CHAT-BOT SYSTEM FOR COMPUTERS, ACCESSORIES & REPAIR CENTER RECOMMENDATION

TMP-23-283

Senadheera H.A.M

IT20125998

B.Sc. (Hons) Degree in Information Technology

Specializing in Data Science

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DECLARATION

We declare that this is our own work, and this proposal does not incorporate without acknowledgement any material previously submitted for a degree or diploma in any other university or Institute of higher learning and to the best of our knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

Name	Student ID	Signature
Senadheera H.A.M	IT20125998	

The supervisor/s should certify the proposal report with the following declaration. The above candidates are carrying out research for the undergraduate Dissertation under my supervision.

Signature: Date:

Signature of the Supervisor: Date:

ABSTRACT

The creation of a chat-bot system that can recommend computers, accessories, and repair shops to users based on simple natural language-based queries is suggested by this project. The system uses ML, ASR and NLP to identify user wants and preferences in order to streamline the process of locating appropriate products and services to user.

Computers, accessories, and repair centers were loaded to the ML model through web scraping so always system is updated with the current products in the market Based on users' queries and previous engagements, the chat-bot system will be able to offer tailored recommendations.

The suggested method may be a useful resource for people with low technical knowledge on and companies looking for dependable and practical ways to improve user friendliness of their systems of websites.

Keywords: Natural Language Processing (NLP), Chat bot, Machine Learning, Web scraping, Computer accessories, Computer repair centers.

ACKNOWLEDGEMENT

I want to extend my sincere gratitude to everyone who has assisted me in finishing this research. I want to express my gratitude to Dr. Lakmini Abeywardhana supervisor, for their advice and assistance. For their contributions, I also like to thank my research group and my colleagues at the Sri Lanka Institute of Information Technology. I must express my appreciation to the research participants for their insightful participation. I also like to thank the financial organizations whose assistance made this study feasible. Last but not least, I want to express my gratitude to my family and friends for their constant support and compassion. I sincerely appreciate everything that each of these people and groups have done to help.

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LIST OF ABBREVIATIONS

Abbreviation	Description
SLIIT	Sri Lanka Institute of Information Technology
NLP	Natural Language Processing
ML	Machine Learning
AI	Artificial Intelligence
KNN	K-Nearest Neighbors
GCP	Google cloud platform
NLTK	Natural Language Tool Kit

LIST OF APPENDICES

1 INTRODUCTION

In today's fast-paced environment, computers are an essential component of daily life. Nowadays, everyone needs computers and related equipment, including homes, businesses, and organizations. With a growth in our reliance on technology, there is an increased need for trustworthy and efficient repair services. However, locating the appropriate product or repair shop that meets our particular needs can be a challenge. At this moment, the Chat-Bot System for Computers, Accessories & Repair Center Recommendation comes into play.

The chore of discovering the best goods and services has been substantially more accessible and streamlined with the introduction of this cutting-edge technology, known as the Chat-Bot System for Laptops, & Service Center Recommendations. This cutting-edge technology combines the strengths of machine learning, natural language processing, and online data scraping to harness the potential of data collection through web scraping. As a result, the system may make highly customized recommendations based on user enquiries in addition to understanding user preferences.

The beauty of this technology resides in its capacity to eliminate barriers between consumers and the wide range of laptops, and service providers that are offered on the market. It serves as a virtual guide, streamlining the difficult decision-making process and ensuring that consumers are presented with choices that exactly meet their needs. The system modifies how people look for information and guidance in the world of computers and related services by leveraging chatbot technology.

The Chat-Bot System shines as a light of efficiency and ease in a world where time is of the importance and information overload is a typical difficulty. It enables users to take rapid, well-informed decisions while making sure that the recommendations it offers are based on their own interests and needs. This system is proof of the revolutionary potential of technology in making our lives simpler, whether you're a

tech enthusiast, a business owner, or an individual looking for solid computer-related solutions.

Modern technology known as the Chat-Bot System for laptops & Service Center Suggestions makes it easier to discover the right goods and services. The technology uses machine learning and natural language processing algorithms to comprehend data obtained through web scraping.

A convenient way to collect large amounts of data for machine learning (ML) model training is through web scraping. It involves obtaining data from websites. Web scraping can be used to collect a large and diverse dataset, which is necessary for building trustworthy and accurate models. to develop a recommendation engine that provides consumers with personalized and exact recommendations. E-commerce websites can be used to obtain information about products, technical details, descriptions, reviews, and ratings. The product information will also always be current.

In order to extract important keywords from user queries and add them to the recommendation model, this system uses NLP. Researchers are constantly creating new techniques and algorithms to improve the efficacy and accuracy of NLP. research into how human language and technology interact

By examining user-submitted queries written in natural language and finding patterns and connections between query terms and items, machine learning (ML) model is used to train recommendation systems. Content based recommendation algorithms use similarity metrics to discover related items and suggest related items based on the user's search queries.

Image processing algorithms were used to get the specific data from images that the users upload to the system if they don’t know specific terms they want to search for.

1.1 BACKGROUND & LITERATURE REVIEW

In recent years, there has been a significant surge in the demand for personalized recommendations and effective customer care across various industries. This growing need has led to the widespread adoption of chatbot systems. Chatbots are sophisticated computer programs designed to replicate human communication using advanced technologies like machine learning and natural language processing (NLP). They have proven their effectiveness in industries such as e-commerce, healthcare, and customer service by providing tailored suggestions for products and services.

One of the primary advantages of chatbot systems is their ability to assist customers in finding the perfect products or services that match their individual needs and preferences. Let's take a closer look at how chatbots are making a difference, particularly in the context of computer repair services and accessory recommendations.

In the field of computer repair services, chatbots play a pivotal role in enhancing the overall customer experience. When customers encounter technical issues with their computers or accessories, they often seek expert advice on how to resolve these problems. Traditionally, this involved navigating through complicated customer support systems or speaking to a human agent, which could be time-consuming and frustrating.

Chatbots, however, offer a streamlined and efficient solution to this problem. By engaging in natural language conversations with customers, chatbots can quickly diagnose the issues and recommend appropriate repair services or troubleshooting steps. This not only saves customers valuable time but also ensures that they receive accurate and timely assistance.

Furthermore, chatbots are capable of recommending accessories and additional products that complement a customer's specific needs. For example, if a customer is getting their laptop repaired and needs a new charger or protective case, the chatbot can suggest compatible options based on the laptop model and the customer's preferences. This level of personalization not only enhances the customer's shopping

experience but also increases the likelihood of upselling and cross-selling, benefiting businesses.

The benefits of chatbots extend beyond customer satisfaction and convenience. They also contribute to the efficiency of the repair procedure. Chatbots can collect essential information from customers, such as the device's serial number, the nature of the issue, and any relevant warranty details. This information can be relayed to human technicians or integrated into automated repair processes, ensuring that the repair procedure is expedited and tailored to the customer's specific situation.

Chatbots can handle a high volume of customer inquiries simultaneously, providing businesses with a cost-effective solution for managing customer support requests. By automating routine tasks and inquiries, chatbots free up human agents to focus on more complex and value-added tasks, further improving overall operational efficiency.

The employment of chatbot systems in a variety of areas, including e-commerce, healthcare, and customer service, has been the subject of numerous studies. There is little research available in the area of recommended computer repair services and accessories. However, the literature review that follows offers some pertinent studies:

In one study by Gao et al. (2021) [1], the use of a chatbot system for troubleshooting computer hardware was investigated. The study found that the chatbot system was effective in identifying hardware issues, pinpointing their locations, and suggesting fixes.

Another study included Wang et al's [2] inquiry into chatbot systems for personalized suggestions in e-commerce. The study found that chatbots were effective at providing personalized recommendations for products and services, boosting customer satisfaction and loyalty.

Chen et al. looked into the use of a chatbot system for customer service in the context of online shopping in a paper that was published in 2020 [3]. The study found that the chatbot system was effective at rapidly and accurately answering client questions, which raised customer satisfaction and loyalty.

According to the research, chatbot systems can be helpful in providing tailored recommendations and efficient customer support across a variety of industries,

including computer repair services and accessory advice. More research is needed to examine the effectiveness and limitations of chatbot systems in this particular context.

1.2 RESEARCH GAP

Although there are numerous research articles on chat bots, e-commerce platforms, device recommendation systems, and repair shop suggestions, none of these topics have been examined as a whole in any one publication.

Even though NLP and image processing are both powerful technologies, combining them may be challenging. In order to increase the accuracy and effectiveness of the chat-bot system, the combination of image processing and NLP needs to be looked into.

Robustness of the Chat-Bot System: The Chat-Bot System must be capable of coping with a variety of inputs from users and circumstances [6]. It is important to look into ways to make the system dependable and robust, especially while working with web-based unstructured data.

It is interesting that although natural language processing (NLP) and image processing are both powerful technologies on their own, their combination creates an intriguing yet difficult frontier. Researchers and practitioners must delve further into the combination of these two potent fields if they are to fully realize the promise of the chat-bot system and improve its accuracy and efficacy. The combination of NLP and image processing has the potential to develop a chat-bot system that can process visual data in addition to textual data, potentially transforming how consumers interact with technology.

The robustness of the Chat-Bot System is one important factor that demands careful attention. It is crucial to ensure the system's dependability and resilience because it caters to a variety of users with different inputs and functions under a variety of conditions.

In the proposed recommendation system price, user reviews and availability of the devices will be considered when giving recommendations rather recommending based on the technical specifications of the devices.

Most of the existing systems use only a single model to give the recommendations to the user but in the proposed system I’m planning to use both content based and

collaborative based recommendation algorithms to recommend devices and repair centers for the user.

1.3 RESEARCH PROBLEM

The world of purchasing computer hardware has evolved significantly with the rise of e-commerce. These online platforms offer a vast array of computers, computer parts, and computer repair services, making it more convenient than ever to acquire the technology we need. However, despite this abundance of choices, many customers still struggle to make the best decisions for their specific needs. This dilemma has led to wasted money and frustration among consumers.

The primary issue stems from the overwhelming number of options available. Customers often want assurance that the product or component they are purchasing will meet their unique requirements, but navigating through this extensive array of choices can be a daunting task. As a result, individuals frequently end up purchasing unnecessary gadgets or, worse, the wrong product altogether.

Traditional search engines have been a go-to solution for many customers trying to find the right computer hardware. However, these search engines rely on users entering precise keywords to generate relevant results. While this approach can yield results, it often inundates users with an excessive number of links and webpages to sift through. This process can be time-consuming and frustrating, particularly when users have to scour an entire website to locate what they are searching for.

The challenge becomes even more pronounced for users who are not tech-savvy or lack specific technical knowledge about the device they desire. In such cases, they may attempt to use natural language-based search queries, hoping that the search engine will understand their intent. However, this approach can be highly ineffective if the search engine does not possess the capability to decipher the user's expressed needs accurately.

In response to these challenges, a proposed solution comes in the form of an AI-powered chatbot system. This innovative approach aims to address the aforementioned issues by integrating AI chatbots into e-commerce websites and establishing them as independent chatbot-driven search engines.

The key advantages of this chatbot system are manifold. Firstly, it streamlines the process of finding the right computer hardware by engaging users in natural language

conversations. Users can describe their needs and preferences in plain language, making it easier for the chatbot to understand and provide tailored recommendations. This not only saves time but also enhances the user's shopping experience.

Moreover, the chatbot system can prevent customers from making unnecessary or incorrect purchases by offering informed guidance. It can assess the user's requirements, provide relevant product or component suggestions, and even compare options to help users make well-informed decisions.

By integrating these AI-powered chatbots into e-commerce websites, businesses can significantly improve customer satisfaction and reduce the frustration associated with navigating extensive product catalogs. Users will no longer have to rely solely on keyword searches or cumbersome website navigation, as the chatbot can swiftly deliver personalized recommendations and answers to their queries.

1.4 RESEARCH OBJECTIVES

1.4.1 MAIN OBJECTIVE

The major goal of this research is to offer people a precise, individualized solution that can meet their unique needs. The Natural Language Processing (NLP) , and Automatic Speech Recognition (ASR) that will be used in the chat bot system are intended to extract user requirements. By applying these strategies, the chat bot will be able to understand the user's queries and deliver appropriate responses that are tailored to their needs.

These technologies are carefully employed to decipher the complexities of user requirements, enabling the chatbot to not only comprehend the nuances of user inquiries but also to provide customized responses that properly match their individual wants.

The seamless integration of a recommender system into the chatbot framework is a key aspect of this research. This recommender system is built on data from web scraping and is intended to be a powerful knowledge base. This sizable database gives the chatbot access to a wealth of knowledge about the various products and services on the market. The recommender system sets out on a quest to understand user preferences and requirements by utilizing insights obtained from NLP and Automatic Speech Recognition (ASR) applied to user inputs. Then it performs

A recommender system built into the chat bot system will be taught using web scraping data. This implies that the chatbot will have access to a huge database of knowledge about the various goods and services on the market. The recommender system will be able to offer consumers the correct product for them based on their unique needs by analyzing data obtained from NLP Automatic Speech Recognition (ASR) from the inputs of the chat bot, and these inputs will be passed through two recommendation models to get the most optimal results.

In essence, this multifaceted approach ensures that users are not only understood but are also guided toward products and services that cater precisely to their unique

needs, reflecting the essence of personalization and precision at the core of this research.

To recommend repair centers in proximity with Google reviews, application access user's location data. The application then searches for repair centers within a specified radius and ranks them based on proximity. Additionally, it retrieves Google reviews for these centers to assess their quality. Users can view the centers on a map and read reviews to make informed decisions about where to repair their computers. The recommendations would consider both proximity and user-generated ratings, helping users find reputable repair services near their location.

To classify users and computers based on their queries and specifications, a rule-based classification system is used. For user classification, analyze their queries and interactions with the system. For instance, if a user frequently searches for gaming-related topics or computer specs, they may be classified as a "gamer" or "enthusiast" user. For computer classification, gather and process detailed specifications of each computer in your database, such as CPU, GPU, RAM, and storage. Use this information to categorize computers into different classes, such as "gaming laptops," "business workstations," or "budget PCs." This classification can be used to provide tailored recommendations and information to users based on their interests and the capabilities of their computers.

1.4.2 SPECIFIC OBJECTIVES

Preprocess the Dataset

The preprocessing of the dataset involves cleaning and transforming the raw data into a format suitable for recommendation models. This includes tasks like handling missing values, removing duplicates, text normalization, and feature extraction. Data preprocessing ensures that the data is in a consistent and usable form for building recommendation models.

Build a Content-Based Recommendation Model

A content-based recommendation model relies on the characteristics or features of items and user preferences to make recommendations. In this sub-objective, the aim is to create a content-based recommendation system that suggests items similar to those a user has shown interest in. It involves encoding item features, such as text descriptions or attributes, and using them to match user preferences to relevant items.

Build a Collaboration-Based Recommendation Model

Collaboration-based recommendation models focus on user behavior and preferences, often through user-item interaction data. This sub-objective involves constructing a collaboration-based recommendation system, such as collaborative filtering or matrix factorization, to identify patterns in user-item interactions and provide recommendations based on user similarity or item similarity.

Inject Parameters/Features Obtained from NLP & ASR Models to Recommendation Model

This step involves enhancing the recommendation models by injecting parameters or features derived from Natural Language Processing (NLP) and Automatic Speech Recognition (ASR) models. For instance, NLP could be used to analyze user reviews or text descriptions of items, extracting sentiment or semantic information to improve recommendations. ASR models might capture voice-based user queries to enhance the recommendation process.

Provide the Optimum Results from Both Algorithms Based on the User Query

The ultimate goal of the recommendation system is to offer the most relevant and personalized recommendations to users. This sub-objective aims to combine the outputs of the content-based and collaboration-based recommendation models and select the most suitable recommendations based on the user's query or preferences. It involves designing an algorithm or strategy to balance and optimize the results from both models to deliver the best user experience.

2 METHODOLOGY

2.1 System Architecture

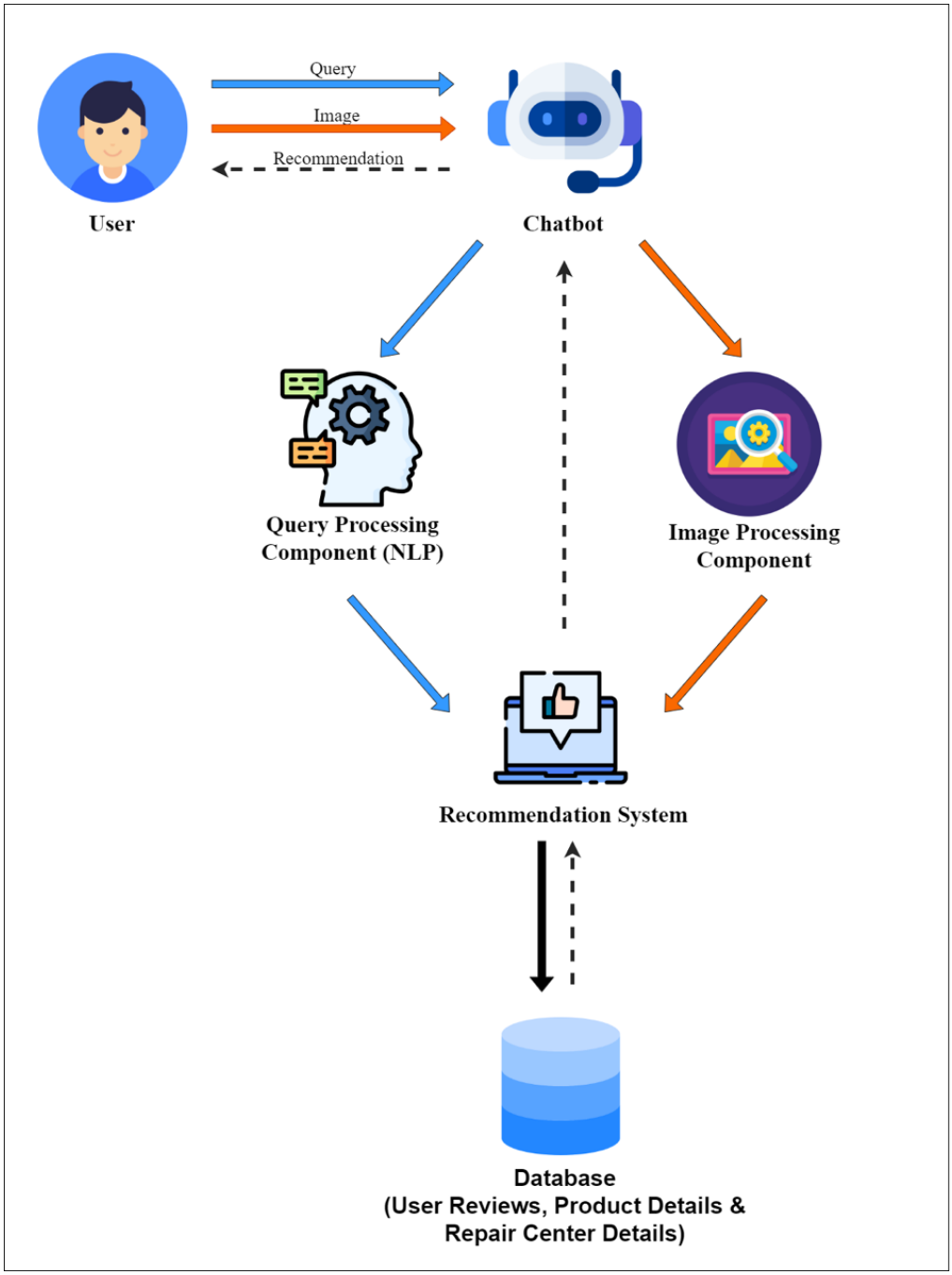

Figure 2.1.1 System Architecture diagram.

2.2 Development Process

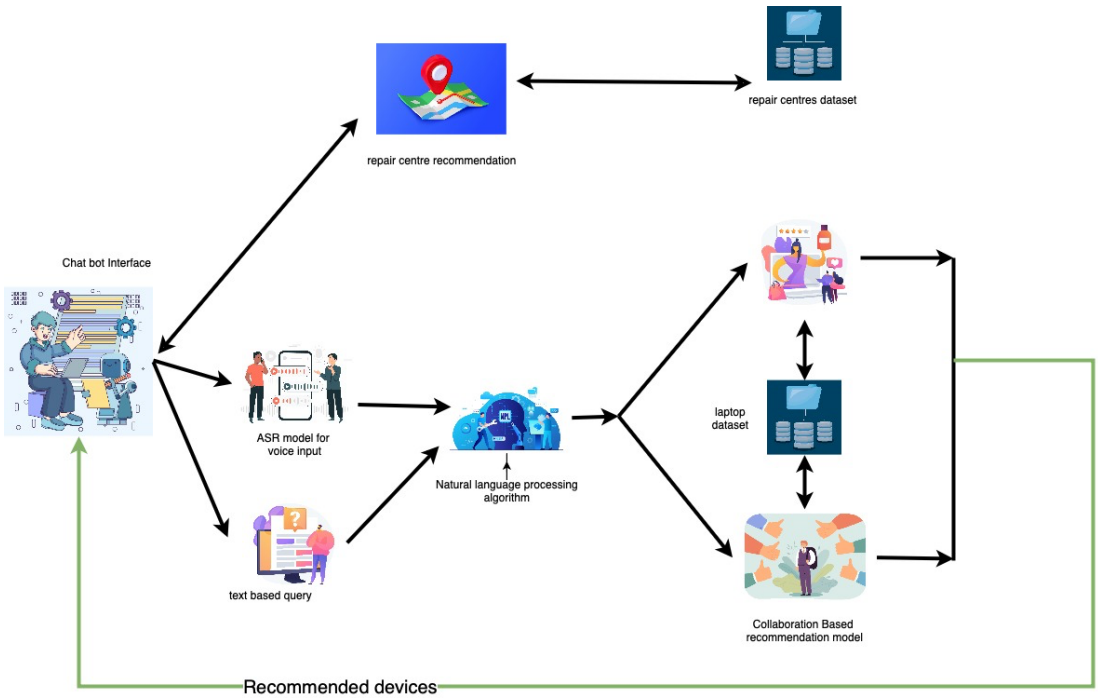

Figure 2.2.1 individual component diagram.

The proposed chatbot system is designed to provide users with tailored recommendations for laptops, taking into account various factors such as the user's job role, location, and specific requirements. This system combines several advanced technologies, including Natural Language Processing (NLP), Automatic Speech Recognition (ASR) , and recommendation algorithms, to deliver a comprehensive and user-centric experience.

To start, the chatbot collects essential user information, including their job role or purpose of use of the laptop they are willing to buy, location, and keywords derived from NLP and ASR algorithms. This preprocessing step is crucial as it enables the

system to classify both laptops and users into different categories based on specifications and job roles, respectively.

When a user expresses a desire to purchase a laptop with technical specifications, the content-based recommendation model comes into play. This model begins by filtering laptops based on the user's category, ensuring that the recommendations are aligned with their specific needs. It then generates a Term Frequency-Inverse Document Frequency (TFIDF) vector for the user's specified keywords and compares it to the scraped laptops dataset. The model calculates the cosine similarity between the user's query and each laptop within the dataset. To provide a comprehensive recommendation, it considers both the similarity of the user's query to the laptops and the similarity of the laptops within the dataset. The top 5 laptops that best match the user's requirements are then presented, complete with price information, stock availability, purchase links, and detailed specifications.

Alternatively, if the user only provides their intended use for the laptop, the collaborative-based recommendation model takes over. Again, it starts by filtering laptops based on the user's category to ensure relevance. This model identifies laptops preferred by users with similar usage purposes, offering recommendations based on user patterns and preferences. Like the content-based model, it also provides the top 5 laptops meeting the user's criteria, including price, stock availability, purchase links, and detailed descriptions.

In cases where the user's request is centered around finding a repair center, the system utilizes the user's location to fetch relevant information. It retrieves repair centers within a 10-kilometer radius of the user's location from Google Maps. The retrieved repair centers are then sorted based on their distance from the user and their Google reviews, ensuring that the user is presented with the most convenient and highly-rated options.

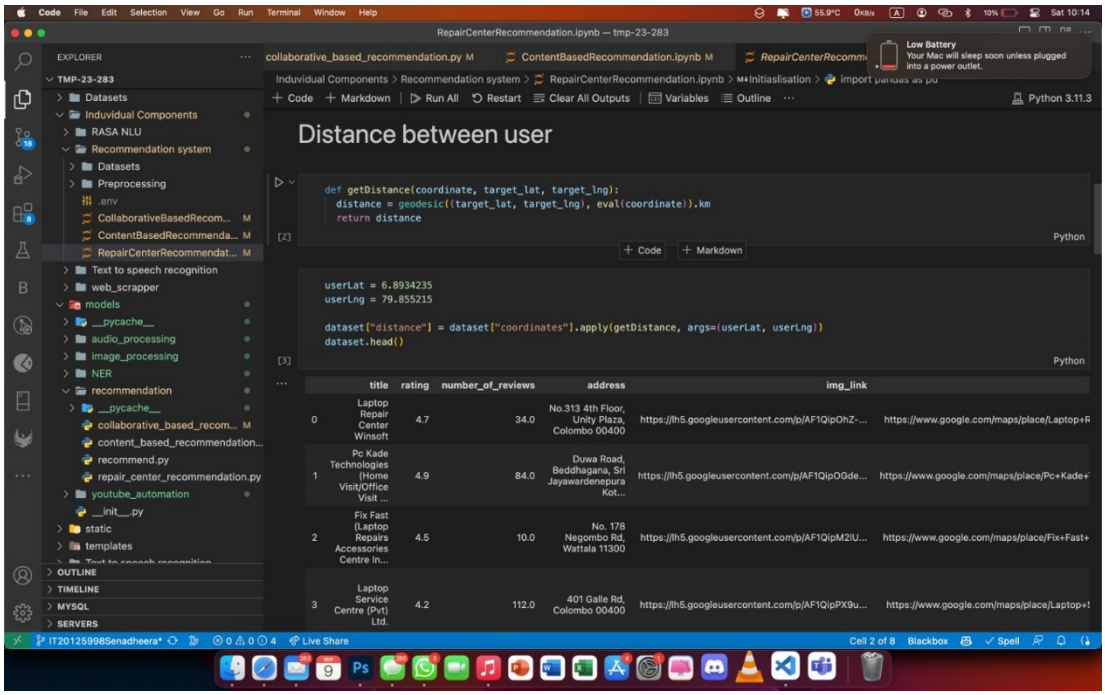

Figure 2.2.2.Repair centre distance calculation

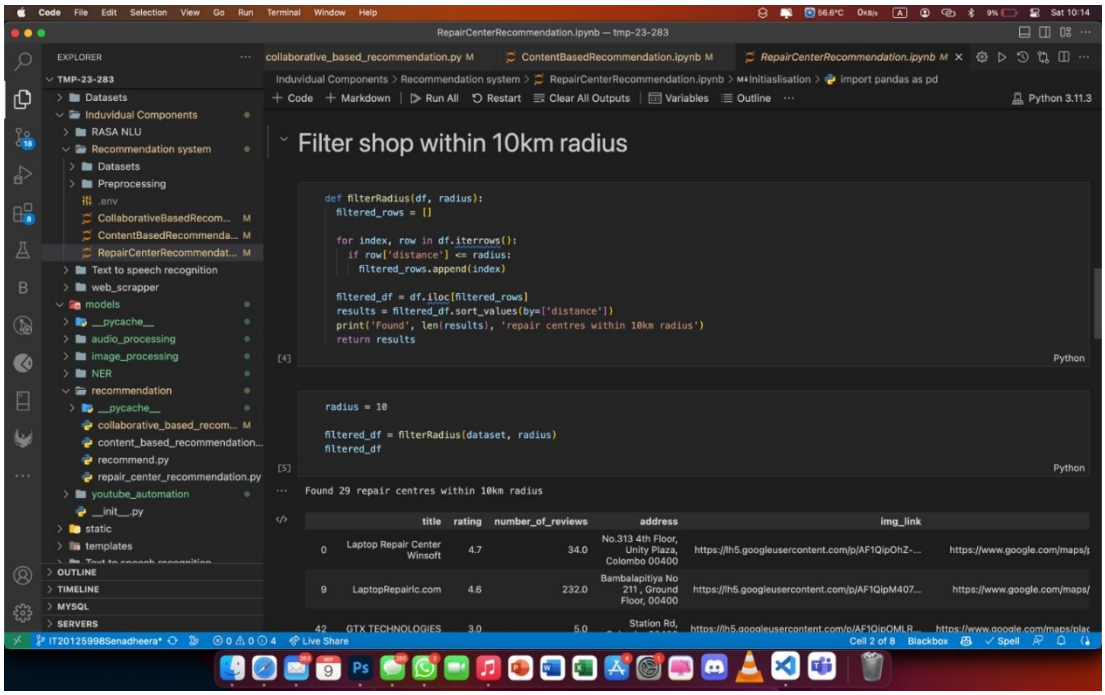

Figure 2.2.3 Repair centre filtering

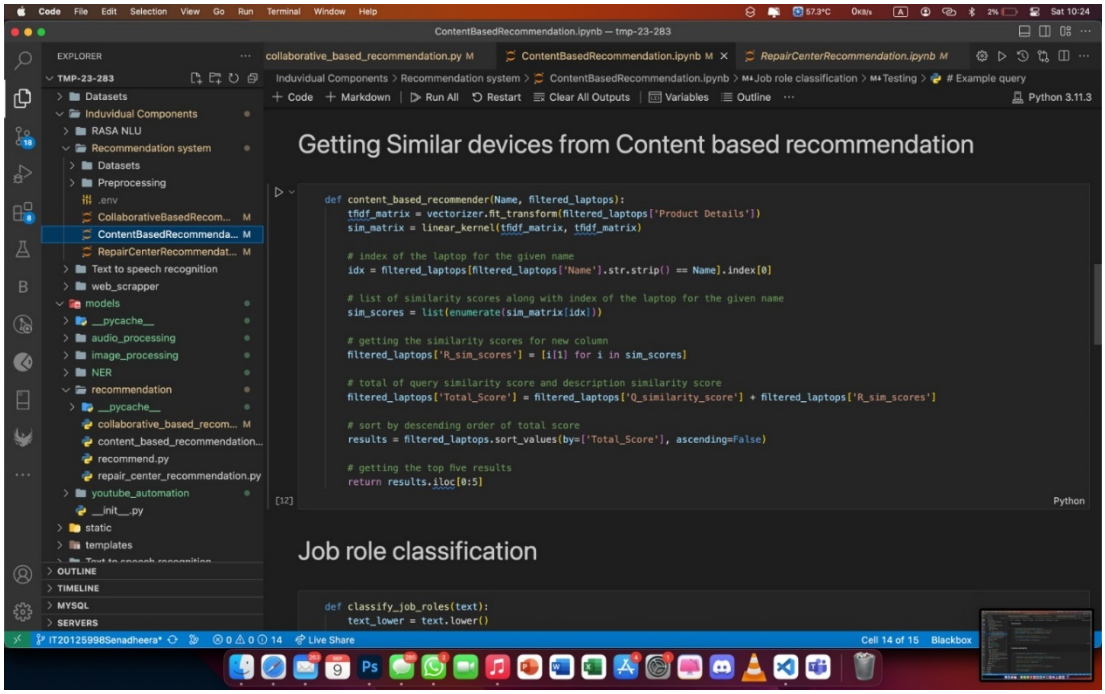

Figure 2.2.4. Content based recommendation

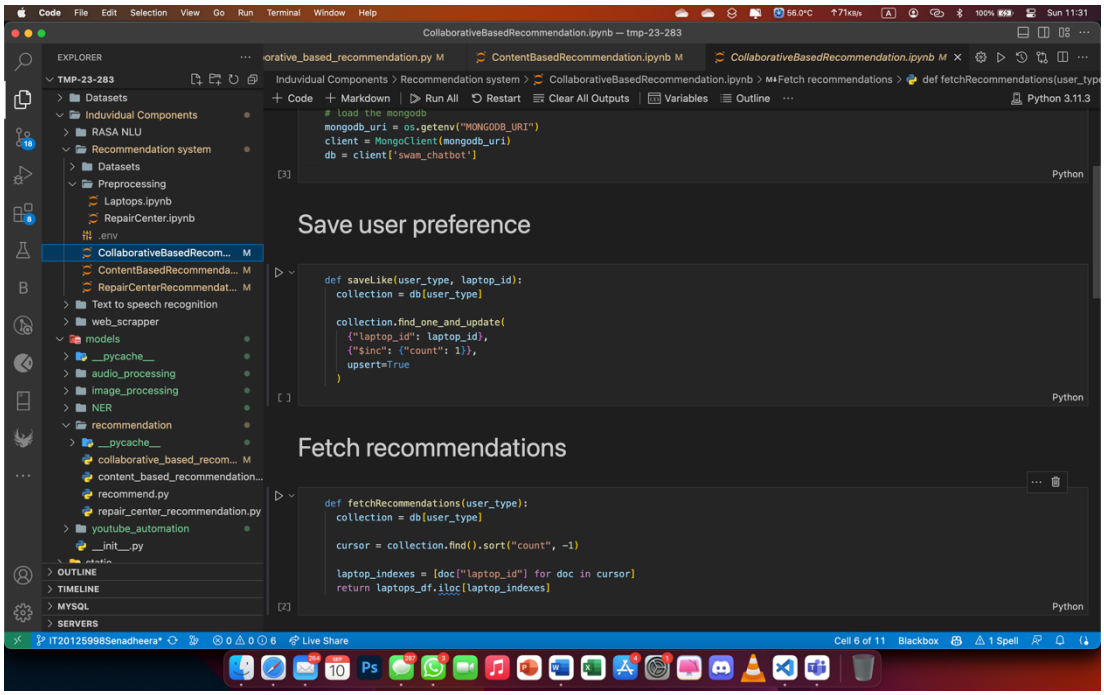

Figure 2.2.5. Collaborative based recommendation

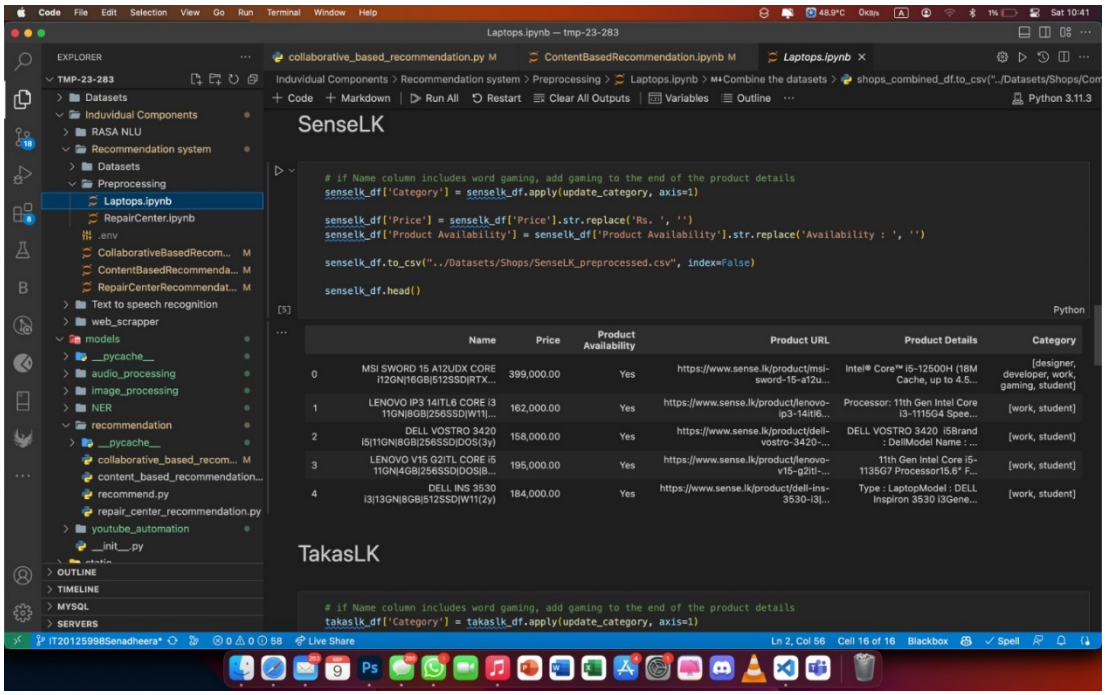

Figure 2.2.6. Preprocessing

2.2.1 Tools and technologies

As proposed for the moment we are looking forward using the following tools and technologies:

Tools & Technologies:

- IDE: VS Code
- Google Collab
- GitHub as version controlling
- python

Algorithms

- Content based recommendation model.

  For users who are selecting a laptop based on specific technological requirements, content-based recommendations are perfect. It makes sure that the suggested laptops are in line with the user's specific requirements.

  How it Operates: The approach starts by screening laptops according to the user's employment function, and then uses NLP and voice recognition algorithms to extract keywords from the user's input. The TFIDF vector for these keywords is then created, and it is compared to a dataset of laptops. Calculated using the cosine similarity, laptops' relevance to the user's inquiry is determined. The final suggestion is based on the cosine similarity values of the query and dataset combined.

  As a result, our model gives the customer a list of the top 5 laptops that most closely fit their technological requirements.

- Collaborative based recommendation model

  Utilizing user behavior and preferences, collaborative-based recommendation makes laptop recommendations. Users who may not have precise technological requirements but desire laptops that are in line with what users in roles comparable to their own prefer can benefit from this.

  How it Operates: It filters laptops according on the user's employment role, just like the content-based model does. Instead of relying solely on technical

specifications, it identifies computers that users in comparable roles favor. Collaboration in the filtering process improves personalization.

As a result, the model gives the user a list of the top 5 laptops that users with comparable job responsibilities choose. It contains important information such as pricing, stock availability, buying links, and a brief description.

2.3 COMMERCIALIZATION ASPECTS OF THE PRODUCT

Commercializing a Chat-Bot system for laptops, accessories, and service center recommendations can be a successful business venture if handled effectively. In order to do so there are certain factors to be considered.

The most initial and crucial factor is identifying the target market and potential buyers of the developed product. In that case, we propose this system towards computer selling companies. In such ways, they will be able to increase their sales & customer base as well.

The relative lack of rivalry in the existing market landscape is a key feature that sets our enterprise apart. Even if there are many technological solutions available, chat-bot systems that are specifically designed for our industry are still uncommon. This obvious gap in the market emphasizes how special and untapped our solution is. It is especially favorable to commercialize a product in such a landscape since it not only presents a chance but also fills a need in the market.

Additionally, we have a far-reaching perspective that includes the Sri Lankan market. The value proposition of our Chat-Bot system is amplified within this geographical setting by the lack of a comparable solution. We hope to increase customer happiness by introducing and executing our solution in Sri Lanka, but we also hope to stimulate the growth of a more competitive environment there. Our objective is to establish new benchmarks for service excellence in the Sri Lankan computer retail and repair market by offering a smart, user-centric solution.

In comparison to the competition seen in the available market, there are none to rare instances where we see Chat-Bot systems. Hence, commercializing such a product would be very useful. In addition, we don’t see such system in the Sri Lanka market as well. So, implementing such a system would raise customer satisfaction and raise develop the competition in the Sri Lankan market as well.

As proposed, shown below is the product logo. We are targeting Sri Lankan e-commerce platforms, computer retail shops & repair centers to promote this product.

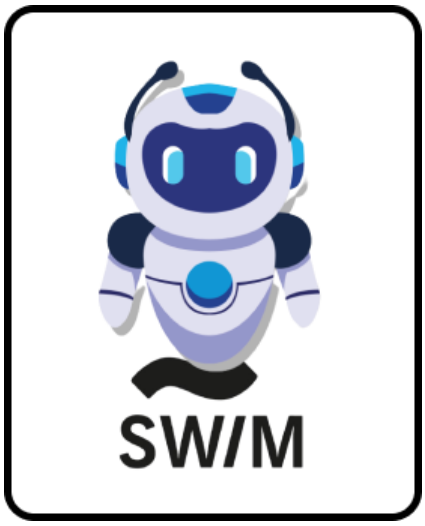

Figure 2.3.1 Logo to used when commercializing.

2.4 TESTING & IMPLEMENTATION

2.4.1 Testing

Test case ID	Test case Name	Test input Values	Test Procedure	Expected Output	Actual Result	Test Result
T_1	Basic Laptop Recommendation	User query: "Recommend a laptop for university use."	User query: "Recommend a laptop for university use."	he chat-bot should recommend a laptop suitable for university use, considering factors like budget, performance, and brand preferences.	The chat-bot recommends a laptop that aligns with the user's general use requirements.	Pass
T_2	Repair Centre recommendation	User query: "Find me a repair center."	User inputs the query.	The chat-bot should recommend a repair centers within 10km radius of users location	The chat-bot suggests a repair centers within 10km radius of users location	Pass

T_3	Laptop Recommendation with specifications	User query: "Recommend a gaming laptop with RTX graphics card"	User inputs the query.	The chat-bot should recommend a gaming laptop with RTX graphics.	The chat-bot provides a recommendation for a gaming laptop with RTX graphics.	Pass
T_4	Brand-Specific Laptop Recommendation	User query: "I prefer Dell laptops. Recommend a Dell laptop for business use."	User inputs the query.	The chat-bot should recommend a Dell laptop suitable for business use based on the user's brand preference.	The chat-bot suggests a Dell laptop tailored for business purposes	Pass

Table 2.1 TEST CASES

3 RESULTS & DISCUSSION

3.1 RESULTS

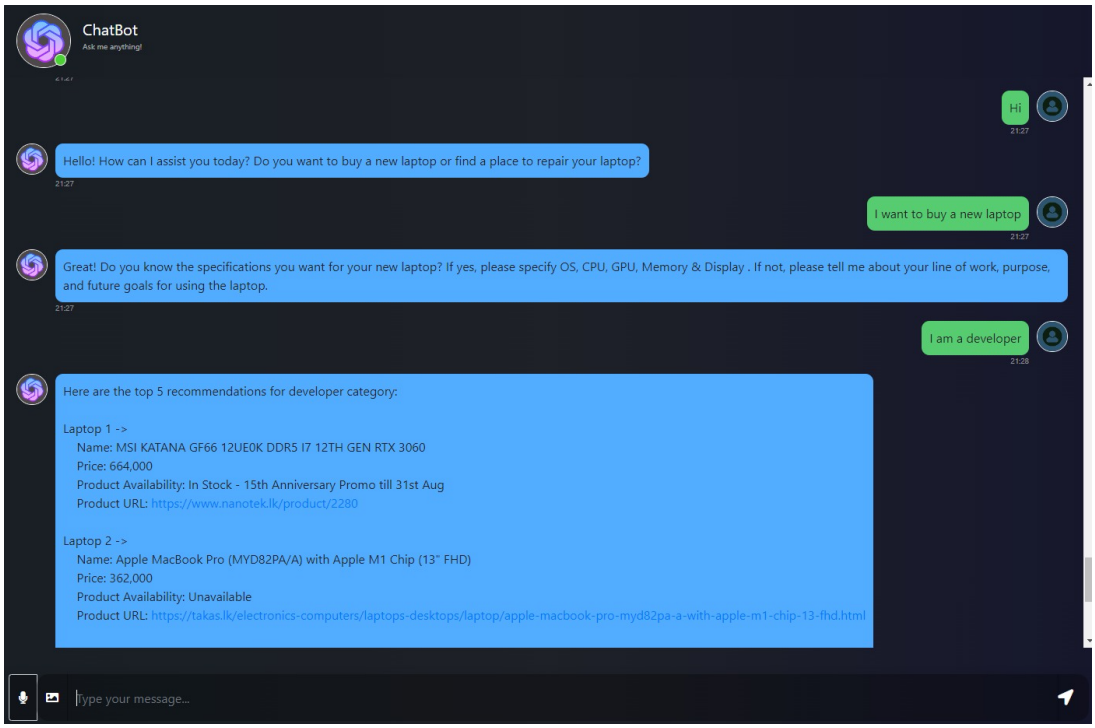

Figure 3.1.1.

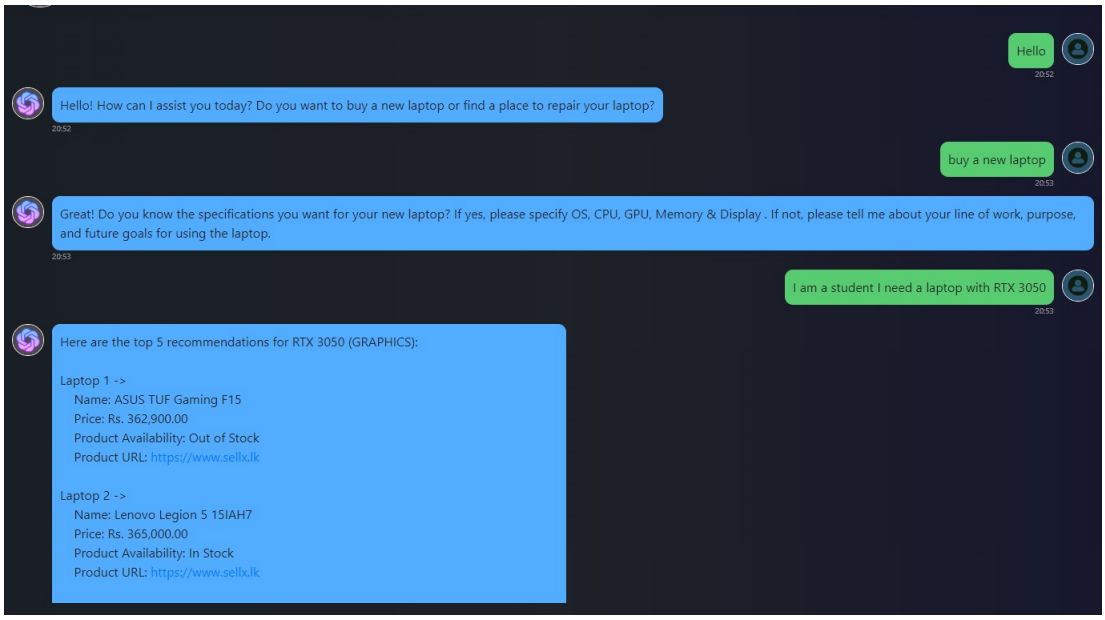

Figure 3.1.2.

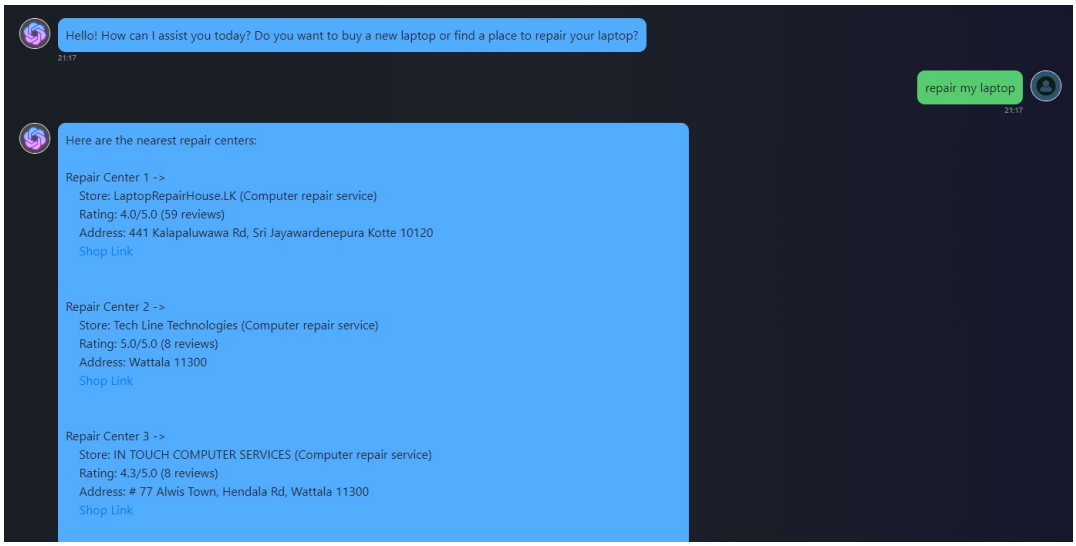

Figure 3.1.3.

3.2 RESEARCH FINDINGS

The research results from the application of the chatbot system with personalized suggestions for laptops and repair facilities based on user data, technical requirements, and preferences indicate several significant insights and advantages.

The research results emphasize the use of user-specific information in improving the suggestion process, to start. The chatbot system may efficiently reduce the options available and offer recommendations that are tailored to the user's individual context by gathering information such as the user's employment position and location. By streamlining the decision-making process, customers are also guaranteed to obtain recommendations that are in line with their needs and tastes.

Another important discovery is the use of Natural Language Processing (NLP) and voice recognition algorithms for keyword extraction from user inquiries. This strategy makes it possible for users to communicate with the chatbot in a more natural and user-friendly way. The system can properly recognize the user's requirements and take them into account when making recommendations by comprehending the user's natural language input. This discovery emphasizes the significance of utilizing cutting-edge technologies to build more user-centric and open systems.

The research results also show how useful it is to use both collaborative and content-based recommendation methods. For users with specific technical requirements in mind, the content-based model, which takes these into account, is quite helpful. Users will be more satisfied as a result of receiving recommendations that are tailored to their needs. However, for users who may not be familiar with technological intricacies, the collaborative-based model, which is based on user preferences and patterns, provides a useful option. This dual strategy makes sure that a variety of users can profit from the chatbot's suggestions.

A remarkable conclusion is the giving of a succinct list of the top 5 laptops for each situation. By giving consumers a manageable list of possibilities, this strategy makes it easier for them to make decisions. The user experience is significantly improved by incorporating critical details in the recommendations, such as pricing, stock

availability, buy links, and specifications. Users may quickly and intelligently choose, saving time and effort on the research and laptop selection process.

The research's findings also highlight the value of location-based services in helping users with particular needs, including locating a repair facility. The technology makes sure users are shown relevant and handy repair centers by exploiting the user's location data and retrieving information from Google Maps. The user's capacity to choose where to seek repairs is improved by the sorting of repair centers by proximity and Google reviews.

3.3 DISCUSSION

A big advance in user-centric technology has been made with the installation of a chatbot system that can suggest laptops and repair shops depending on a user's employment position, location, and input through natural language processing (NLP) and voice recognition. This complex system integrates cutting-edge technology to provide individualized recommendations, boosting the user's decision-making process.

Preprocessing is first and foremost important since it involves classifying computers and users according to their traits and roles. This initial stage establishes the framework for future in-depth recommendations, ensuring that customers receive advice tailored to their particular needs.

The content-based recommendation model takes center stage when a user indicates a desire to buy a laptop with particular technological needs. Users that have a good understanding of the technological requirements they need can benefit the most from this model. It starts by categorizing laptops for the user to assist limit the choices to those that are most pertinent to their job position and preferences. The model then uses TFIDF vectorization to examine the keywords connected to the user's query and the dataset that was scraped from a laptop. The cosine similarity calculation that follows offers a reliable indicator of how well the laptops adhere to the user's specifications. The final suggestions, which include the top 5 laptops, take into account not only technical details but also crucial details like pricing, stock availability, purchasing links, and comprehensive specifications. Users who apply this complete method can make well-informed selections.

The collaborative-based recommendation methodology, on the other hand, is useful for customers who are looking for laptop recommendations based only on their planned use. The model focuses on laptops that have attracted favor among users with comparable usage goals by filtering laptops within the user's category. Utilizing the preferences of all users, this collaborative technique makes recommendations that fit the user's intended use case. Once more, the top 5 laptops are displayed together with all pertinent information.

The system also offers support to users looking for repair facilities. The technology uses the user's location to retrieve and show repair centers from Google Maps that are situated within a 10-kilometer radius. Users are given options that are both incredibly handy and reliable thanks to the sorting of these facilities based on both proximity and Google reviews.

This chatbot system's versatile features considerably improve the user experience in a number of ways. First off, it makes decision-making easier for users with different degrees of technical expertise. The system offers specialized recommendations, regardless of whether a user is knowledgeable about technical specs or just has a certain usage situation in mind. Moreover, the algorithm makes sure that the recommendations are really pertinent by taking the user's employment function and interests into account. This not only saves consumers time, but also increases the likelihood that they will be satisfied with the laptop or repair facility they have selected.

4 CONCLUSION

The construction of a chat-bot system using machine learning (ML) and natural language processing (NLP) to offer users simple and tailored suggestions for computers, accessories, and repair businesses is the project's conclusion. This solution appeals to a wider audience, including those with less technical understanding, by streamlining the user experience through natural language-based inquiries. Users are guaranteed to receive recommendations based on the most recent information available thanks to the integration of web scraping, which keeps the system updated with the newest goods and services. Additionally, by analyzing user searches and previous interactions, the system is able to provide personalized suggestions that are in line with each user's interests and needs, greatly increasing the likelihood that users will locate the most appropriate goods and services. This approach serves as a flexible tool that not only aids those looking for computer-related advice but also offers useful and trustworthy solutions for businesses looking to improve the usability of their websites or systems. In summary, this initiative promises to address the needs of both tech-savvy and non-technical users in an ever-evolving digital environment while improving the accessibility and efficiency of computer-related decision-making processes.

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[6] Robustness of the Chat-Bot System: "chatbot system robustness", "chatbot system reliability", "dealing with unstructured data in chatbot systems"

6 APPENDICES

APPENDIX 1: TIMELINE