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ChatGPT recommendation system for retail shops

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October, 2023

TECNOLOGIAS
E ARQUITETURA

Department of Information Science and Technology

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Keywords: Artificial Intelligence (AI), Retail business, E-commerce, Personalized recommendation systems, Machine learning, ChatGPT

Resumo

O rápido crescimento das plataformas de comércio eletrónico enfatizou a importância dos sistemas de recomendação personalizados para aumentar o envolvimento e a satisfação dos utilizadores. Esta tese apresenta o desenvolvimento e avaliação de um Sistema de Recomendação de Produtos inovador que utiliza técnicas avançadas de Inteligência Artificial (IA) para fornecer sugestões de produtos personalizadas. O objetivo principal é criar uma experiência centrada no usuário, integrando um assistente de IA, permitindo interações naturais e interativas. Através de uma pesquisa abrangente realizada para compreender o comportamento dos clientes durante a compra de produtos usando IA, o estudo visa avaliar a eficácia do sistema na entrega de recomendações precisas e no fornecimento de uma experiência de compra perfeita. Este documento contribui para a área ao mostrar a implementação prática de sistemas de recomendação baseados em IA, destacando o seu potencial para transformar as interações de comércio eletrónico.

Palavras-chave: Inteligência Artificial (IA), Negócios de varejo, E-commerce, Sistemas de recomendação personalizados, Aprendizado de máquina, ChatGPT

Abstract

The rapid growth of e-commerce platforms has emphasized the significance of personalized recommendation systems in enhancing user engagement and satisfaction. This dissertation presents the development and evaluation of an innovative Product Recommendation System that leverages advanced Artificial Intelligence (AI) techniques to provide tailored product suggestions. The primary objective is to create a user-centric experience by integrating an AI assistant, enabling natural and interactive interactions. Through a comprehensive survey conducted to understand customer behaviours while purchasing products using AI, the study aims to assess the system's effectiveness in delivering accurate recommendations and providing a seamless purchasing experience. This document contributes to the field by showcasing the practical implementation of AI-driven recommendation systems, highlighting their potential to transform e-commerce interactions.

Keywords: Artificial Intelligence (AI), Retail business, E-commerce, Personalized recommendation systems, Machine learning, ChatGPT

Contents

List of figures

Glossary

AI - Artificial Intelligence

E-commerce - Electronic Commerce

ML - Machine Learning

DSRM - Design Science Research Methodology

RQ1 - Research Questions 1

RQ2 - Research Questions 2

H1 – Hypothesis 1

H2 – Hypothesis 2

NLP - Natural Language Processing

UI - User Interface

API - Application Programming Interface

BERT - Bidirectional Encoder Representations from Transformers

ELMo - Embeddings from Language Models

CHAPTER 1
Introduction

In today's fast-paced world, retail shopping has become an integral part of our daily lives. With the rise of e-commerce and the vast array of available products and services, consumers face the challenge of finding the right product that suits their needs and preferences. This often leads to frustration, wasted time, and decreased satisfaction. To address this issue, there is a growing interest in leveraging artificial intelligence (AI) and chat-based recommendation systems to enhance the retail shopping experience [1].

1.1 Background

Retail is the business activity of selling goods and services to consumers for personal, family, or household use. It encompasses various types of sales, including electronic items, cars, apparel, meals at restaurants, and movie tickets. Retailing is the final stage in the distribution channel. There are two main types of retail: offline or traditional retailing, which takes place at fixed locations such as retail shops, petrol stations, or vending machines, and online or e-commerce retailing, which involves selling and buying products through electronic connections like the internet. Offline retailing follows a fetch principle, where consumers visit physical locations to make immediate purchases, while e-commerce involves the delivery of products to consumers through parcel or courier services. Additionally, there exists a hybrid retail model, known as "brick-and-click" retailing, which combines elements of both traditional and online retailing. In this model, customers have the option to shop in physical stores and, at the same time, browse products and make purchases online [2]. This approach capitalizes on the strengths of both traditional and e-commerce retailing, offering consumers flexibility and choice. It recognizes the changing preferences of consumers and leverages technology to provide a seamless shopping experience. It’s essential to note that there are distinct modes of retailing, such as business-to-consumer (B2C) and business-to-business (B2B). B2C retailing focuses on sales to individual consumers, while B2B retailing involves transactions between companies and institutions. This distinction plays a crucial role in shaping the dynamics of the retail industry and should be considered in the context of our discussion[3].

The fusion of retail and AI technology in the modern commerce landscape is transformative. The term "AI," introduced in 1956, refers to the development of computer systems that emulate intelligent human behaviour. AI encompasses a wide array of tasks, including decision-making, language translation, speech recognition, and visual perception. In essence, AI empowers systems to accurately interpret external data, learn from this data, and apply these learnings to achieve specific goals and tasks by adapting flexibly [3].

1.2 Motivation

This research stems from the pain points experienced by consumers and businesses in the retail industry. Consumers often struggle to navigate the overwhelming number of product options available, especially given their limited time [4]. For those who are unfamiliar with a specific product category, the process of understanding and choosing the right product becomes even more challenging. This often leads to dissatisfaction and wasted resources, as consumers spend more money without achieving the desired outcome.

From a business perspective, satisfying generic customer interests is becoming hard, as the one-size-fits-all approach fails to address individual preferences effectively. Convincing customers to purchase specific products can be challenging, requiring additional human resources and time. Waiting for suggestions from service providers can be time-consuming and frustrating for customers, delaying their decision-making process. Businesses also struggle to gain insights into what customers truly want, hindering their ability to tailor their offerings effectively [5].

The increasing popularity of AI and chat-based technologies, along with their disruptive potential, has captured the attention of researchers and businesses. Advancements in AI have allowed machines to better understand and respond to human queries and preferences. ChatGPT, OpenAI's cutting-edge language model, is revolutionizing AI. With its human-like text generation and ability to tackle complex questions, it has already made a significant impact. The future holds even more exciting opportunities to transform how we interact with technology and enhance our lives [6]. It offers a promising foundation for developing a recommendation system that can understand and interact with users in a conversational manner. The novelty and competitive advantage associated with leveraging this technology in the early stages make it an intriguing area of research.

As consumers increasingly value their shopping experience, providing a personalized and efficient means of discovering products becomes a key differentiator for retail businesses. By developing a recommendation system, we can enhance the user experience and change the way people shop. This research aims to explore the potential benefits and implications of such a system for the retail industry. Implementing this system holds several benefits for both consumers and businesses. Consumers will enjoy an enhanced user experience, as the system provides tailored product recommendations based on their preferences and needs. This personalized approach improves product discovery, saving users valuable time and effort in finding the right items. Consequently, businesses are likely to witness increased conversion rates as customers make more informed purchasing decisions, leading to greater satisfaction.

The system extends beyond the mere task of helping customers find products. It seeks to address the broader goal of creating a unique and enhanced shopping experience for each customer. The significance of this aim is multi-fold. Firstly, personalized experiences can substantially boost sales in the retail sector. Consider not only helping customers find the product they're looking for but also recommending related items through strategies like cross-selling and up-selling. Cross-selling involves suggesting additional products or services that complement a customer's primary choice, like offering smartphone accessories when they're buying a phone. On the other hand, up-selling persuades customers to opt for more premium versions of their intended purchases. Both these techniques aim to enrich the customer's shopping journey by providing options that add value, thereby increasing the overall sales revenue [7].

In business the system provides significant time and cost savings by reducing the need for manual intervention in the recommendation process. With AI-powered recommendations, businesses can streamline their operations and focus on delivering exceptional customer service. Additionally, the system generates valuable data insights and analytics, allowing businesses to gain a deeper understanding of consumer behaviour and preferences.

The implementation of this system for retail shops has the potential to make a positive impact on both a local and global scale. By promoting small and local businesses, the system contributes to fostering entrepreneurship and economic diversity worldwide. Through personalized recommendations, these businesses gain visibility and can compete more effectively with larger enterprises, levelling the playing field and supporting local economies. The system can have a positive environmental impact. By guiding users towards products that precisely meet their specific needs, unnecessary purchases and subsequent returns are minimized. This reduction in wasteful consumption helps to conserve resources, reduce waste, and lower carbon footprints.

The findings of this dissertation were selected for publication and presentation at the international Industry Sciences & Computer Sciences Innovation 2023 (ISCSI) conference. This recognition highlights the significance and interest of this research for the scientific community.

1.3 Objective

The proposed solution for the project is to introduce an innovative approach to enhance the retail shopping experience. By embedding a conversational AI model within an interactive kiosk placed in front of the retail shop, customers will have the opportunity to engage in natural language conversations and receive personalized product recommendations. While online marketplaces like Mercari[7] and Zalando[8] have introduced AI based shopping tools, this project takes a unique direction by focusing on the retail shop environment and incorporating an interactive kiosk. This approach offers several advantages over existing solutions.

This approach differs significantly from existing solutions, even from well-established retail giants like Leroy-Merlin and IKEA, as well as renowned algorithms used by Amazon, Netflix, and Google [9]. What sets this system apart is the utilization of an interactive kiosk, fostering a distinct user experience. Unlike Leroy-Merlin and IKEA, this approach brings the AI-powered shopping assistant directly into the physical retail shop, creating a seamless blend of online and in-store shopping. This integration permits customers to engage in human-like conversations with the recommendation system, rendering the shopping experience more intuitive and user-friendly. Such a personalized and interactive approach is a unique offering in the retail industry. The recommendation algorithm employed in this system significantly distinguishes it from algorithms used by major online platforms like Amazon, Netflix, and Google. Instead of providing generic recommendations based on broad categories, this algorithm reaches deeply into individual customer profiles, incorporating retail shop data. It ensures that recommendations are closely aligned with each customer's specific preferences and requirements, thus fostering a personalized shopping journey.

A further differentiator lies in the integration of the retail shop's data, including product catalogues, customer reviews, and real-time user behaviour data. Unlike Amazon and Netflix, this solution is designed to the specific inventory and offerings of the retail shop. The continuous learning and improvement techniques embedded in the system further set it apart. Learning from user feedback and interactions, the system continually refines its recommendations, making them increasingly effective over time. This dedication to improvement guarantees that the system remains responsive to customer needs and preferences.

1.3 Methodology

In this dissertation, Design Science Research Methodology (DSRM) is thoroughly applied to systematically address the challenges and goals of developing an innovative product recommendation system. It is a research approach used to create and evaluate innovative artifacts (such as systems, models, or algorithms) with the goal of solving real-world problems or addressing practical needs. In Figure 1 each box represents a step in the DSRM model, and the arrows show the logical flow from one step to the next. Researchers follow this sequence to design, develop, evaluate, and share innovative artifacts for solving practical problems [10]

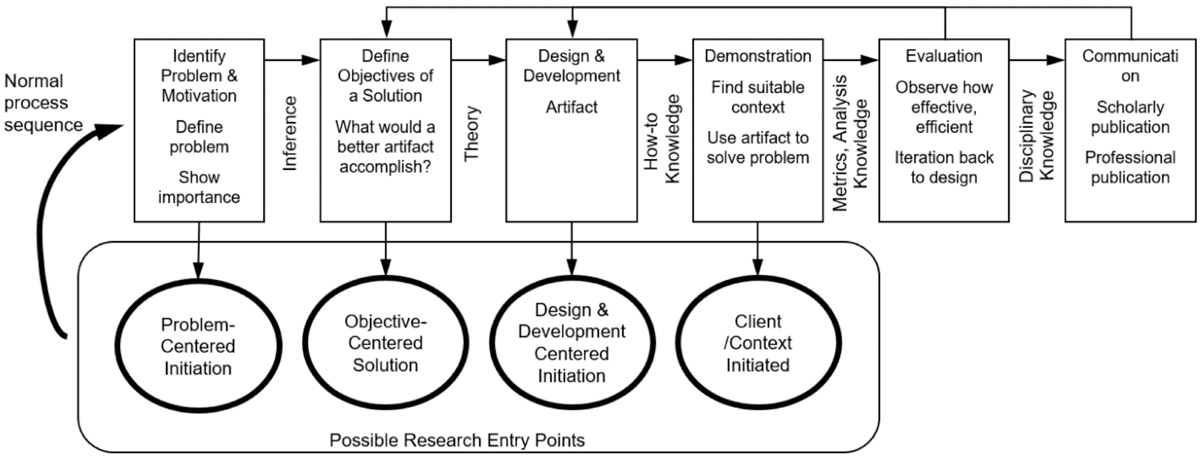

Figure 1 DSRM Process Model (taken from[10]*)*

The "problem-centred approach" of DSRM was chosen for this work [10]. This decision was based on the pre-existing definition and discovery of the problem that the dissertation seeks to address. This phase is reflected in the literature review within the dissertation. Here's how each step of DSRM was executed within the context of this dissertation:

Problem Identification and Motivation: In this dissertation, the initial step involved a thorough exploration of the e-commerce landscape. It identified a critical issue: the need for personalized recommendation systems to enhance user satisfaction. The motivation behind this recognition was grounded in the rapid expansion of online shopping platforms and the desire to improve user engagement within this context.

Objectives of the Design: With the problem identified, the dissertation particularly outlined its primary objectives. It aimed to design and develop a cutting-edge product recommendation system. These objectives were not vague; they were explicitly stated to create a clear direction for the research. This system was envisioned to provide highly adapted product suggestions and ultimately redefine the shopping experience.

Design and Development: This section attempted into the practical aspects of system development. It provided in-depth insights into the architectural aspects of the Product Recommendation System. The design and development phase encompassed the integration of advanced AI techniques, including algorithms and system components. The dissertation offered a detailed explanation of how these theoretical concepts were translated into a functional system.

Demonstration: To ensure readers fully grasp the system's functionality, the dissertation dedicated a section to demonstration. It wasn't merely a theoretical description but rather a visual journey through the user interface. Screenshots, system flowcharts, and detailed user interactions were presented to provide a tangible representation of how users would engage with the system.

Evaluation: One of the pivotal phases of the research involved rigorous evaluation. Usability testing was conducted to gather empirical data on user interactions. This section outlined the methodology for these evaluations, including usability criteria, and user testing scenarios.

Communication: The results of the usability testing were communicated through surveys and user feedback. The data collected were analysed to draw conclusions about the system's usability and its ability to provide personalized recommendations. It carefully presented the results, shedding light on the system's performance from a user's perspective.

In The central research question for this dissertation, to be addressed upon completing the proposed study, is as follows:

RQ1. What are the main factors that shape the acceptance and adoption of an AI based recommendation system in retail shops, and how do these factors differ among various customer demographics and shopping contexts?

RQ2. What are the main potential and challenges in adopting an AI based recommendation system in retail stores?

The formulation of hypotheses from the research questions in this dissertation was necessary to provide a structured approach to investigate and answer those questions. Hypotheses allow for specific predictions to be made, enabling focused research and analysis of the factors influencing the acceptance, adoption, and challenges of a proposed system[11]. Following are the two main hypothesis for our proposed system:

H1: The acceptance and adoption of an AI based recommendation system in retail shops are not influenced by significant differences among various customer demographics and shopping contexts. Alternatively, there are significant differences in the factors that shape the acceptance and adoption of the system across different customer demographics and shopping contexts. This hypothesis aims to fulfil RQ1.

H2: The adoption of an AI based recommendation system in retail stores does not present significant challenges. In contrast, we propose that there are indeed substantial challenges associated with the adoption of such a system in retail stores. This hypothesis aims to respond to RQ2.

1.5 Structure

The opening chapter of this dissertation, the foundation for the entire research is laid. Here, the context is provided by discussing the background of the study and the key motivations that fueled the investigation. The objectives of the research are explicitly stated, and the methodology that guides the approach, in this case, is the Design Science Research Methodology (DSRM).

Chapter 2 is dedicated to exploring the existing body of knowledge in the field. A systematic review of the literature is conducted to comprehensively analyse the current state of research. Additionally, related works and studies that closely align with the research topic are presented, placing the study within the broader academic landscape.

Chapter 3 begins with an analysis of survey findings on what users desire and expect in the e-commerce domain. Subsequently, the transition is made into the design phase by outlining the use cases. This chapter discusses how the system will be designed to address the specific needs and preferences identified through the surveys.

Chapter 4 investigates the technical aspects of the research. The incorporation of a Transformer model within the system is explored, and a detailed view of the system's architecture is provided. This chapter explains how various components work together to form a cohesive system.

In chapter 5, the move is made from theory to practice. The practical development of the Product Recommendation System is detailed, including the integration of AI components and the creation of a user-friendly interface.

Chapter 6 is dedicated to discussing the results of the usability testing. The analysis focuses on how users interacted with the system, including their ratings on ease of use, satisfaction levels, and the accuracy of product recommendations.

Chapter 7, the concluding chapter, encapsulates the key findings from the research journey, summarizing the entire dissertation. Potential avenues for future research and improvements that could enhance the recommendation system are explored.

CHAPTER 2
State of the art

2.1 Systematic review

The systematic review methodology to analyse the existing literature on chatbot-based recommendation systems in retail shops would have to be done. The systematic review process involves a thorough and structured analysis of relevant studies, enabling a comprehensive understanding of the state of the art, key findings, and emerging trends in this field. Through this methodology, the dissertation aims to identify research gaps, inform the development of the proposed system, and provide an unbiased synthesis of the existing research.

Weber and Schütte [12] explore the concept of Artificial Intelligence and its application in the retail industry, discussing the goal of transferring tasks from humans to machines and the definition of AI as the science of creating intelligent machines. The focus is on evaluating the impact of AI in the retail sector, which faces intense competition and cost pressures. The article highlights the potential for AI to automate manual tasks, reduce personnel costs, and improve operational efficiency in an industry characterized by high labour costs and low profit margins. Overall, there is significant potential for AI to transform the retail industry by replacing human activities with machine-driven solutions. Additionally, they discuss various applications of AI in the retail industry, particularly focusing on activities at the point of sale (POS). AI is used for digitizing and automating POS processes, as well as advertising. Examples include self-checkout systems, robots for sales assistance, chatbots, language-assisted ordering, interactive displays, and AI-based security and fraud detection systems. These AI applications aim to enhance customer experiences, improve efficiency, and mitigate risks in retail operations. Virtual showrooms and virtual assistants are also mentioned as tools that utilize machine learning algorithms to personalize the buying experience and facilitate customer interactions.

Previous research has recognized the numerous benefits of chatbot technologies across various research domains, particularly in the field of customer engagement in marketing and management. Artificial intelligence (AI) technology has been acknowledged for its potential to enhance customer experiences and increase engagement[13]. Now let us focus on chatbots and previous research on their impact on customer engagement from an interactive marketing perspective. The three main aspects are conceptual understanding of chatbots, factors influencing customer engagement with chatbot technologies, and customer responses to engaging with chatbots.

Kasilingam[14] examined customer attitudes towards chatbots and found that perceived usefulness, ease-of-use, enjoyment, price awareness, perceived risk, and personal innovation significantly influenced attitudes. However, the intention to use chatbots was primarily influenced by trust, personal innovation, and attitude. In contrast, Moriuchi[15] utilized the Theory of Conversation and Partially Observance Markov Decision Process to understand customer intention to adopt chatbots. They found that while customer attitudes towards technology influenced engagement, it did not impact attitudes towards retailers, affecting satisfaction. They emphasized the need to avoid relying solely on chatbots for engagement to maintain deeper brand connections. Tran[16] observed that customers expressed higher levels of satisfaction when interacting with chatbots as opposed to online human agents. Moreover, their study indicated a stronger inclination towards using chatbots in the fashion industry compared to the telecoms sector. These findings suggest that customers find chatbot interactions more enjoyable and demonstrate a preference for their use in certain domains, such as fashion.

Zarouali[17] developed a framework that examined consumer responses to chatbots, considering factors such as perceived usefulness, ease-of-use, helpfulness, pleasure, arousal, and dominance. Their findings showed that these factors positively influenced consumer attitudes towards brands with chatbot services, indirectly impacting their willingness to use and recommend chatbots. In addition, Lee et al. (2020) highlighted the significance of perceiving a "mind" behind chatbots, which enhanced the sense of co-presence and interpersonal connection. Social cues employed by chatbots further strengthened this sense, emphasizing the role of thought perception and social cues in creating a favourable chatbot experience. Tsai[18] showed that consumer engagement is influenced by perceived parasocial interaction and conversation, which are shaped by the strong social presence communication of chatbots. Furthermore, the anthropomorphic design of chatbots can amplify the positive effects of social presence communication through psychological mechanisms. Additionally, Chung[19] emphasized the positive impact of chatbots on customer satisfaction in retail by highlighting the quality of communication.

The research on the current implementation of chatbots in the retail industry reveals several noteworthy findings. Firstly, chatbots are criticized for their limited and inflexible functionalities, restricting the topics customers can discuss with them. Secondly, the application of artificial intelligence technology in chatbots falls short, as real human advisors often handle customer inquiries instead of automated responses, resulting in long waiting times. Moreover, the virtual try-on feature provided by chatbots is limited to certain products and does not fully utilize new technologies for customer engagement. Existing chatbots primarily focus on interpreting user input and providing contextually appropriate responses through input pattern matching. However, this approach has limitations, particularly in open-ended conversations where chatbots struggle to deliver satisfactory outcomes [20]. As an alternative solution, personalized recommendation system that incorporate machine learning model in retail shopping can overcome these limitations by leveraging customer input and preferences to offer tailored product suggestions, providing a more versatile and adaptable shopping experience compared to the goal-oriented nature of chatbots.

After studying different research articles, several research gaps have emerged in the field of chatbot recommendations systems for retail shops. These gaps revolve around the acceptance, adoption, and impact of chatbots on consumer experiences in various domains. One research gap is related to understanding the impact of chatbots on consumers' affective responses. Existing studies highlight the need to investigate how chatbot interactions influence consumers' emotions, satisfaction, and overall experience [21]. To address this gap, the chatbot recommendation system for retail shops can be designed to provide personalized product recommendations based on customer preferences and past interactions. By tailoring recommendations to individual customers' needs and interests, the chatbot can enhance the emotional responses of consumers, leading to higher satisfaction and a positive shopping experience.

Another research gap related to the influence of chatbots on customers' decision-making processes and their participation in the consumption experience [22]. To bridge this gap, the recommendation system can be designed to provide comprehensive product information and reviews empowering customers to make informed decisions. The chatbot can engage customers through interactive conversations, actively involving them in the shopping process and providing personalized assistance. By facilitating decision-making and customer participation, the chatbot recommendation system enriches the overall shopping experience.

The emotional responses of customers to chatbots may vary across segments and industries. Understanding these differences is crucial in different retail domains where emotional connections play a significant role[16]. The recommendation system can address this research gap by analysing customer responses and feedback, the chatbot can adapt its tone, language, and recommendations to evoke appropriate emotional responses in different customer segments. This customization enhances the emotional resonance between customers and the chatbot, leading to a more personalized and effective shopping experience.

Another research gap is the examination of the effects of chatbots on different age groups, particularly those unfamiliar with this technology[19]. The chatbot recommendation system can bridge this gap by providing user-friendly interfaces and intuitive interactions. It can employ natural language processing capabilities to understand and respond to diverse customer queries, regardless of their age or technological familiarity. The system can offer guidance and assistance tailored to the specific needs and preferences of different age groups. By catering to the unique characteristics of various age demographics, the recommendation system ensures a seamless and inclusive shopping experience for all customers.

2.2 Related works

Before moving into the related work of this dissertation it's important to understand the design of chatbots and how they are used. The design of chatbots focuses on providing accurate responses to user requests, which are typically given in the form of text or speech input. The three main approaches in chatbot design are rule-based, retrieval-based, and generative-based models. Rule-based models rely on predefined rules or decision trees to generate responses, while retrieval-based models search a pre-constructed conversation repository to select the best matching response. Generative-based models, on the other hand, employ machine translation techniques to generate responses based on extensive training data[20].

Retrieval-based chatbots are simple in design and use pre-defined responses, making them suitable for basic user queries. But they lack flexibility and struggle with domain-specific responses. Generative-based chatbots, also known as Artificial Intelligence Chatbots, function more like human beings and learn from large quantities of interaction data. They offer greater flexibility across different domains but may have difficulty forming sentences correctly and require access to domain-specific knowledge bases[20]. As an example, ChatGPT utilizes a generative-based approach to generate coherent and natural-sounding responses. This approach employs transformers, which enable the model to process and generate text sequences. Through training on a vast amount of text data, it learns the intricacies of language and gains the ability to generate contextually appropriate responses. This combination of generative modeling and transformer architecture allows ChatGPT to excel in producing high-quality and human-like dialogue[23]. It stands out with its natural language generation capability, allowing it to generate coherent and human-like responses. This advantage is especially valuable in applications like customer service chatbots and language translation, enhancing user experience and satisfaction compared to rule-based approaches[23].

The natural language generation capability of ChatGPT has led to its widespread application in customer service-related tasks, resulting in numerous related works in this domain. As highlighted earlier, its ability to generate human-like and coherent responses has been leveraged by various companies and platforms to enhance their customer service chatbots. This includes the implementation of ChatGPT-powered tools by retailers like Mercari, Zalando, and Klarna to provide personalized product recommendations and assist shoppers in their purchasing decisions[24]. The use of ChatGPT in customer service chatbots has been explored by organizations like Shopify to enhance product descriptions and improve user engagement[25]. Its effectiveness in providing natural and contextually appropriate responses has made it a valuable resource for creating more meaningful and engaging interactions with customers in the customer service domain.

Zalando, a prominent European fashion platform, is developing a fashion assistant powered by ChatGPT that allows customers to navigate their extensive assortment using their own fashion terms and receive personalized recommendations. The assistant aims to provide intuitive and natural interactions for customers, enhancing their online shopping experience. The beta version will be available to a selected group of customers in multiple countries.

Mercari, an online marketplace in the U.S., has launched Merchat AI, a conversational shopping assistant powered by ChatGPT. Customers can engage in real-time conversations with Merchat AI to receive product recommendations based on their specific needs. The AI tool scans millions of listed items on Mercari's platform to provide personalized recommendations. The platform offers a beta experience and plans to improve the offering based on user interactions.

Shopify, a popular e-commerce platform, has integrated ChatGPT-assisted technology into their Shop app. The AI-powered shopping assistant enables users to ask for help in finding products and receive recommendations based on their preferences. The tool aims to enhance the buyer's experience and potentially impact buyer behaviour and conversions.

Klarna, a global retail bank and shopping service, has collaborated with OpenAI to bring personalized and intuitive shopping experiences using ChatGPT. Klarna's integrated Plugin for ChatGPT provides curated product recommendations to users seeking shopping advice. Users can provide feedback and receive updated recommendations. Klarna's focus on innovation and creating value for retail partners aligns with its goal of offering a unique shopping experience.

The existing projects mentioned above showcase the use of ChatGPT in retail settings. However, there are gaps that the ChatGPT recommendation system for retail shops aims to address. The project aims to explore the potential for interactive conversations with customers. While some existing projects mention the ability for customers to engage in conversations with AI assistants, this project seeks to further enhance that interaction.

The ChatGPT recommendation system for retail shops introduces interactive kiosks enhancing the shopping experience. These kiosks allow customers to engage in real-time conversations with the ChatGPT-powered system, ask questions using their own terms, and receive personalized recommendations. The kiosks serve as a physical connection point, enabling customers to explore products, view images, and make purchases. By merging physical and digital interactions, interactive kiosks offer an immersive and convenient way for customers to discover and shop for products.

CHAPTER 3
Requirement analysis

3.1. Survey findings and analysis

The survey conducted among 71 customers and retail shop owners’ (see APPENDIX A) sheds light on the current state of AI-powered technology and chatbots in the retail industry. From the shop owners' viewpoint most respondents currently do not utilize any AI-powered technology or chatbots in their shops. There are notable proportion of shop owners already employ these advanced solutions, and a significant number express openness to adopting AI-powered technology or chatbots in the future. This indicates a growing interest in leveraging innovative technologies to enhance their businesses and improve customer experiences.

Total of 11 shop owners with different shop categories (as seen in *Figure 1*) were surveyed. The survey reveals, the main challenges faced by shop owners in providing personalized recommendations to customers. About 54.5% of shop owners cited staff resources and training as a significant challenge, indicating the importance of user-friendly and easy-to-implement AI-powered recommendation systems that can assist and support staff effectively. Another 72.7% of shop owners mentioned the lack of suitable technology as a barrier to providing personalized recommendations, emphasizing the need for robust and adaptable AI solutions.

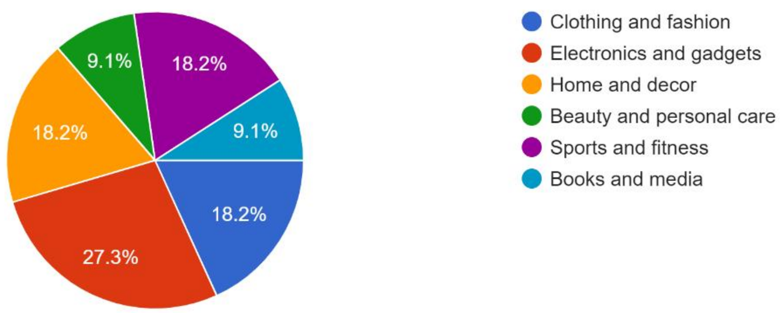

Figure 2 Shop category

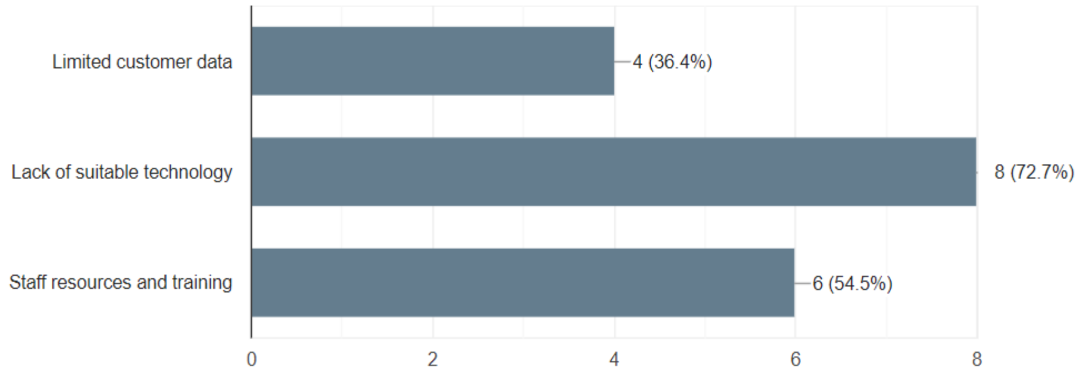

Figure 3 Challenges faced by retail shops.

Shop owners are enthusiastic, as shown in Figure 4, about the potential benefits that AI-powered recommendation systems can offer both their businesses and customers. The most anticipated advantages include improved customer satisfaction, increased sales and conversions, and enhanced customer engagement. With personalized recommendations, shop owners expect customers to have more satisfying shopping experiences, leading to heightened sales and improved customer loyalty.

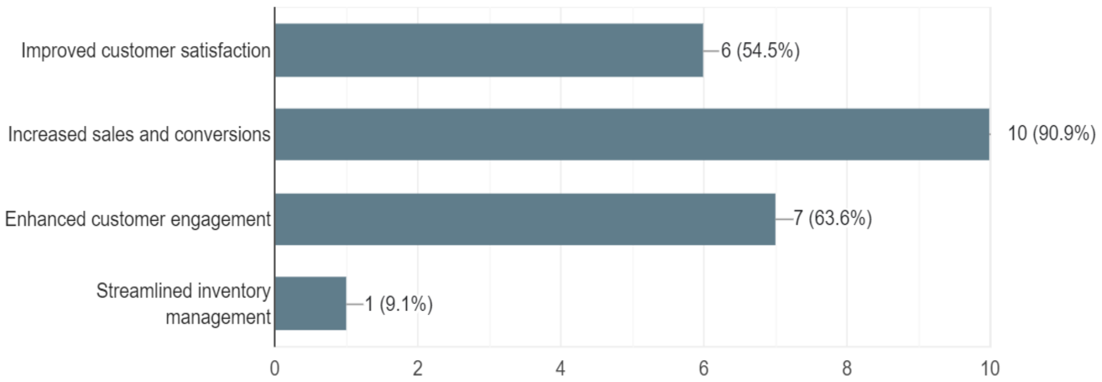

Figure 4 Envision of an AI-powered recommendation system benefiting retail shops and customers.

A total of 61 customers were surveyed to gather valuable insights for the chat-based recommendation system. Through this comprehensive survey, their age distribution, shopping preferences, expectations from the recommendation system, and concerns related to privacy and data security were analysed. The survey reveals (see Figure 5) that most potential users for the chat-based recommendation system fall within the age range of 25-35. Users aged 18-25 and 35-45 also constitute significant portions of the audience. The respondents are primarily from urban areas, with a smaller representation from suburban and rural areas. Around 23% of customers shop multiple times a week, and 28% shop 2-3 times a month can direct the need for a recommendation system that can deliver timely and regular suggestions.

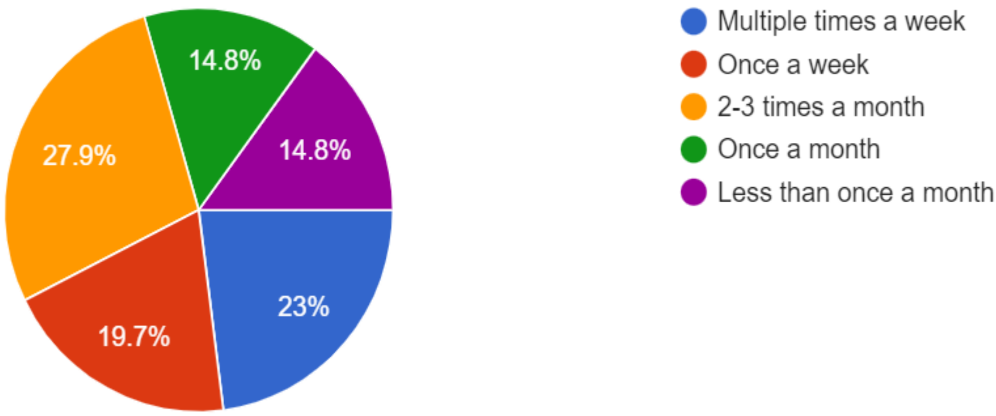

Figure 5 Frequency of shopping

In terms of giving preferences, Figure 6 shows that customers highly value AI based personalized recommendations which utilizes GPT model that analyses customer interactions and preferences, with approximately 35% considering them extremely valuable and another 50% valuing them as valuable. This emphasizes the significance of implementing a recommendation system that can effectively analyse user preferences and historical data to deliver personalized suggestions. The system should leverage machine learning algorithms and data analysis techniques to continuously improve its recommendation accuracy and enhance the overall shopping experience.

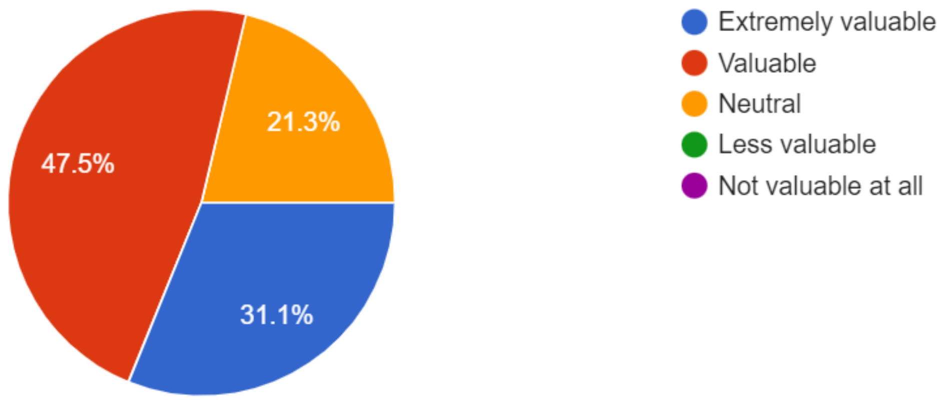

Figure 6: Value of personalized recommendations

In an open-ended question, the survey asked participants about the specific features or functionalities they would like to see in a chat-based recommendation system for retail shops. The responses varied, but common themes emerged. Many participants emphasized the importance of accuracy and efficiency, expressing their desire for a system that works effectively and provides accurate answers. Detailed product information, including prices and quality, was also a key concern among respondents, as they sought to make well-informed purchasing decisions.

Participants also highlighted the value of recommendations that complement their purchases, indicating a need for personalized and relevant suggestions. Additionally, the survey revealed an interest in seasonal-based answers, suggesting that users expect the system to offer timely and contextually appropriate recommendations. Customers expressed a desire for authentic product reviews from real buyers, allowing them to gauge the pros and cons of products. The importance of discounts and cost-effective shopping options was also evident, as users seek to take advantage of good bargains.

A notable portion of respondents express concerns about privacy and data security (see Figure 7) when using a chat-based recommendation system. Addressing these concerns is essential in gaining customer trust and ensuring the success of the system. The recommendation system should adopt robust security measures, comply with data protection regulations, and offer transparency in data usage and storage practices. Implementing a clear and user-friendly privacy policy will be crucial in alleviating customer apprehensions.

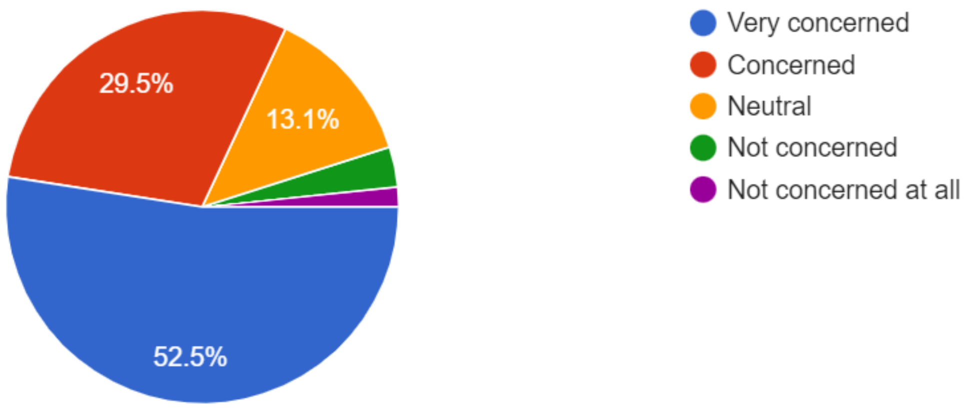

Figure 7 Privacy and data security concern

The survey data from both customers and shop owners reveals a strong demand for an AI-powered chat-based recommendation system in retail shops. Customers seek personalized recommendations and an interactive interface, while shop owners recognize the potential benefits in increased sales and customer satisfaction. Addressing data security and technology suitability challenges is crucial.

3.2. Use case design

After analysing the data from survey, the use case for the recommendation system is designed to accommodate customers. The system provides personalized features for registered users, such as the ability to view their order history. The use case diagram in

Figure *8* illustrates the flow of interactions between the customers, the retail shop owner, and the recommendation system. The customers can easily interact with the system through a user-friendly GUI, engaging in natural language conversations to receive product recommendations. Additionally, customers have the option to search for specific products and provide valuable feedback on the recommended items. The retail shop owner can update product details and view customer feedback and ratings to further enhance the system's performance.

Let's explore the role of each feature or element in the use case diagram in

Figure *8*:

Registered Customers: These are individuals who have created accounts and are logged in to the e-commerce platform. They have access to features like viewing their order history and receiving personalized recommendations based on their past interactions.

Guest Customer: Guest customers are users who haven't created accounts or logged in. They can still browse products and make purchases but may have limited access to certain features.

Retail Shop Owner: This actor signifies individuals or entities that own and manage retail shops or product listings on the e-commerce platform. They have specific privileges related to product management.

Login: This represents the process of customers logging into their registered accounts to access personalized features and order history.

View Order History: Registered customers can use this feature to review their past orders and track their purchase history.

Continue as Guest: This option allows guest customers to proceed with a purchase without creating an account. It streamlines the checkout process for users who prefer not to register.

Update Product Details: This is likely an admin-specific feature, enabling retail shop owners or administrators to modify product information such as descriptions, prices, or availability.

View Customer Feedback: This feature allows both registered and guest customers to read and provide feedback or reviews on products they've purchased or viewed.

Interact with Feature: This is a general term and could represent various interactive features within the e-commerce system, such as product filters, sort options, or chat support.

Receive Recommendations: Registered customers can receive personalized product recommendations based on their browsing and purchase history. Machine learning models often power this feature.

Search Products: Users can search for specific products using keywords or filters, helping them find items of interest more efficiently.

Provide Feedback: Customers can leave feedback, reviews, or ratings for products they've interacted with. This feedback can help other users make informed decisions.

View Product Details: This represents the action of users viewing specific product pages, where they can see detailed information about a product, including descriptions, images, prices, and specifications.

Retails Shop Owner: This actor likely represents individuals who own retail shops and use the e-commerce platform to sell their products.

Machine Learning Model: This is a crucial component of the system. Machine learning models are used to generate personalized product recommendations for customers based on their behaviour and preferences.

Generate Recommendations: The machine learning model is responsible for generating product recommendations, which are then presented to registered customers to enhance their shopping experience.

Update Knowledge Base: This is an admin-specific action that involves updating the system's knowledge base, which could include adding new product information, updating existing data, or refining recommendation algorithms.

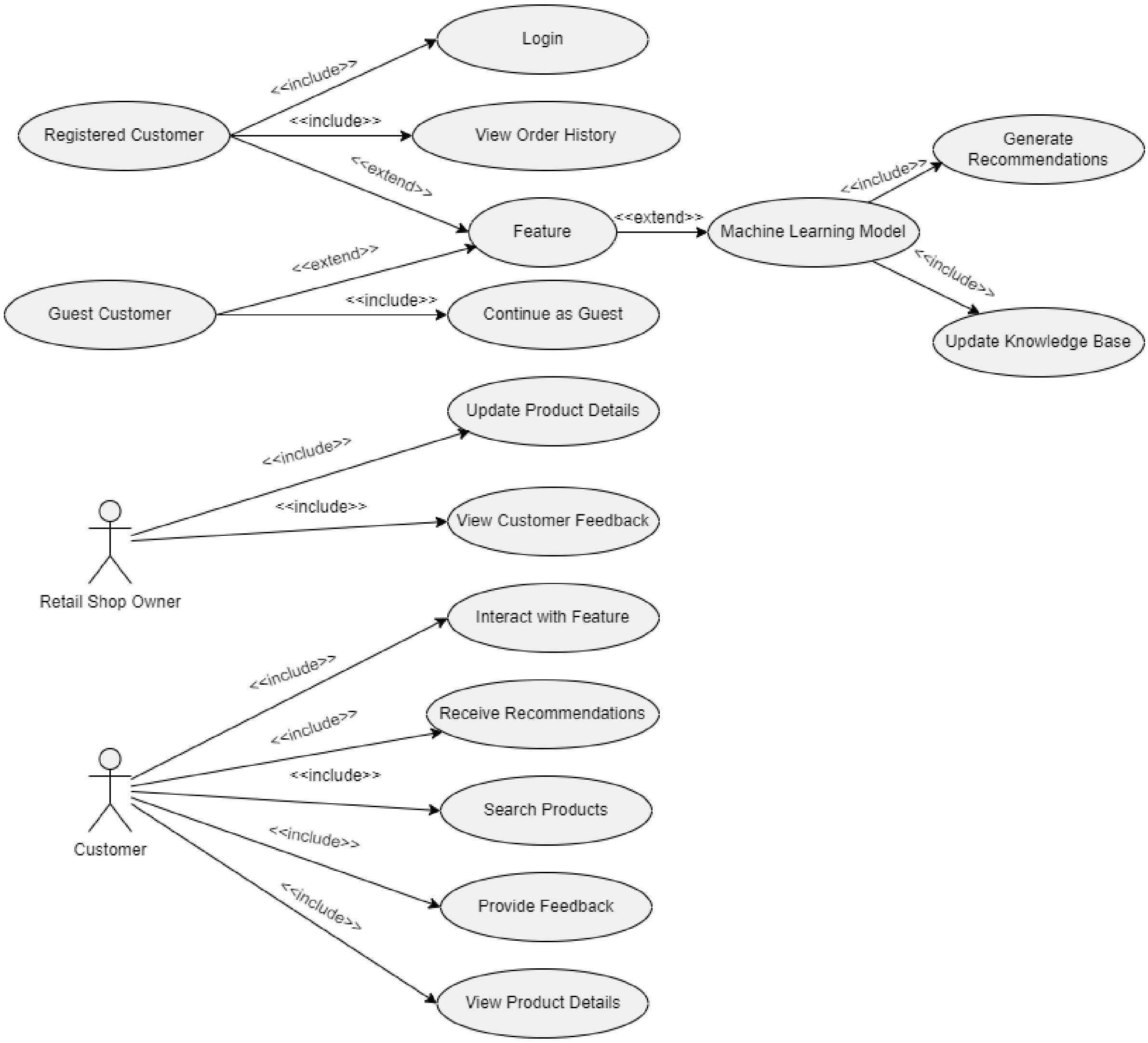

Figure 8 Use case diagram of the system.

CHAPTER 4
System architecture

4.1 Transformer model

The language model is a critical component that allows the chatbot to understand user queries, generate responses, and provide recommendations. The specific language model we use for the system is "ChatGPT." ChatGPT is a variant of the GPT (Generative Pre-trained Transformer) series developed by OpenAI. GPT models are built on a deep learning architecture called transformers, which have proven to be highly effective in natural language processing tasks. Transformer is a neural network architecture that was proposed in 2017 by Vaswani et al. It revolutionized the field of natural language processing (NLP) and has been widely used in various NLP tasks. The Transformer architecture relies on attention mechanism and does not use recurrent structures like Recurrent Neural Network (RNNs). It is known for its ability to capture long-range dependencies in sentences and its parallelizability, which makes training faster. Transformer-based models, such as GPT, BERT, and others, have outperformed previous state-of-the-art networks in NLP tasks [26].

Figure *9* shows that Cutting-edge neural models for retrieval take advantage of transformer-based encoders, such as cross-encoders or bi-encoders. Cross-encoders process concatenated sentences, creating a single representation, while bi-encoders handle sentences individually, allowing for quick indexing and inner product searches. Although cross-encoders perform better in capturing interactions between two sentences, bi-encoders are more computationally efficient. Researchers are currently investigating the utilization of fine-tuned neural language models as bi-encoders due to their proven success in other retrieval tasks and their capability to pre-compute and index textual data representations. [27].

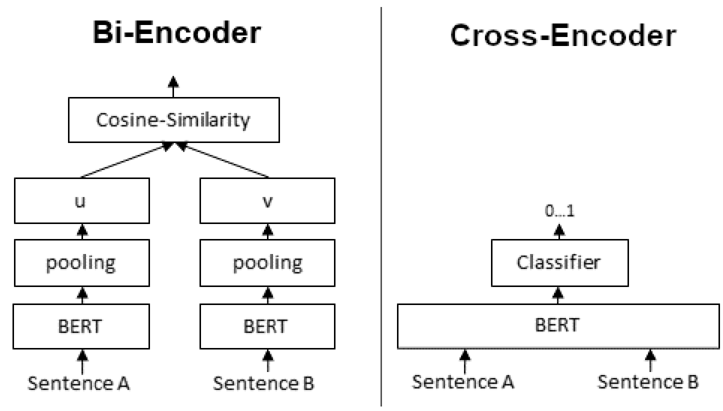

Figure 9 General architecture of a Bi-Encoder (left) and a Cross-Encoder (right), using BERT as the language model[27].

4.2 Architecture

As we dived into the concept of the transformer model, let's now navigate into the system architecture. This architecture is meticulously designed to create a seamless and efficient product recommendation experience for users. Each component plays a pivotal role in ensuring a user-friendly interface, accurate recommendations, and smooth interactions. Let's explore the various components that constitute this well-orchestrated system, as seen in Figure 9.

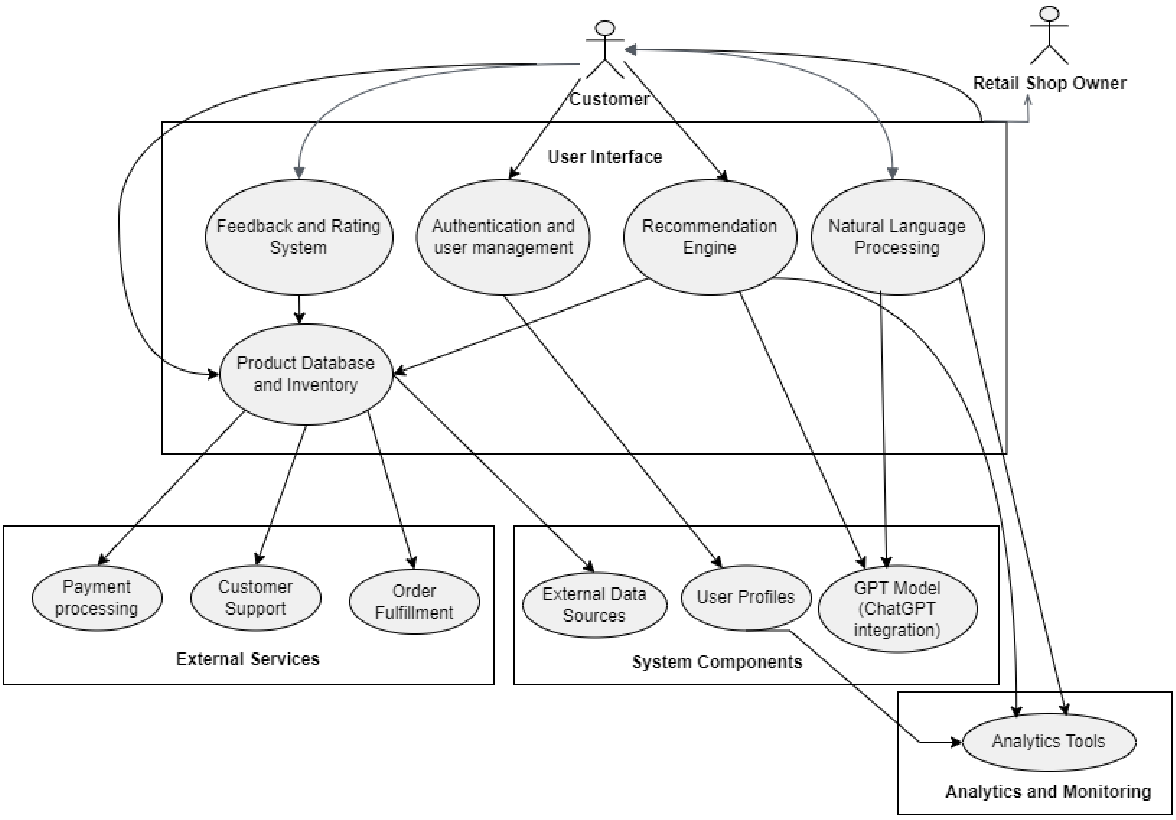

Figure 10 Architecture of the system

User Interface (UI): The UI serves as the user's entry point, offering elements like search bars, product displays, profiles, and conversational interfaces. Users can either register or proceed as guests, benefiting from easy navigation and natural language interactions.

Authentication and User Management: This component manages user registration, logins, and profiles. Registered users access personalized features, while guest users engage without logging in. User profiles capture past interactions and preferences.

Natural Language Processing (NLP) Module: The NLP module acts as a bridge between users and the system, interpreting queries, context, and preferences. It generates natural language responses by interfacing with the ChatGPT language model.

Recommendation Engine: The recommendation engine lies at the system's core, using advanced algorithms to provide personalized product suggestions based on user behaviour and preferences.

Product Database and Inventory: This repository stores comprehensive product details and tracks availability.

Feedback and Rating System: Users can rate and offer feedback on recommended products, helping fine-tune future suggestions.

External Data Sources: External datasets, like customer reviews and industry trends, enhance the system's knowledge.

ChatGPT Integration: Seamlessly linking with ChatGPT, this component enables natural language conversations with product recommendations.

APIs and Services: Integration with external services supports payment, order fulfillment, and customer support.

Analytics and Monitoring: This segment tracks user interactions, recommendation effectiveness, and system performance.

In the development of the Recommendation System for Retail Shops, several key components have been implemented to create a user-friendly and effective platform. The User Interface (UI) provides a welcoming entry point for users, enabling them to easily navigate through the system's features for natural language interactions. Authentication and User Management ensure that both registered and guest users can make the most of their experience, with user profiles capturing their preferences and past interactions. The Product Database and Inventory component serves as a comprehensive repository for product details and availability tracking, facilitating the foundation of the recommendation engine. Meanwhile, the ChatGPT Integration component is seamlessly woven into the system, enabling users to engage in natural language conversations while receiving personalized product suggestions. As the system evolves, the integration of Feedback and Rating Systems, External Data Sources, APIs and Services, and Analytics and Monitoring will be pivotal for fine-tuning the recommendation system's performance and user satisfaction.

CHAPTER 5
Implementation

The system's development and implementation encompassed several key areas that were rigorously tested and validated. The user-friendly interface was carefully designed, employing HTML, CSS, and JavaScript, and extensively tested to ensure it provided an intuitive platform for users to receive personalized product recommendations. The core of the system, the chat interface powered by ChatGPT, underwent thorough testing to guarantee dynamic and natural language interactions. Furthermore, a dedicated checkout page was developed, enabling real-time order summaries and seamless payment processing. The data models, including product data models, user profiles, and interaction data models, were created and validated to efficiently manage data related to products, user preferences, and interactions. Data ingestion processes were implemented and optimized to ensure that external data, such as product information, was accurately collected and seamlessly integrated into the system. The user interface was designed, validated, and extensively tested to incorporate interactive chat features, product displays, user profiles and seamless integration with the backend, while ChatGPT was seamlessly integrated to facilitate dynamic conversations and real-time recommendations. All of these components underwent rigorous testing and validation processes to create a comprehensive and effective system that enhances the online shopping experience. Let’s discuss more in detail of those components:

5.1 Data model

Data models serve as the foundational framework for managing, storing, and processing various types of data critical to the system's functioning. It encompasses the structure and organization of data elements, defining how information is stored, linked, and retrieved. This data model is designed to efficiently handle data related to products, user profiles, and user interactions. Let's explore this data model in more detail.

Product Data Model: Within this system, the product data model is responsible for the representation of products available on the platform. It includes attributes such as product name, description, category, price, unique identifiers, and any other product-specific data. Each product is uniquely identified within the system, facilitating efficient data retrieval and linking to user preferences and interactions. The product data model ensures that product information is structured in a way that the recommendation algorithm can easily analyse and suggest products that align with user preferences.

User Profile Data Model: User profiles are essential for creating personalized recommendations within this system. The user profile data model encompasses information related to individual users, including demographic data, historical shopping behaviours, product preferences, and other relevant user-specific details. Each user is associated with a unique user profile that stores their interaction history and personal preferences. This data model is designed to help the recommendation system understand user behaviour and tailor product suggestions accordingly.

Interaction Data Model: The interaction data model manages user interactions with the platform. It records how users interact with products, such as views, clicks, purchases, and feedback. The interaction data model links users to specific products they've interacted with, creating a rich dataset that serves as the basis for training and fine-tuning the recommendation algorithm. It plays a crucial role in tracking user behaviour and assessing the impact of recommendations.

5.2 Data ingestion

In this system, data ingestion refers to the process of collecting and importing external data into the system. This data can come from various sources, such as product catalogues and user feedback containing valuable information related to products and user preferences. This data could be in the form of .txt files, databases, spreadsheets, or any other structured data format. For example, for this system we are using .txt file for product information from retail shops. Once this external data is collected, it undergoes a series of data transformation and validation steps. These steps ensure that the ingested data is in the right format, free of errors, and aligns with the system. For example, product details from .txt files need to be standardized and validated before being incorporated into the system.

5.3 User Interface Design

The UI implementation for the system is crucial encompassing several key features to enhance the customer’s shopping experience. Here's a detailed breakdown of the implemented UI components:

Interactive Chat Interface: The core of the UI is an interactive chat-like screen. This interface allowed users to engage in a conversation with the system. Users could input their preferences, ask for product recommendations, or seek information about specific products. The chat interface provides an intuitive and conversational way for users to interact with the system.

Product Viewing: Following the user's conversation and input, the UI seamlessly presented product recommendations. Users could view these recommended products in a user-friendly display. Each product is accompanied by essential details, such as an image, name, description, and price.

Product Details: For users interested in more information about a specific product, the UI allowed them to access detailed product information. This included specifications, customer reviews, and related products for a comprehensive shopping experience.

Add to Cart: To facilitate the buying process, an "Add to Cart" feature is seamlessly integrated into the UI. Users could easily add products they wished to purchase to their virtual shopping cart.

User Profile: The UI also included a user profile section, allowing users to manage their accounts, track their order history, and adjust their preferences. This personalized section enhanced the user experience and enabled the system to tailor recommendations more effectively.

Feedback Mechanism: To gather user feedback, the UI featured an integrated feedback system. Users can provide ratings, reviews, and comments about the products they purchased. This feedback loop was invaluable for both improving the system's recommendations and enhancing user satisfaction.

Backend Integration: Behind the scenes, the UI is tightly integrated with the system's backend. This integration is instrumental in powering the product recommendation engine. As users interact with the UI and explore products, the backend which is integrated with ChatGPT API analyse their preferences to provide highly personalized recommendations.

5.4 ChatGPT Integration

In the heart of the UI implementation lay a robust connection with the GPT model. This connection facilitated the interactive conversation between users and the system, enabling users to seek recommendations, ask questions, and engage in a chat-like dialogue. GPT model served as the intelligent conversational agent, processing user inputs and generating relevant responses.

The connection is established through a well-defined API integration. User inputs enter the system through the chat interface, where they are transmitted to the GPT model. The model processes these inputs considering the data of the store, understanding user intent, preferences, and requests. It then generates responses that were seamlessly presented in the chat interface, creating a dynamic and interactive conversation.

The connection with GPT model is central to the system's ability to provide personalized recommendations. It allowed the model to continuously learn and adapt to user behaviour, refining its recommendations over time. As users interact with the chat interface, the system collects valuable data about their preferences, which is utilized to enhance the accuracy and relevance of product recommendations. The combination of intuitive design, real-time interaction, and AI-driven recommendations results in a cohesive and efficient platform that enhances the way users shop in retail stores, as shown in Figure 11 and Figure 12.

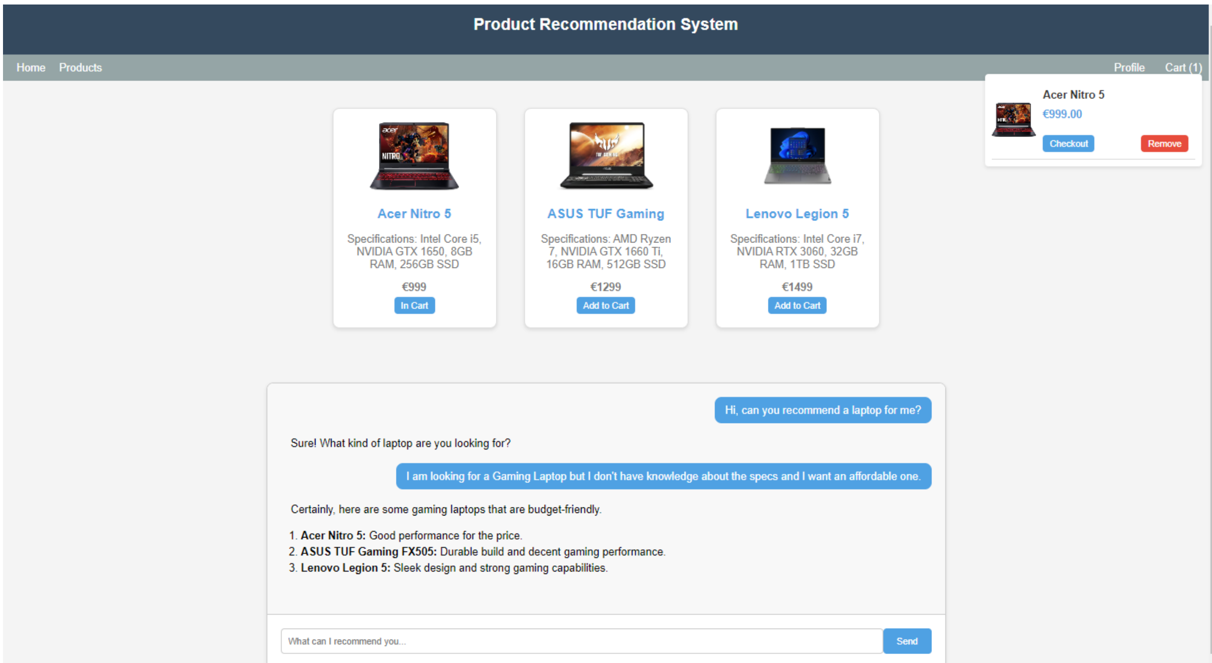

Figure 11 Product recommendation system home UI

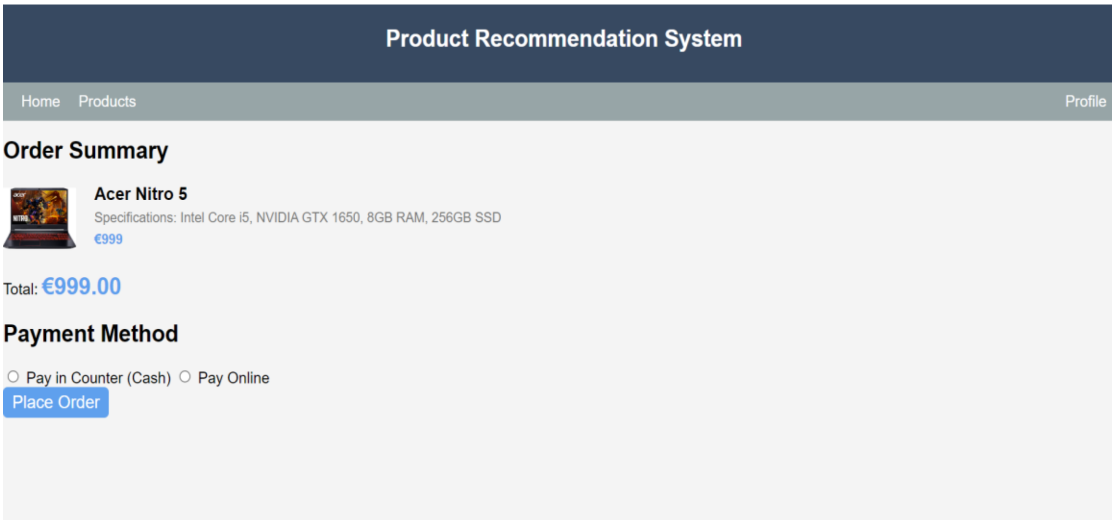

Figure 12 Product recommendation system checkout

CHAPTER 6
Result discussion

The usability test conducted as part of this dissertation served as a fundamental step in evaluating the system's overall usability and user-friendliness. It aimed to assess how effectively users could interact with the system and navigate its various features. The primary focus of usability testing was to ensure that the system offered a smooth and enjoyable user experience, independent of the underlying precision of its recommendation system. This approach acknowledges that while recommendation system accuracy is crucial, usability plays a pivotal role in determining the system's real-world effectiveness. Subsequently, the second survey was designed based on the insights gained from the usability test, aligning the system more closely with user needs and preferences, and enhancing its accessibility and user-friendliness for a diverse user base.

The research findings are explored within the context of the central research questions and hypotheses. The study aimed to investigate the acceptance and adoption factors of AI-based recommendation systems in retail settings (RQ1) and the challenges surrounding their adoption (RQ2). Hypotheses H1 and H2 guided the expectations, and data from usability testing and surveys (see APPENDIX B) shaped empirical insights. Through this result discussion, the bridge between theory and practice is established, offering a deeper understanding of how real-world user interactions resonate with the research objectives.

Regarding Research Question RQ1, which investigated factors influencing the acceptance and adoption of AI-based recommendation systems in retail, the finding confirms Hypothesis H1. While the initial hypothesis suggested no significant differences among various customer demographics and shopping contexts, data from usability testing and surveys reveal variations among customer segments and shopping scenarios. Key determinants of user acceptance include factors like age, AI familiarity, shopping frequency, and product preferences. Thus, the validation of H1 underscores the intricate nature of tailoring AI recommendation systems to diverse user profiles and shopping contexts.

Turning to Research Question RQ2, exploring the challenges tied to AI system adoption in retail, the results provide a different perspective. Contrary to hypothesis H2, the data highlights significant challenges in adopting AI-based recommendation systems in retail stores. Substantial hurdles include privacy concerns and data security issues, along with logistical challenges in system integration related to data management and maintenance. The usability testing and survey data indicated that challenges related to privacy, data security, and system integration pose significant hurdles for adopting AI-based recommendation systems in retail. To effectively address these challenges, customized solutions may involve implementing robust data security measures, ensuring customer privacy, and streamlining the system integration process. When system is implemented in retail, future support might entail regular system maintenance, addressing technical glitches promptly, and providing user assistance when needed, the study underlines the importance of customized solutions and future support to effectively address these challenges. In summary, the result discussion reinforces how the research aligns with the questions and hypotheses, offering valuable insights for refining AI-based recommendation systems in the retail sector. As shown in

Figure 13, positive alignment between recommended products and user needs emphasized personalization's essence. Through the interactive chat interface, users had the freedom to articulate precisely what they were seeking. They could input their preferences, request specific product recommendations, or seek information about particular products, much like they would in a conversation with a sales assistant. This direct and user-driven interaction allowed users to articulate their needs explicitly, influencing the nature of the recommendations provided by the system. Consequently, the recommendations were rooted in the users' requests and preferences, ensuring a personalized shopping experience that closely matched their needs. Overall satisfaction affirmed the success of AI-driven recommendations. The feedback underlines recommendation systems' pivotal role in modern e-commerce, meeting user expectations for personalization, accuracy, and relevance. The system's success indicates its potential to reshape digital shopping experiences.

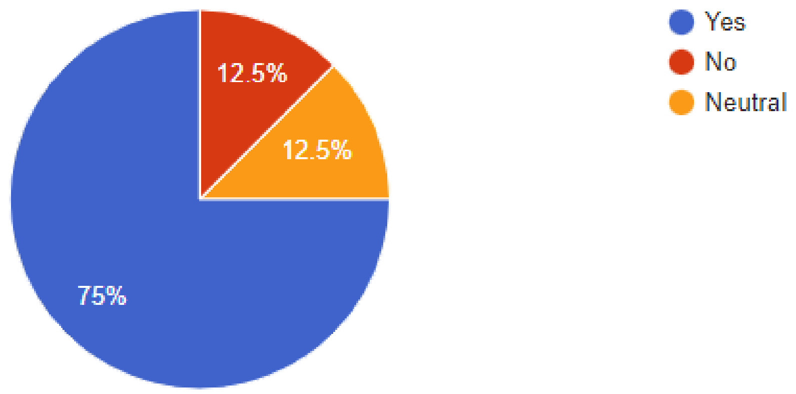

Figure 13: Recommended products aligned with preferences and needs of customers

CHAPTER 7
Conclusion and future work

In this dissertation we presented the development and evaluation of a novel product recommendation system empowered by advanced AI techniques. The system's integration of an AI assistant facilitated natural interactions, enriching user experiences. Usability testing revealed the system's efficacy in delivering tailored recommendations, offering valuable insights into user preferences, and enhancing engagement. The positive feedback on navigation, chat interaction, recommendation accuracy, and user satisfaction highlight the significance of AI-driven recommendation systems in modern e-commerce.

While this dissertation successfully demonstrated the potential of AI-based recommendation systems, there are opportunities for further exploration and enhancement. Future work could focus on refining the recommendation algorithm to accommodate dynamic user preferences and evolving trends. Additionally, integrating sentiment analysis and user feedback could fine-tune recommendations. This paper opens doors for continuous innovation and advancement in the realm of AI-driven recommendation systems, contributing to the ongoing transformation of the e-commerce landscape.

In addition to using the GPT model, exploring alternative NLP models can be a valuable chance for future work for the system. Two noteworthy models to consider are BERT (Bidirectional Encoder Representations from Transformers) and ELMo (Embeddings from Language Models).

BERT, known for its bidirectional training and transformer architecture, holds several advantages. It excels in capturing contextual nuances in language, making it suitable for a wide range of NLP tasks, including sentiment analysis, question-answering, and, notably, recommendation systems. By leveraging BERT, the system could gain a deeper understanding of user reviews and feedback, leading to more accurate recommendations based on sentiment and user preferences.

ELMo, on the other hand, focuses on capturing word embeddings based on context. This model enhances the comprehension of word meanings within sentences or documents. By incorporating ELMo, the recommendation system could significantly improve its ability to understand the semantic traces in product descriptions and user queries. This, in turn, can contribute to more precise and context-aware product recommendations.

The selection of this dissertation findings for publication and presentation at the prestigious International Industry Sciences & Computer Sciences Innovation 2023 (ISCSI) conference signifies the substantial relevance and interest this research holds within the academic community. This recognition paves the way for future work by emphasizing the potential impact and value of further investigations and advancements in this field. It encourages the exploration of new innovations and collaborations to continue contributing to the evolving landscape of AI-driven recommendation systems in retail and beyond.

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APPENDIX A
Research Questionnaire and Responses

ChatGPT recommendation system for retail shops

I am conducting a short survey on a ChatGPT based recommendation system for retail shops for my Master's thesis in Computer Engineering at ISCTE. Your input will help me understand customer preferences. It's anonymous, voluntary, and will take only a few minutes to complete. Thank you for your valuable contribution!

* Indicates required question

1. Please select the appropriate option below to indicate if you are a customer or a retail shop owner/representative: *

   Mark only one oval.

   - ( ) I am a customer *Skip to question 11*
   - ( ) I am a retail shop owner/representative *Skip to question 2*

2. Shop Category

   Mark only one oval.

   - ( ) Clothing and fashion
   - ( ) Electronics and gadgets
   - ( ) Home and decor
   - ( ) Beauty and personal care
   - ( ) Sports and fitness
   - ( ) Books and media
   - ( ) Other: ______________________

3. How do customers currently discover new products in your shop? (Check all that apply) *

Check all that apply.

- [ ] In-store displays and promotions
- [ ] Staff recommendations
- [ ] Printed catalogs or brochures
- [ ] Online website or app
- [ ] Social media platforms
- [ ] Other: ______________________

4. Do you think personalized product recommendations would be beneficial for your customers? For example: chatbot for the customer to interact and choose the product *

Mark only one oval.

- ◯ Yes
- ◯ No

5. Are you currently using any AI-powered technology or chatbots in your shop? *

Mark only one oval.

- ◯ Yes *Skip to question 8*
- ◯ No *Skip to question 9*

6. What are the main challenges you face in providing personalized recommendations to customers? *

Check all that apply.

- [ ] Limited customer data
- [ ] Lack of suitable technology
- [ ] Staff resources and training
- [ ] Other: ____________________

7. How do you envision an AI-powered recommendation system benefiting your shop and customers? *

Check all that apply.

- [ ] Improved customer satisfaction
- [ ] Increased sales and conversions
- [ ] Enhanced customer engagement
- [ ] Streamlined inventory management
- [ ] Other: ____________________

Skip to question 10

8. In what areas are you using AI-powered technology or chatbots? *

Check all that apply.

- [ ] Customer support
- [ ] Product recommendations
- [ ] Virtual shopping assistants
- [ ] Inventory management
- [ ] Other: ____________________

9. Are you open to implementing AI-powered technology or chatbots in the future? *

Mark only one oval.

- ( ) Yes
- ( ) No

11. What is your gender? *

Mark only one oval.

- Male
- Female
- Prefer not to say

12. What is your age? *

Mark only one oval.

- Under
- 18-25
- 25-35
- 35-45
- 45-55
- Above 55

13. What is your location?

Mark only one oval.

- ( ) City
- ( ) Suburb
- ( ) Rural area
- ( ) Other: __________

14. How frequently do you shop for retail products? *

Mark only one oval.

- ( ) Multiple times a week
- ( ) Once a week
- ( ) 2-3 times a month
- ( ) Once a month
- ( ) Less than once a month
- ( ) Other: __________

15. Which retail categories do you shop for most frequently? (Check all that apply) *

Check all that apply.

- [ ] Clothing and fashion
- [ ] Electronics and gadgets
- [ ] Home and decor
- [ ] Beauty and personal care
- [ ] Sports and fitness
- [ ] Books and media
- [ ] Other: __________

16. On a scale of 1 to 5, how satisfied are you with your current methods of product discovery in retail shops? *

Mark only one oval.

Very dissatisfied

1 ◯

2 ◯

3 ◯

4 ◯

5 ◯

Very satisfied

17. Which of the following features do you expect and prefer in a chat-based recommendation system? (Select all that apply) *

Check all that apply.

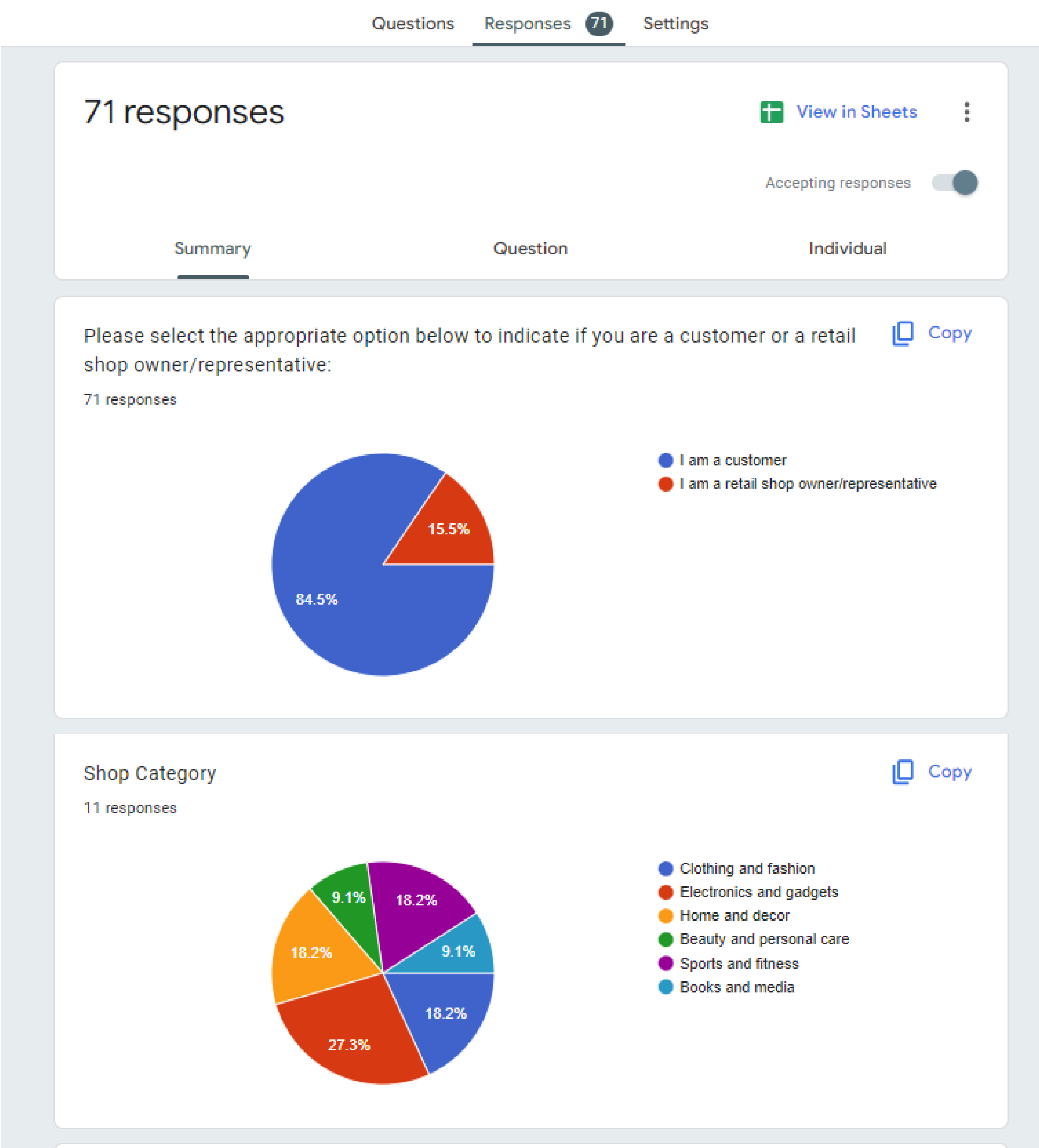
- [ ] Personalized recommendations (you ask and get response based on your queries)
- [ ] Easy-to-use interface
- [ ] Responsive and quick recommendations
- [ ] Detailed product information
- [ ] Integration with customer preferences/history
- [ ] Interactive conversational experience like talking with human
- [ ] Other: ______________________

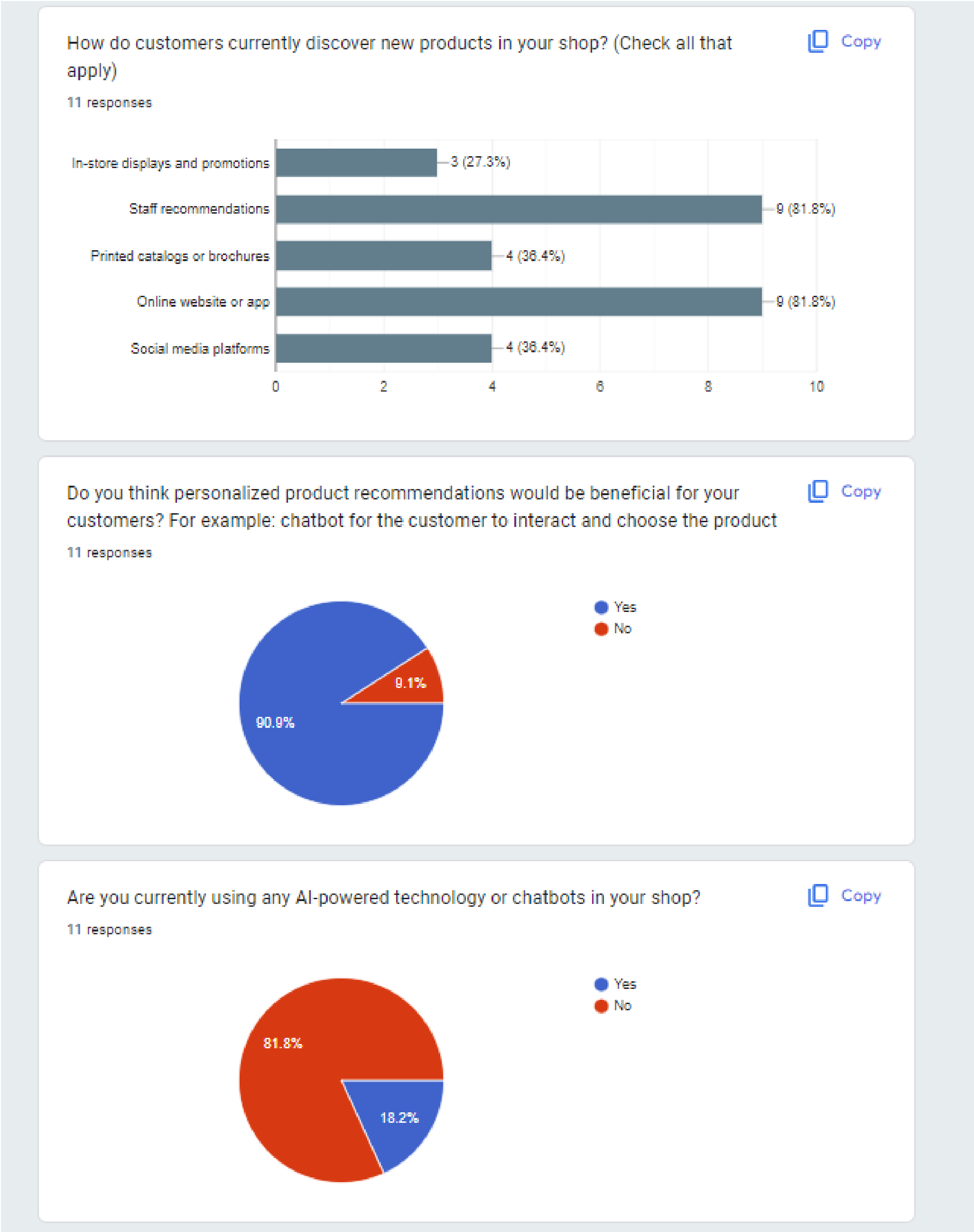
18. How valuable do you consider personalized recommendations compared to generic recommendations in your retail shopping experience? *

Mark only one oval.

- Extremely valuable
- Valuable
- Neutral
- Less valuable
- Not valuable at all

19. What specific features or functionalities would you like to see in a chat-based recommendation system for retail shops? (Open-ended response)


Questions
Responses 71
Settings
71 responses
View in Sheets
Accepting responses
Summary
Question
Individual
Please select the appropriate option below to indicate if you are a customer or a retail shop owner/representative:
Copy
71 responses
15.5%
84.5%
I am a customer
I am a retail shop owner/representative
Shop Category
Copy
11 responses
9.1%
18.2%
18.2%
9.1%
18.2%
27.3%
Clothing and fashion
Electronics and gadgets
Home and decor
Beauty and personal care
Sports and fitness
Books and media

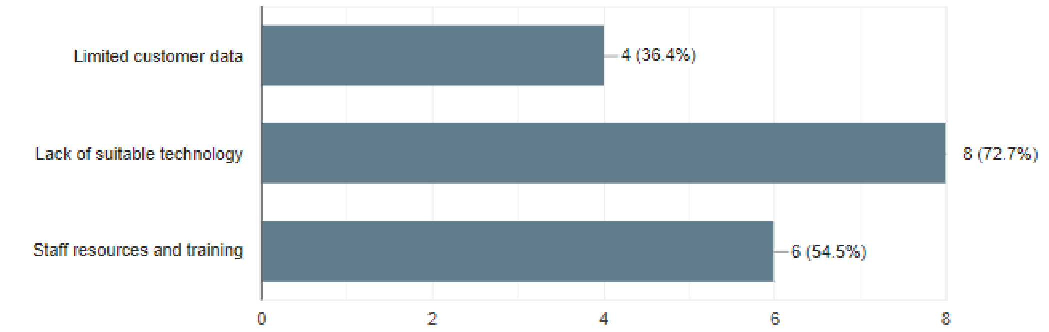


How do customers currently discover new products in your shop? (Check all that apply)
Copy
11 responses
In-store displays and promotions
3 (27.3%)
Staff recommendations
9 (81.8%)
Printed catalogs or brochures
4 (36.4%)
Online website or app
9 (81.8%)
Social media platforms
4 (36.4%)
0
2
4
6
8
10
Do you think personalized product recommendations would be beneficial for your customers? For example: chatbot for the customer to interact and choose the product
Copy
11 responses
Yes
No
9.1%
90.9%
Are you currently using any AI-powered technology or chatbots in your shop?
Copy
11 responses
Yes
No
81.8%
18.2%

What are the main challenges you face in providing personalized recommendations to customers?

Copy

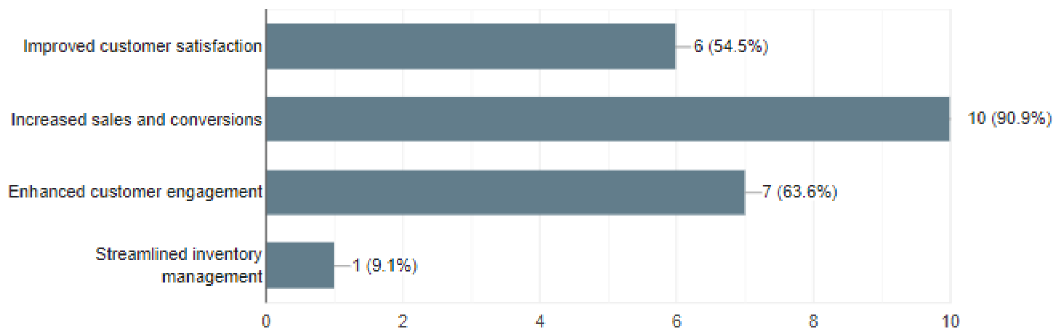
11 responses



How do you envision an AI-powered recommendation system benefiting your shop and customers?

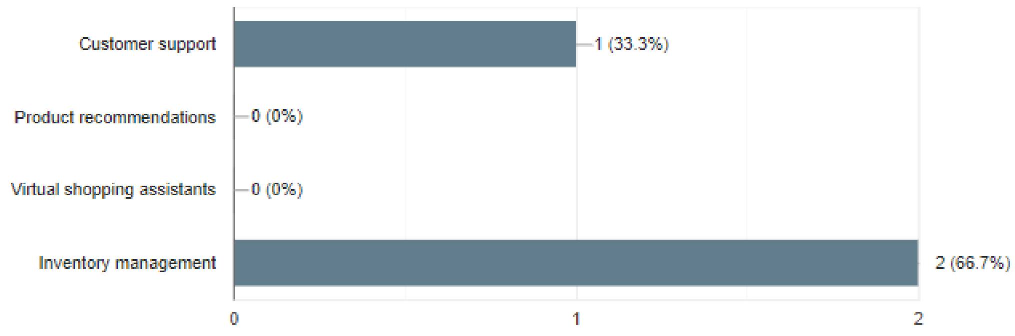
Copy

11 responses



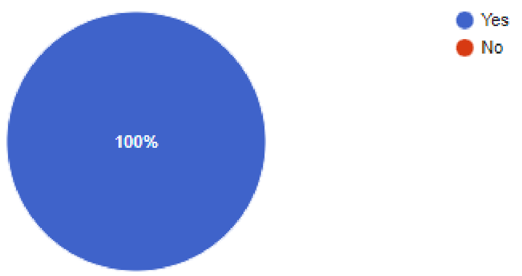
In what areas are you using AI-powered technology or chatbots?

3 responses



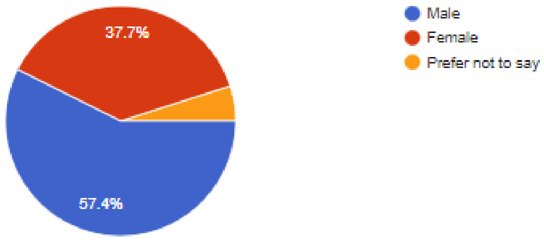
Are you open to implementing AI-powered technology or chatbots in the future?

11 responses



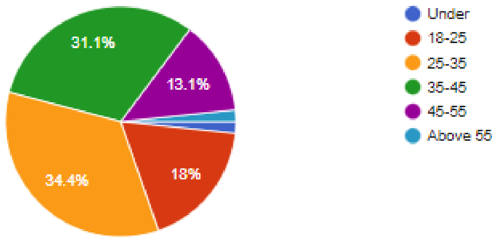
What is your gender?

61 responses



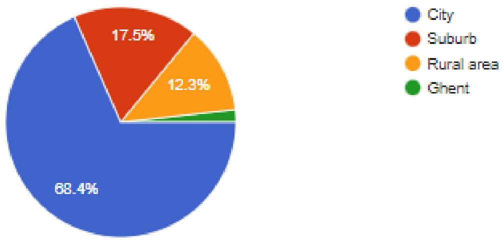
What is your age?

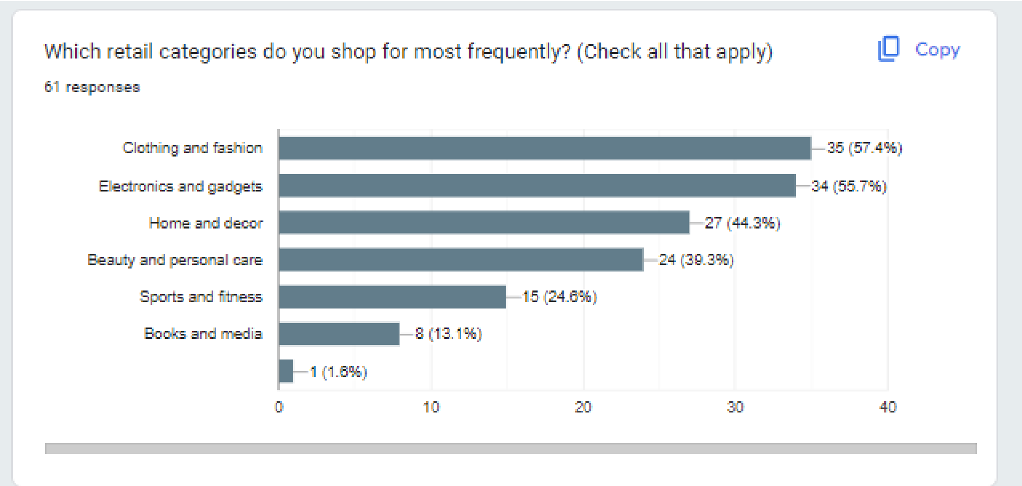
61 responses

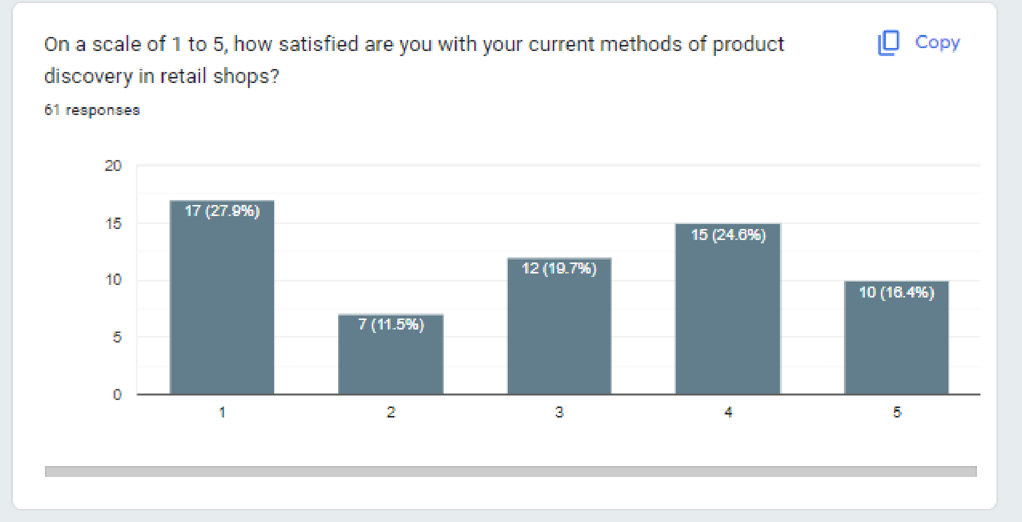


What is your location?

57 responses

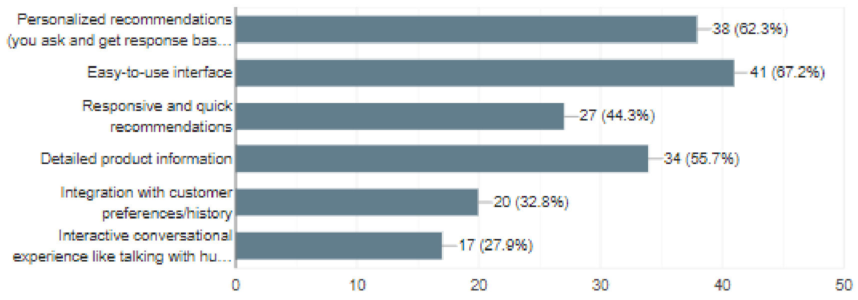



Which retail categories do you shop for most frequently? (Check all that apply)
Copy
61 responses
Clothing and fashion
Electronics and gadgets
Home and decor
Beauty and personal care
Sports and fitness
Books and media
35 (57.4%)
34 (55.7%)
27 (44.3%)
24 (39.3%)
15 (24.6%)
8 (13.1%)
1 (1.6%)
0
10
20
30
40


On a scale of 1 to 5, how satisfied are you with your current methods of product discovery in retail shops?
Copy
61 responses
20
15
10
5
0
17 (27.9%)
7 (11.5%)
12 (19.7%)
15 (24.6%)
10 (16.4%)
1
2
3
4
5

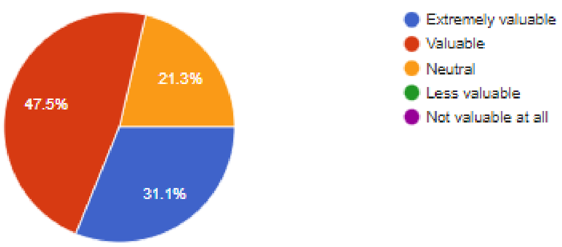
Which of the following features do you expect and prefer in a chat-based recommendation system? (Select all that apply)

61 responses



How valuable do you consider personalized recommendations compared to generic recommendations in your retail shopping experience?

61 responses



What specific features or functionalities would you like to see in a chat-based recommendation system for retail shops? (Open-ended response)

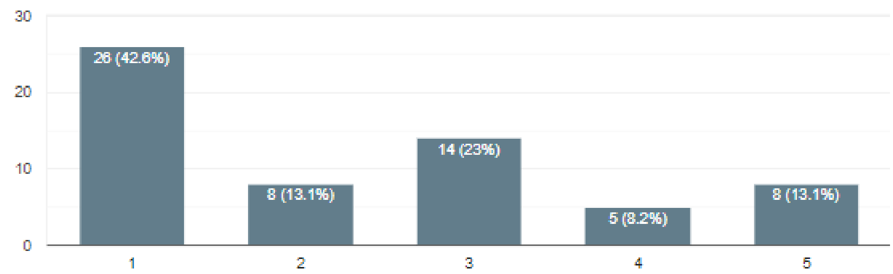
17 responses

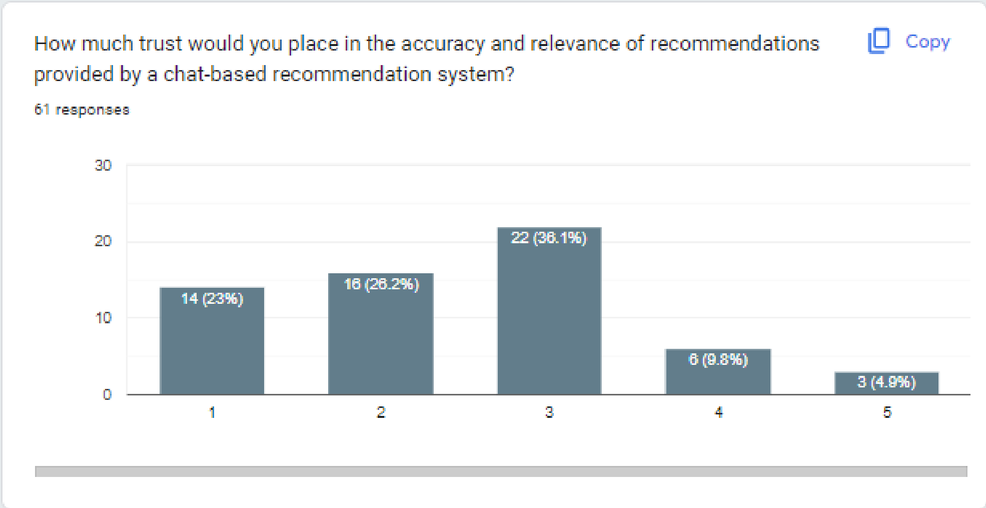
- Discounts, it's all about a good bargain!
- Interactiveness
- Reviews of the product
- Products listing, comparison and ratings on the basis of users' needs and prompts given by the user
- Comparison of products and its value
- Everything good
- Detailed products information prices and quality
- Exact recommendation
- A system that works and provides accurate answers

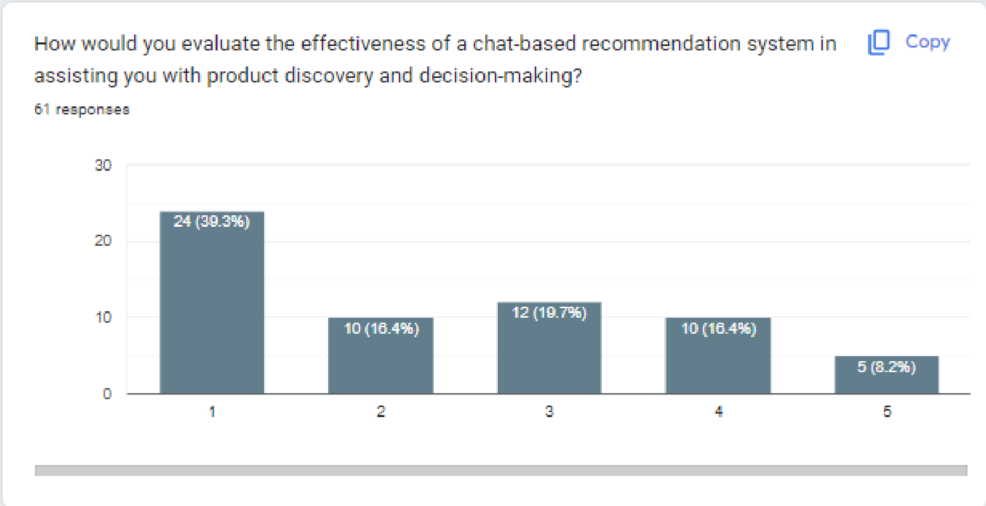
How comfortable would you feel interacting with a chatbot for receiving product recommendations?

Copy

61 responses

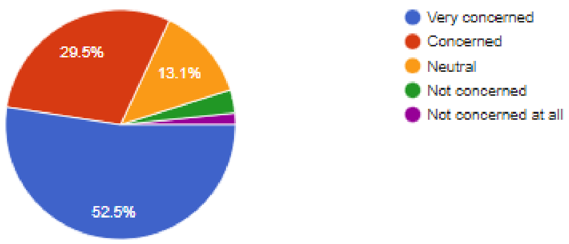



How much trust would you place in the accuracy and relevance of recommendations provided by a chat-based recommendation system?
Copy
61 responses
30
20
10
0
14 (23%)
16 (26.2%)
22 (36.1%)
6 (9.8%)
3 (4.9%)
1
2
3
4
5


How would you evaluate the effectiveness of a chat-based recommendation system in assisting you with product discovery and decision-making?
Copy
61 responses
30
20
10
0
24 (39.3%)
10 (16.4%)
12 (19.7%)
10 (16.4%)
5 (8.2%)
1
2
3
4
5

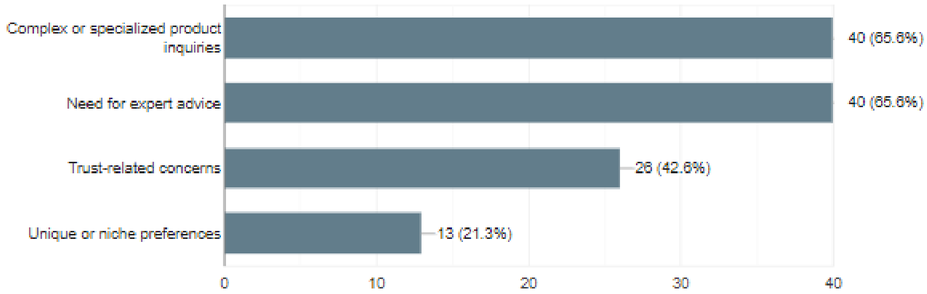
How concerned are you about privacy and data security when using a chat-based recommendation system?

61 responses



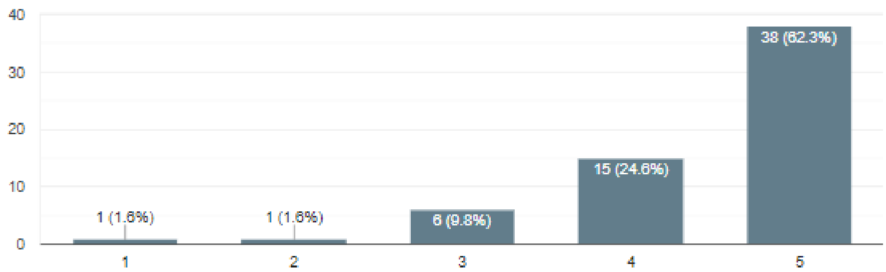
In what scenarios would you prefer human interaction over automated recommendations in a chat-based recommendation system? (Select all that apply)

61 responses



On a scale of 1 to 5, how important is the speed and responsiveness of a chat-based recommendation system in providing recommendations and addressing your queries or concerns?

61 responses



APPENDIX B
Usability Test Questionnaire and Responses

Feedback : usability testing of system

Thank you for participating in usability testing ChatGPT based recommendation for retail shops. Your feedback is valuable in improving my Product Recommendation System. Please take a few minutes to provide your responses to the following questions.

* Indicates required question

1. Age

Mark only one oval.

- Under 18
- 18-24
- 25-34
- 35-44
- 45-54
- 55 and above

2. Gender

Mark only one oval.

- Male
- Female
- Other: ____________________

3. On a scale of 1 to 5, how would you rate the ease of navigating the system's user interface? *

Mark only one oval.

	Very difficult
1	◯
2	◯
3	◯
4	◯
5	◯
	Very easy

4. Did you find the chat-based interaction with the AI assistant intuitive and user-friendly?

Mark only one oval.

- ◯ Yes
- ◯ No
- ◯ Neutral

5. Were the product listings and recommendations presented in a clear and organized manner?

Mark only one oval.

- Yes
- No
- Neutral

6. How accurate were the product recommendations provided by the system?

Mark only one oval.

Not accurate at all
1
2
3
4
5
Very accurate

7. Were the recommended products aligned with your preferences and needs?

Mark only one oval.

- Yes
- No
- Neutral

8. On a scale of 1 to 5, how satisfied were you with your overall experience using the system?

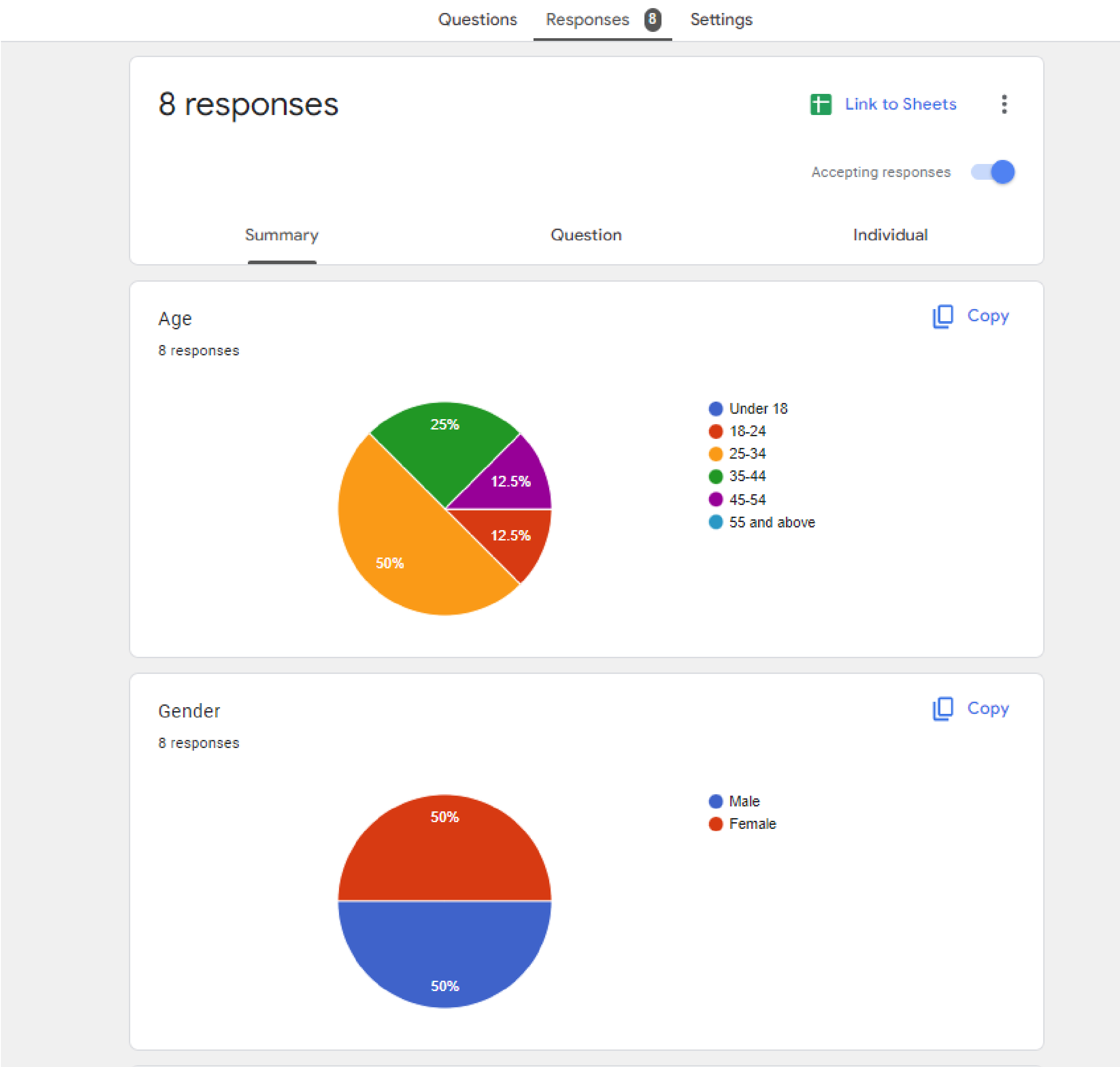
Mark only one oval.

Very dissatisfied

- 1
- 2
- 3
- 4
- 5

Very satisfied

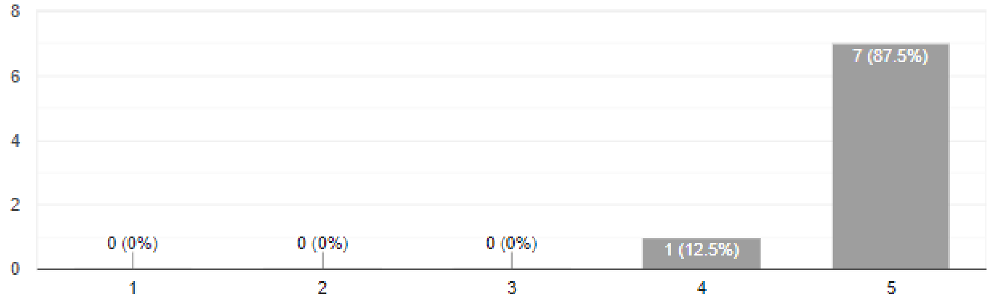
9. What features of the system do you think could be enhanced or improved?


Questions
Responses 8
Settings
8 responses
Link to Sheets
Accepting responses
Summary
Question
Individual
Age
Copy
8 responses
25%
12.5%
12.5%
50%
Under 18
18-24
25-34
35-44
45-54
55 and above
Gender
Copy
8 responses
50%
50%
Male
Female

On a scale of 1 to 5, how would you rate the ease of navigating the system's user interface?

Copy

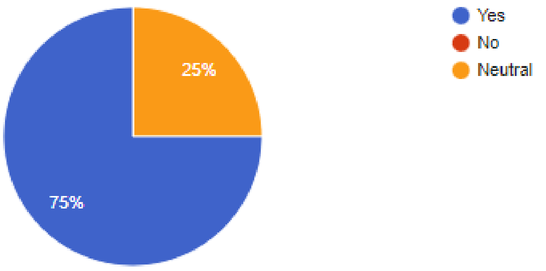
8 responses



Did you find the chat-based interaction with the AI assistant intuitive and user-friendly?

Copy

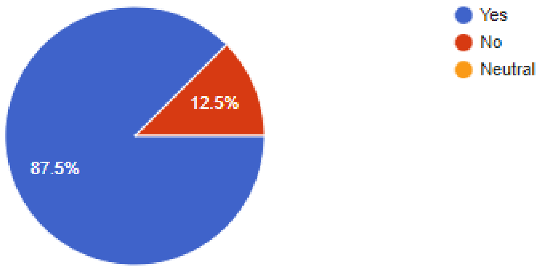
8 responses



Were the product listings and recommendations presented in a clear and organized manner?

Copy

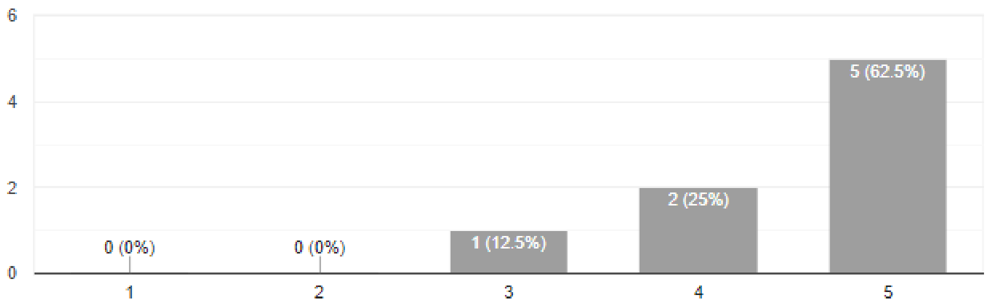
8 responses



How accurate were the product recommendations provided by the system?

Copy

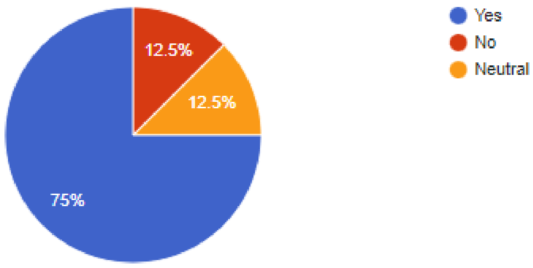
8 responses



Were the recommended products aligned with your preferences and needs?

Copy

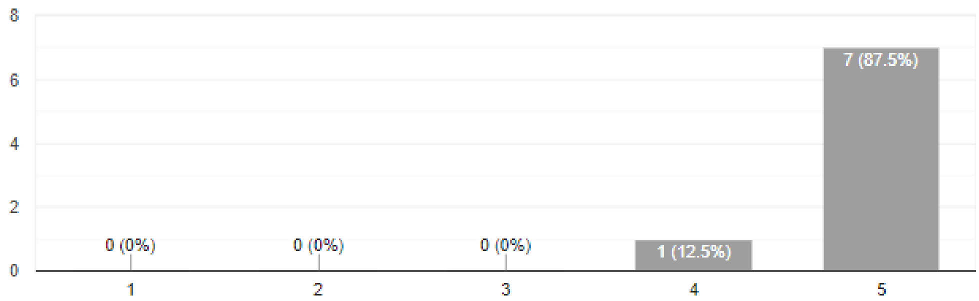
8 responses



On a scale of 1 to 5, how satisfied were you with your overall experience using the system?

Copy

8 responses



What features of the system do you think could be enhanced or improved?

0 responses

No responses yet for this question.