Chavatar: AI-Integrated SDG Awareness Online Platform

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CHAPTER I

PROBLEM AND ITS BACKGROUND

This chapter provides the problem of the study and its background. This chapter also includes the introduction, statement of the problem, objectives, significance of the study, and its scope and limitations.

Introduction

A collection of technologies known as conversational artificial intelligence (AI) are capable of identifying and reacting to text and speech inputs. This term refers to interacting with customers through AI-powered solutions such as voice-activated assistants or chatbot software. Chatbots, voice assistants, and interactive voice response are the three current forms of conversational AI. Additionally, it can be applied to a wide range of industries, including internet of things, customer service, sales and marketing, data collection, and more (Galic, 2024).

Conversational AI during the last few years has been gaining unprecedented traction. Rapid online contacts with public sector organizations (PSUs) and government have become more and more necessary due to the development of mobile devices and the growing number of people who use them. As a result, the use of conversational AI solutions has increased dramatically, improving the effectiveness and productivity of providing services to netizens. Chatbots are versatile as they have become essential instruments for assisting customers with their online shopping experiences, particularly, the e-commerce and retail industries emerge as key players, using conversational AI technologies to dramatically enhance customer service. Moreover, virtual assistants and chatbots expedite help, speed up responses, and increase client happiness. Conversational AI is transforming industries all around the

world, boosting efficiency, transforming consumer interactions, and catapulting innovation to previously unheard-of levels (Kawade, 2024)

And lastly, people are constantly looking for information. This information might have come from outside sources, such as the entire human race, or it might have come from within you and your coworkers. We currently employ computer search, which is essentially an index of the information that is accessible. AI will classify it and provide the best possible response. Search engines of today will become supplementary. A new method for obtaining the information you need will save a ton of time and increase productivity. OpenAI's ChatGPT release is just the start, and that's where the programmers and their rationale come into play. Learning more about conversational AI, learning how to create them, and determining how accurate it is.

Statement of the Problem

The proponents aim to create a system that utilizes artificial intelligence and promotes the 17 Sustainable Development Goals (SDG). Specifically, it seeks to answer the following questions:

1. What is the significant difference between the system compared to other well-known ai applications?
2. How optimal is the system compared to other well-known ai applications in terms of:
    a. AI Response Quality
    b. Response Time Interval
    c. Real-time Conversation Latency

Objectives

During the course of study, the proponents are expected to:

1. Develop a system that incorporates both aspects of artificial intelligence and the 17 SDGs.
2. Add more features that also focus on the 17 SDGs.
3. Analyze and determine the system response quality, response time interval, and real-time conversation latency.
4. Compare the created system compared to other widely-used conversational AIs.

Significance of the Study

This study consists of artificial intelligence, along with the encouragement of the 17 SDgs. By using AI to aid preserve the environment, protect biodiversity, mitigate climate change, eradicate poverty, promote social inclusivity, and foster long-term economic growth, this study addresses the impact of AI in world changing.

The study is deemed beneficial to the following:

Users. This study could be helpful for people who are constantly looking for information or assistance through conversational interaction and benefit from the convenience with which information may be accessed. They would also be aware of environmental issues and tips.

Programmers. This study could be beneficial for programmers especially for those interested in learning AI. They can also help to enhance the chatbot's performance, introduce new features, and improve its functioning over time.

Environmentalists. This study could aid those who take strong interest in the natural environment, and those who want to preserve it and prevent damage to it. The program also acts

as an online platform where others who also share the same interest can interact with each other through online chats and forums.

Scope and Limitations

The system functions as a desktop application which aims to have functionalities of being able to answer user prompts with regards to all of the sustainable development goals as well as allow users to have real-time conversations with each other. Moreover, the system also features a community forum that allows users to post guides, event announcements, questions, news, and research articles.

Regarding its limitations, the chatbot's responses are reliant on Gemini because the application uses the Gemini Pro API. Additionally, the system, for now, only accepts text inputs for there is still no official library of Gemini API for C#. Hence, the use of JSON format to send prompts and retrieve responses. Moreover, storing conversation is not included as a function since Gemini Pro is primarily built for generating text content in response to a prompt. In terms of online conversation, the same LAN connection is needed to send and receive messages. Furthermore, the system will only be available on desktop in the foreseeable future.

CHAPTER II

REVIEW OF LITERATURE

This chapter presents the review of conceptual and research literature with the end view of identifying the constructs of the study. Likewise, the synthesis of literature reviewed, the theoretical and conceptual frameworks, hypotheses as well as the definition of key terms were included.

Conceptual Literature

Artificial Intelligence Chatting. The evolution of chatting from human-to-human interaction to interactions with various AI models has transformed the way communications are done. Sites like C.AI leverages this new type of chatting creating various models designed for a variety of topics tailored to different topics and purposes (De Luna, 2023). As reported by The New York Times, chatbots are continually improving, becoming less robotic and more human-like in their interactions. This advancement enables them to engage with users in a manner that closely resembles human conversation (Lohr, 2022). One of the key factors driving the popularity of AI chatbots is their vast knowledge base, which stems from extensive training on large datasets. These datasets enable AI models to access and comprehend a wide array of information available on the internet, making them reliable sources of answers and insights (Staff, 2023). Moreover, the increasing sophistication of AI chatbots allows them to mimic human behavior and communication patterns more accurately. This human-like quality enhances the user experience, making interactions with AI feel more natural and intuitive. As AI technology continues to advance, we can expect chatbots to become even more sophisticated, blurring the lines between human and machine communication further. This trend indicates a

promising future for AI-driven conversational systems, with the potential to revolutionize various industries and aspects of daily life.

Environmental Awareness. While it's true that awareness about environmental issues among the general public remains limited in some areas, there has been a noticeable shift in recent years towards greater awareness and engagement. Various events and initiatives have emerged to address this gap, leveraging platforms like social media to amplify their message and reach a wider audience (CBC, 2019). This increased awareness has led to more successful efforts aimed at protecting the environment. One of the key strategies in raising awareness has been the use of social media platforms. These platforms provide a powerful tool for spreading messages quickly and efficiently to a large number of people. Campaigns, events, and educational content related to environmental issues can now reach audiences around the globe with just the click of a button. This widespread dissemination of information has helped to educate and inform people about pressing environmental concerns, encouraging them to take action and make more sustainable choices in their daily lives. Moreover, the interconnected nature of social media has facilitated the formation of online communities and networks dedicated to environmental activism and advocacy (Puentes, 2021). These communities serve as platforms for sharing knowledge, resources, and support, empowering individuals to get involved in environmental initiatives and make a positive impact in their communities. As a result of these efforts, more and more people are becoming informed and connected to environmental activities. From grassroots movements to large-scale campaigns, the collective efforts of individuals, organizations, and communities are making a difference in protecting the environment and promoting sustainability.

Research Literature

The following studies were retrieved because they contain findings that are relevant to the present study:

Boubker (2024) suggests that artificial intelligence (AI) has the potential to revolutionize education by improving teaching and learning experiences, student outcomes, and administrative efficiency. The study examines the role of ChatGPT in enhancing student learning. It finds that the quality of output affects perceived usefulness, ChatGPT usage, and student satisfaction. Social influence also plays a significant role in perceived usefulness and ChatGPT usage, while ease of use influences perceived usefulness and student satisfaction. Moreover, perceived usefulness of ChatGPT positively impacts its usage and student satisfaction, ultimately enhancing individual impact. These findings offer valuable recommendations for leveraging AI to transform teaching practices in the digital age.

Furthermore, Hakim and Rima (2022) explored how artificial intelligence enables individuals to engage in conversations with machines, computers, or robots. Chatbots, a prominent application of AI, simulate human-like interactions, serving as a convenient tool for language practice anytime and anywhere. To enhance students' English communication skills, researchers investigated the use of AI chatbot applications in English language courses. Through interactions with chatbots such as ELIZA, ALICE, MITSUKU/KUKI, and ANDY on various topics including introductions, emotions, daily routines, hobbies, lectures, and the COVID-19 pandemic. The findings revealed that ANDY emerged as the most preferred chatbot, with 86% of expressions conveying positive meanings and no negative sentiments towards it. Conversely, ELIZA ranked as the least favorite, with 43% of expressions expressing negativity, surpassing the 39% of positive expressions.

In a study by Yang et al. (2022), concerns surrounding the integration of artificial intelligence (AI) chatbots in educational environments, particularly for language learning. This research introduced "Ellie," a task-based voice chatbot developed by the researchers, and assessed its suitability in task design and performance as an English conversation partner, as well as students' perceptions of its use in an English as a Foreign Language (EFL) class. Korean EFL learners aged 10–15 years interacted with Ellie in their school classrooms, completing three speaking tasks. On average, participants took 9.63 turns per session using the first 1,000-word band, indicating a high level of engagement, which is often rare in traditional EFL classes in Korea. The high success rates of tasks (88.3%) demonstrated the appropriateness of task design and operational intents, with users showing successful understanding and completion of chatbot tasks. Survey responses from participants not only affirmed the positive potential of the chatbot in EFL settings but also highlighted areas for improvement. The study concludes with suggestions for future enhancements and implementations of AI chatbots in EFL classrooms.

In a study by Mageira et al. (2022), leveraging advanced artificial intelligence (AI) technology in educational settings emerges as one of the latest challenges for educators and policymakers in the field of education. Conversational AI introduces new avenues for alternative and innovative Information and Communication Technologies (ICT) tools, such as AI chatbots. This paper presents field experiments conducted with an AI chatbot, showing its potential contribution to Content and Language Integrated Learning (CLIL). Specifically, the study showcases an experimental use case of an educational AI chatbot named AsasaraBot, designed to impart cultural content in a foreign language, namely English or French to high school students. The content focuses on the Minoan Civilization, with a particular emphasis on the iconic figurine of the Minoan Snake Goddess. The educational program, facilitated through the chatbot, was

evaluated at both public and private language schools in Greece. The results of these experiments indicate that utilizing AI chatbot technology for interactive ICT-based learning proves conducive to acquiring foreign language skills and cultural knowledge simultaneously.

In addition, the survey conducted by Hamid et al. (2023) revealed that ChatGPT improved group collaboration and engagement during Problem and Project-Based Learning, while increasing motivation and encouraging more questions. Nevertheless, some students encountered difficulties understanding ChatGPT's information and questioned its reliability and credibility. Despite these challenges, most students saw ChatGPT's potential to eventually replace traditional information-seeking methods.

Additionally, in the study conducted by Morgil et al. (2018), the researchers aimed to explore the impact of computer-assisted education on the environmental knowledge and awareness of university students. In the study, a pre-test consisting of an environmental knowledge test with 35 questions and an environmental awareness scale with 13 questions was administered to 88 students. Following the pre-test, the students engaged in a 15-hour-per-week Internet class for a duration of 2 weeks, during which they extensively utilized computer-assisted methods. Subsequently, the same environmental knowledge test and awareness scale were administered as post-tests, and the results were compared. The findings indicated that after the computer-assisted instruction, students' environmental knowledge and awareness showed improvement. However, it was observed that while environmental knowledge increased, the predictive power of environmental awareness in determining the level of success decreased. This suggests that while computer-assisted education effectively enhances students' understanding of environmental issues and concepts, other factors may also influence their overall success in environmental studies.

In another study conducted by Altın et al. (2014), the researchers aimed to assess the awareness of environmental issues and the level of active participation in environmental activities among secondary school students. They also investigated the influence of various factors such as family, school, and media on students' environmental awareness and participation. The results of the study indicated a generally high level of environmental awareness among the participating students. However, the researchers found that environmental education provided within schools was insufficient, and the level of student participation in environmental activities was relatively low. Interestingly, the study revealed that students predominantly gained environmental knowledge and experiences from mass media sources, including audio, printed, and visual media.

Synthesis

In comparison with Boubker's (2024) study on the application of AI in education, the system being considered—which includes a chatbot that makes use of the Gemini API—gives priority to environmental challenges that are in line with the 17 Sustainable Development Goals (SDGs). Although Boubker focuses his study on improving student results and teaching techniques, the program by proponents broadens its focus to include environmental sustainability awareness and education. By means of incorporating a user-to-user chat feature and a forum, the software seeks to promote conversations and activities concerning environmental issues, thereby supporting wider societal objectives that extend beyond improvements in education.

Moreover, Hakim and Rima (2022) do research in the field of artificial intelligence, with a particular focus on examining the efficacy of chatbots in promoting language proficiency and practice. Their research assesses several chatbot models on a range of conversational subjects,

including ANDY, ELIZA, ALICE, and MITSUKU/KUKI. Notably, people overwhelmingly give ANDY positive comments, making it the preferred option, while ELIZA receives criticism over its performance. On the other hand, the proposed system, which includes a chatbot powered by the Gemini API, is more focused on addressing environmental issues by means of forum features and user-to-user communication.

And in relation to a study by Yang et al. (2022), the rise of the task-based voice chatbot "Ellie" highlights ongoing worries about the use of AI chatbots in learning contexts, especially when it comes to language learning. Ellie's task design and performance as an English conversational partner are evaluated in the study. In contrast, the proponents' program, driven by the Gemini API, presents a holistic approach extending beyond language learning, integrating environmental awareness through user interaction, thus underscoring broader societal benefits and educational applications instead of measuring the performance of the AI as an English conversational partner.

Meanwhile, according to a study by Mageira et al. (2022), educators and legislators face a critical problem when it comes to integrating advanced artificial intelligence (AI) technologies into educational settings. This study looks at how conversational AI, and specifically AI chatbots, can help with Content and Language Integrated Learning (CLIL). On the other hand, the program is more comprehensive and places more of an emphasis on environmental consciousness in addition to language learning if the users wish to, which promotes multidisciplinary learning opportunities that are relevant to society.

In addition, Hamid et al. (2023) found that ChatGPT was useful for improving group engagement and collaboration in Project-Based Peer-Led Learning (PDPBL) settings. Participants apparently felt more motivated and were encouraged to ask more questions as a

result. On the other hand, the proposed program goes beyond classroom settings, placing more of an emphasis on environmental consciousness and encouraging user-to-user communication and interaction rather than improving engagements and collaborations in a workplace setting.

Regarding the environmental issues, the knowledge of environmental issues and the involvement of secondary school pupils in associated activities were investigated in the study by Altın et al. (2014), taking into account influences from the media, school, and family. The findings showed that participants had a good level of environmental awareness overall, but that student participation in activities and school-based environmental education were considered insufficient. Meanwhile, the proposed program addresses environmental issues similarly to the previously mentioned study, but it differs in that its goal is to raise awareness rather than determine it.

Lastly, in order to improve customized and student-centered learning in environmental studies, Morgil et al. (2018) looked into the effects of computer-assisted education on university students' environmental knowledge and awareness. The proposed system is similar in the sense that it is involved environmental-wise and the students' system complements conventional educational approaches by attempting to enable environmental education and involvement through interaction with AI and fellow users.

Definition of Terms

The following terms are defined conceptually and operationally for a better understanding of this study:

Artificial Intelligence (AI). The term means the ability of a digital computer or computer-controlled robot to perform tasks commonly associated with intelligent beings. It is

frequently applied to the project of developing systems endowed with the intellectual processes characteristic of humans, such as the ability to reason, discover meaning, generalize, or learn from past experience (Copeland, 2024). In this study, it denotes a program or model that is trained to emulate human-like behavior and capabilities.

Chatbot. The term means a software application created to engage in interactive or automated discussions with humans. Basic versions of chatbots emerged in the latter half of the 20th century, and they improved in sophistication and accessibility during the late 2010s and early 2020s (Gisona, 2024). As used within the context of this study, the term stands for a software that generates human-like conversations with users and is trained with large datasets pertaining to a particular topic.

CHAPTER III

RESEARCH DESIGN AND METHODOLOGY

This chapter will cover the detailed explanation of methodology that is being used to achieve the objectives and to complete the project. The methodologies in this study are generated for others to take advantage and improve for future studies with relevance to this project. Specifically, this methodology is based on System Development Life Cycle (SDLC), which has three major steps - (1) planning, (2) implementing, and (3) analysis.

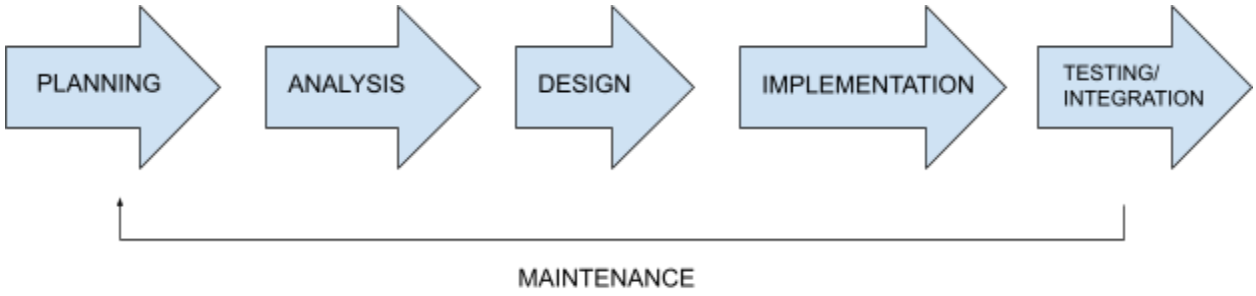

Figure 3.1: The System Development Life Cycle (SDLC)

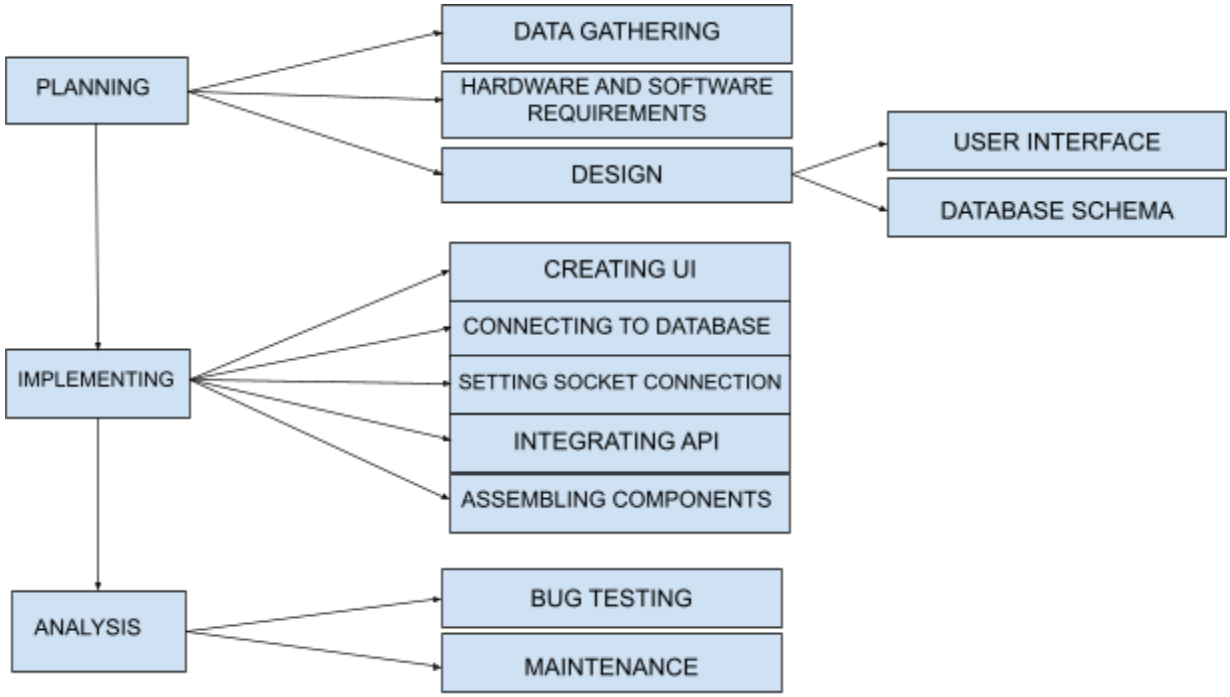

Figure 3.2: The three major phase of the Methodology

3.1 Planning

The first step in making the project is the planning process. This phase is the most important phase of this study for this will be the guide for the whole implementation of the system. The planning phase will be divided into two parts, the data collection phase and the gathering of hardware and software.

3.1.1 Data Gathering

Data gathering is mostly the first step in making any project. At this phase, the researchers conducted thorough research for related literature studies and other related projects to get enough information for the implementation. Most of the materials and information are collected from online journals, websites, and online research articles all gathered from the Internet.

3.1.2 Hardware and Software Requirements

After gathering information, the researchers will then set-up the required hardware and software platforms. The researchers will use a laptop for the hardware. While for the software applications, Visual Studio will be used. In creating the user interface, Windows Forms Application will be used and for the backend, socket, Gemini API, and mysql will be used for the connection.

3.1.3. Design

3.1.3.1. User Interface

Figure 3.3.1: Welcome Page

Figure 3.3.2: Login Page

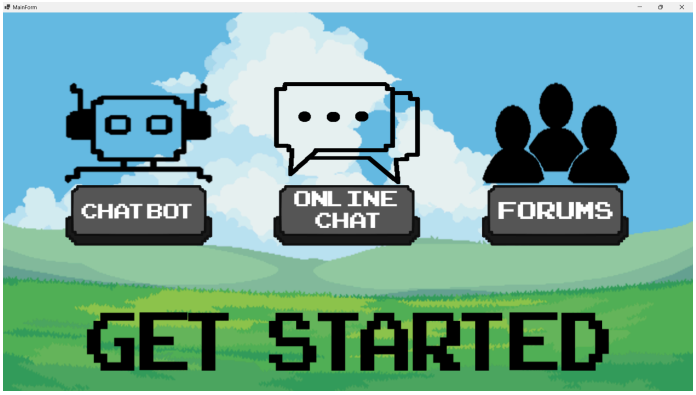

Figure 3.3.3: Main Menu

Figure 3.3.4: ChatBot Page

Figure 3.3.5: Online Chat Page

Figure 3.3.6: Community Forum Page

The figures above show the designed user interface by the researchers. The created UI will be used by users to interact with the system. Each element of each page will be responsive and will scale based on the screen's size and resolution.

3.1.3.2. Database Schema

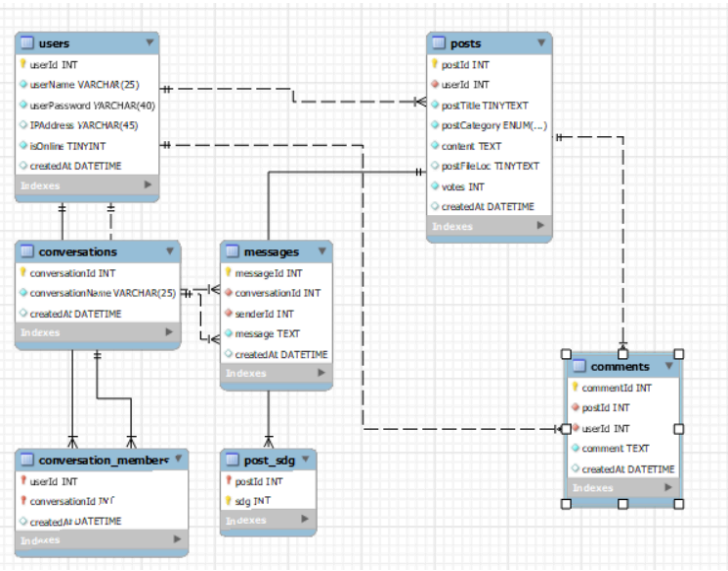

Figure 3.4: Database Schema

The figure above shows the database schema that the researchers will use to show the relationship of each entity to each other. This will also help in building the tables that will be used in the management of the database to handle and store the data in the system.

3.2 Implementing

After the creation of the UI and researching about the possible tools and libraries to be used in making the project, implementation will take place. The implementation phase will involve creating the UI, database connection, socket connection, integrating the Gemini API, and finalizing.

3.2.1 Creating the UI

Windows Forms Application is a UI framework that creates rich desktop client apps for Windows. The researchers used Visual Studio to create a Windows Forms Application project. The controls included will all be based on the created design by the researchers during the planning phase.

3.2.2 Connecting to the database

For the database, the researchers used a SQL or structured query language, specifically MySQL to manage the database. The researchers decided to use a database to manage, store, create, and edit all the data that will be created during the implementation and testing process of the system.

3.2.3 Setting up the socket connection

One of the features of this project is the chat system. The researchers used sockets to send data packets through the IP/TCP. This allows users to interact and send messages in a separate device as long as they are connected in the same WIFI.

3.2.4 Integrating Gemini API

Aside from the chat system, the integration of the Gemini is also a feature of this project. The Gemini API allows the researcher to connect, send, and receive messages from Gemini, an

AI bot. All the queries will be sent to Gemini and then it will send back a response generated from the AI bot.

3.2.5 Assembling Components

After configuring the features of the program, assembling it all in one project is the last step in implementing. All the components of the program from the frontend to the backend will be combined. The final output will then be tested for analysis in terms of its performance and speed level.

3.3 Analysis

The last part in creating this project is the analysis of the response time, reliability, and overall performance of the system. This will be analyzed through conducting multiple testing of the system and fix any bug that will be encountered.

3.3.1 Bug Testing

The system, once complete, will be tested multiple times trying different procedures in order to see flaws in the program that are required to be fixed. This iterative testing process ensures the program's reliability and performance under various conditions.

3.3.2 Maintenance

Updating the system for future developments such as added new features, design overhaul, and more bug fixes will be performed moderately in order to keep expanding the program. This approach will maintain the program's stability while continuously enhancing its capabilities.

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