base of the chatbot. This is where the chatbot derives its intelligence and can be referred to as the database.

Data for this study was collected through various methods. Primarily, information was gathered from the website of the Union of Industry, Commerce, and Finance Workers (UNICOF), focusing on organizational details, frequently asked questions, and other relevant content. Additionally, insights were obtained through interviews with administrative and front office staff members of UNICOF, allowing for a more comprehensive understanding of the organization's operations, challenges, and customer service needs.

The collected data was subsequently cleaned, structured, and organized into distinct sections to facilitate the chatbot's ability to provide accurate and relevant responses. This structured dataset served as the foundation for training and testing the chatbot's capabilities in offering timely and consistent information to users.

It's worth noting that while the primary source of data was UNICOF's website and interviews, other sources, such as industry reports and case studies, were consulted to gain broader insights into chatbot implementation and its impact on customer service across various sectors.

Implementation

The table below outlines the steps taken to create the chatbot from the Jupyter notebook interface.

Table 3: Methodology Steps

Below are snapshots of the actual codes entered into the Python interface (Jupyter NoteBook);

STEP	ACTION TAKEN	OUTCOME
Step 1	This first involved the installing and the importing of all the necessary libraries needed for the creation of the chatbot.	Successful
Step 2	The second step was to import the database or corpus which have been created into the Python and call/read it.	Successful
Step 3	The next step is Tokenisation, which is the procedure of altering the normal text strings into a list of words called Tokens and also sentences the project is looking out for. In this project both word and sentence tokenizer were used.	Successful
Step 4	The next step, Pre-processing was to define a function called LemTokens. This function takes tokens as input and return normalised tokens.	Successful
Step 5	Next, the greeting function was defined by provided the system with a list of greetings and the possible matching responses.	Successful
Step 6	Apart from responding to pre-defined greeting, the bot would be responding to other queries and so a response command based on user queries is also defined. For our response generation the project made use of the Time Frequency-Inverse Document Frequency (TF-IDF) approach, which would be evaluated with the Cosine Similarity that we imported earlier. The chatbot returns "Sorry! don't seem to understand you", when there is no match for the query or input from user.	Successful
Step 7	The next step was to input starting sentences and ending sentences or words. The start sentence for this project is "Hi, my name is UNIBOT. I can answer queries about UNICOF. You can type Bye! if you want to exit". We also defined other words like "bye", "thanks or thank you" to end the conversation.	Successful

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CHAPTER FOUR

RESULTS AND FINDINGS

Introduction

The results and findings section presents a comprehensive overview of the outcomes derived from the implementation and testing of the chatbot within the context of the Union of Industry, Commerce, and Finance Workers (UNICOF).

It analyzes user interactions, response quality, engagement levels, and user satisfaction to assess the chatbot's effectiveness in addressing inquiries and enhancing communication. The section also discusses encountered challenges and aligns the chatbot's performance with the study's objectives, providing a tangible connection between theory and implementation.

Results

The Chatbot (UNIBOT) was successfully run with no errors and negative feedback. The UNIBOT was also tested and it was able to return queries requested for. The UNIBOT was able to responded to the greeting and answer specific question about UNICOF.

Evidence of Implementation

Below is are snapshots of sample conversation with the UNIBOT. The user enters queries and the Chatbot gives the needed answers.

Figure 5: Welcome window

UNIBOT: Hi, my name is UNIBOT. I can answer queries about UNICOF. You can type Bye! if you want to exit
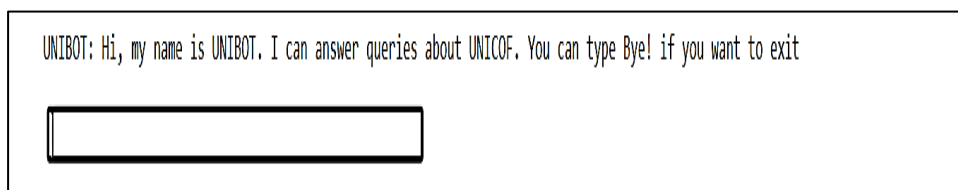
Figure 6: Greetings and Response

```
Hello
UNIBOT: greetings
Hi
UNIBOT: how can i assist you
Sup
UNIBOT: good day
Hey
UNIBOT: How may i help you
```

Figure 7: Sample Question 1 and Response

```
WHAT IS UNICOF
UNIBOT: unicof: union of industry, commerce and finance workers.
```

Figure 8: Sample Question 2 and Response

```
WHAT IS YOUR WORKING HOURS
UNIBOT: working hours: 8:00am to 5:00pm mondays to fridays.
```

Figure 9: Sample Question 3 and Response

```
I WANT SOME CONTACTS
UNIBOT: contacts:
+233) (0303) (931217)/(931216)/(931218)/(931215)/(932671)/(932672)
+233) (0302) (220305) info@unicofgh.org, www.unicofgh.org.
```

Figure 10: Sample Question 4 and Response

```
GIVE ME LOCATIONS
UNIBOT: office locations:
national secretariat:
house number 18, south liberia link
adabraka, accra
ghana

regional offices
ashanti regional office:
ground floor
top martins complex
asokwa
tema regional office
1st floor
vertical plaza
community 6
tema

western/central regional
fijai hills 2nd junction
accra â€" takoradi road
takoradi

volta/eastern regional office
gtuc regional office
ho.
```

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Figure 11: Sample Question 5 and Response

```
HOW DO I JOIN THE UNION
UNIBOT: how to join the union:
ask yourself the following questions
are you consulted when major changes are made to your working practices
does your employer listen to your opinion
is your working environment safe and healthy
are your wages reviewed on regular basis
if you have answered no to any of these then we will be able to help you and your colleagues
if 50% plus one employee in your place of work join unicof, we can apply for a bargaining certificate.
```

Figure 12: Closing Window

```
THANK YOU
UNIBOT: You are welcome..
```

```
BYE
UNIBOT: Bye! please visit again
```
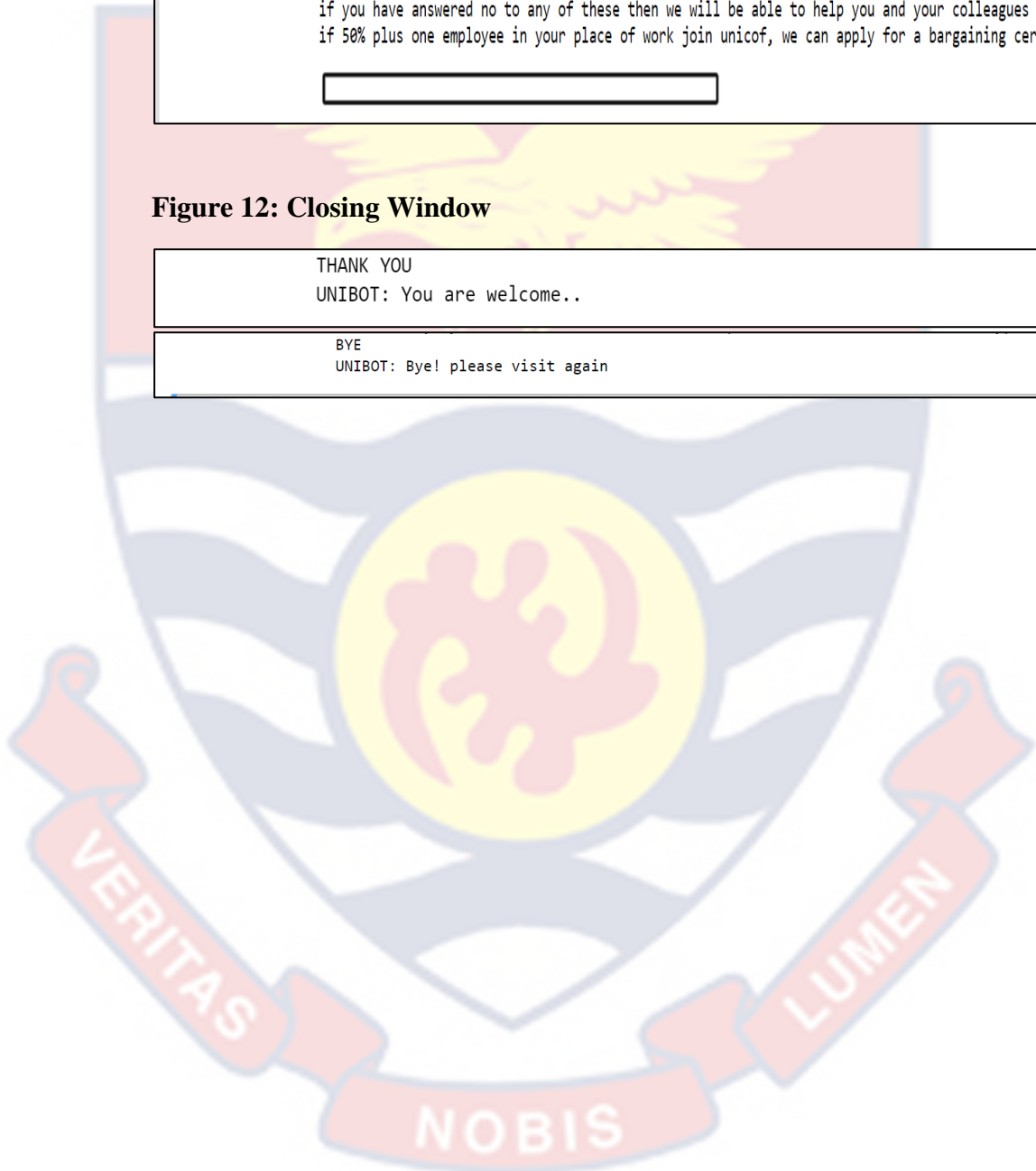
CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

Conclusion

The main aim of this project was to create an environment where some basic information would be available to the general public, especially members of the Union, in a manner that is readily available and consistent, in this case with the help of a chatbot to;

- cut down the cost associated with customer interactions.

- And improve customer service by answering questions at any time of day, effectively addresses user's requests, and have some level of conversation that resembles a human, all in the context of UNICOF.

To this end the UNIBOT was created and implemented successfully. The testing stage also proved that the chatbot was able to provide basic information as requested and based on the database given.

Challenges

UNICOF did not have any data collected on frequently asked question by their members and the general public. Therefore, for this work, the data (corpus) used mainly originated from the Union's website and some few general information which the was pre-empted.

Even though all the codes from Python executed successfully and the UNIBOT was also working well, it was not possible to transfer same onto the Union's website. Issues of permission from the Management Team did not make it possible for the successful integration of the chatbot onto the Union's website.

Recommendations

Based on the findings and insights gathered from the study, several recommendations emerge to enhance the implementation and utilization of the chatbot within the Union of Industry, Commerce, and Finance Workers (UNICOF):

- **Continuous Monitoring and Improvement:** Regularly monitor the chatbot's performance by analyzing user interactions and feedback. This proactive approach will allow for adjustments, improvements, and refinements to ensure that the chatbot remains aligned with users' needs and expectations.

- **Natural Language Processing Enhancement:** Consider investing in advanced natural language processing (NLP) capabilities to improve the chatbot's ability to understand and respond accurately to user queries. Upgrading the NLP component can significantly enhance user satisfaction and the overall effectiveness of the chatbot.

- **User Training and Engagement:** Conduct training sessions for users to effectively navigate and utilize the chatbot's capabilities. Providing clear guidelines and tips for optimizing interactions with the chatbot can improve user engagement and encourage its adoption.

- **Expand Content and Scope:** Continuously update the chatbot's database with new and relevant information. Include a broader range of frequently asked questions, industry updates, and organizational news to ensure that users find value in interacting with the chatbot.

- **Integration with Website:** Seek approval for the integration of the chatbot onto UNICOF's website, allowing users to access it seamlessly

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from the organization's online platform. This integration can enhance user accessibility and convenience.

- **Feedback Collection Mechanism:** Implement a feedback mechanism that allows users to provide suggestions, report issues, and rate their experiences with the chatbot. User feedback can guide ongoing improvements and help maintain a user-centric approach.

- **Multilingual Support:** Consider incorporating multilingual capabilities to cater to a diverse user base. This enhancement can expand the chatbot's reach and inclusivity, making it more valuable for UNICOF members.

- **Data Privacy and Security:** Ensure that the chatbot's interactions prioritize data privacy and security. Implement robust encryption and compliance measures to protect user information and maintain trust.

- **Promote Awareness:** Conduct awareness campaigns within UNICOF to inform members about the chatbot's capabilities, benefits, and its role in improving customer service. This can encourage greater adoption and utilization.

- **Ongoing Training and Maintenance:** Provide regular training and updates to the chatbot's algorithms and knowledge base to keep it aligned with evolving user needs and industry trends.

By implementing these recommendations, UNICOF can optimize the effectiveness of the chatbot, enhance customer service, and create a seamless and efficient communication channel for its members.

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