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E-commerce Shopping System to Improve Marketing Operations Using Artificial Intelligence

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Abstract. Shopping in grocery stores, department stores, and shopping malls has become an integral component of modern city life. On holidays and busy weekend days, shoppers flood stores and public areas. Customers must search for the things they want and wait in line to pay their bills, both of which are inconvenient and taxing. In this paper, we provide brand-new, comprehensive Artificial Intelligence (AI) SHOPPING SOLUTIONS that would streamline and improve marketing operations. Selecting an AI-enhanced e-commerce shopping system has several benefits that improve consumer satisfaction and operational efficiency. Adoption of AI technology may result in better business results, greater conversion rates, and happier customers. Segmenting clients according to their tastes, behavior, and demographics may be done using AI. By developing customized marketing strategies, this method seeks to increase the potency of sales and advertising. Improving total client happiness is the main objective. The goal of the AI-powered e-commerce shopping system is to provide a smooth, engaging, and customized experience that fosters consumer loyalty and enhances brand perception. The COVID-19 crisis has highlighted the need to put people's health and social isolation first. Now is the time to take advantage of this brand-new technology, which makes it possible for consumers to receive the goods they need quickly and easily, either by going to a local store or by having them delivered by self-cleaning drones. The result shows that the investment in AI shopping systems is 2000 million USD.

Keywords: Artificial Intelligence, Online shopping, E-Commerce, client-server and Marketing operations

INTRODUCTION

Some shoppers have turned to online stores because of the COVID-19 pandemic's effect on their ability to interact with others, while others have done so out of fear for their own health and the health of their families. With the development of AI technology, it seems to be extremely beneficial for e-commerce platforms to provide tailored suggestions, and customers also benefit from personalized content. The rising privacy concerns of customers, however, cloud this otherwise win-win scenario. Consumer privacy protection strategies that focus on technical solutions have received a lot of attention, but studies that examine the psychological and behavioral ramifications of these strategies are few [1]. In this research, we develop evolutionary game models of privacy protections between e-commerce platforms and customers to identify the processes via which different elements exert impact and use the resulting equilibrium points to derive evolutionary stable solutions. Once a strategy has been decided upon, it is simulated using MATLAB 2020. Conclusions are drawn that (1) consumers will reap fundamental benefits from the use of AI technologies in e-commerce, prompting them to actively share personal information with e-commerce platforms in exchange for rich rewards; (2) e-commerce platforms can increase their profitability by engaging in data mining by enhancing their use of AI technologies and minimizing technical cost; and (3) regulators must increase the levels of oversight over data mining practices [2].

In this work, we propose Virtual Reality (VR) Supermarkets, VR e-commerce platforms that would allow customers to have a truly realistic purchasing experience. The VR program, front-end interface, external database, and recommendations system are the four parts that make up the whole System. System front's end interface manages customer input in a fully immersive 3- 3-dimensional virtual store. The program uses both Structured Query Language (SQL) and No Structured Query Language (NoSQL) databases to keep track of stock levels, customer profiles, and financial transactions. Users are given a more tailored purchasing experience thanks to the

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suggestions of an integrated recommendation system [3]. The VR supermarket is a dynamic, adaptable, and user-oriented system since the suggestions are based on the user's past purchases. The study suggests a recommendation system based on Neural Collaborative Filtering (NCF), which is then supplemented with Convolutional Neural Networks (CNNs) and Attention layers. In the VR supermarket, customers may browse a wide selection of goods and easily make orders. With the ability to save huge amounts of grocery data and the possibility of scaling up to corporate levels, "Shop at home" takes on a whole new meaning with this application [4].

The uses of AI are revolutionizing the retail industry. The next big thing in brick-and-mortar retail is automated stores powered by artificial intelligence. In these shops, customers encounter only automated technology. For this reason, it's important to investigate why people say they plan to purchase at automated stores powered by AI. The purpose of this research is to identify the factors that influence customers' decisions to make purchases in automated retail stores powered by AI. By drawing on existing research, it adds AI-specific components like Perceived Enjoyment, Customization, and interaction to the technological readiness and adoption paradigm. One thousand two hundred fifty customers are surveyed to evaluate the suggested model, and the results are examined using the method for empirical validation [5]. The research found those customers' levels of optimism and inventiveness influenced how simple and helpful they found the experience. Automated shops driven by AI face a reduction in perceived value due to concerns about data security. Customers' intent to shop is significantly predicted by their perceptions of the store's ease of use, utility, pleasure, ability to tailor their experience, and involvement with the store's AI. This study has important management and intellectual consequences for the retail and technology industries [6].

It has become clearer, because of human progress and technological advancement, that every person has the capacity to play a crucial role in the transcendence of society and the community. To create the conditions for productivity and creativity, those with less material resources may need to have greater willpower and commitment than others. The purpose of this research is to investigate a strategy that will aid the elderly and the determined in engaging in one of the most fundamental individual activities: shopping [7]. The Problem statement is discussed below. The difficulties and problems that the system can address or resolve are outlined in the problem statement for an AI-powered online purchasing system. Although precise issue statements could change depending on the objectives and setting of a given e-commerce platform, Lower customer satisfaction may be the outcome of the current user experience (UX), which may be less than ideal due to challenges with navigation, product discovery, and a general lack of customization. Conventional recommendation systems could find it difficult to provide pertinent and accurate product suggestions, which would decrease client engagement and result in lost sales opportunities. Traditional marketing techniques could be imprecise, which makes it harder to target certain clientele. Marketing and campaign performance may suffer as a result. The advantages of real-time data analysis may not be completely realized if marketing insights are only obtained via manual analysis, which might cause delays in reacting to changes in the market. The effective deployment of AI-driven solutions may be hampered by internal opposition or a lack of knowledge about the advantages of adopting AI inside the company. The following are the contributions.

- The benefits and developments brought about by the integration of AI into different system components are the work contributions of an AI-powered online shopping system.
- Recommendation engines powered by AI provide more precise and tailored product suggestions, increasing the possibility that consumers will find and buy relevant products.
- AI provides a smooth and customized shopping experience by optimizing the user interface and overall user experience. A good user experience is enhanced by elements like dynamic content, customizable interfaces, and easy navigation.
- By providing real-time assistance, responding to inquiries, and assisting customers with the purchasing process, chatbots and virtual assistants driven by AI enhance customized consumer interaction and boost customer happiness.
- AI reduces excess inventory, minimizes stockouts, improves order fulfillment procedures, and provides accurate demand projections, all of which save costs and increase efficiency in inventory management.
- By using sophisticated algorithms and pattern recognition to identify and stop fraudulent activity, AI enhances security by protecting consumers and the e-commerce platform.

- AI makes it possible to use cutting-edge marketing techniques that boost consumer engagement, such as tailored promos, focused ads, and the incorporation of cutting-edge technology like voice commerce and augmented reality (AR).
- All things considered, using AI in an e-commerce platform improves consumer satisfaction by offering a customized, effective, and creative purchasing experience that builds brand loyalty and a favorable customer image.

Together, these efforts provide an E-commerce platform that is more customer-focused, intelligent, and adaptable and that uses AI technology to satisfy the changing needs of contemporary customers. The following section discusses the literature survey in section 2. After that, the proposed System discussed using AI for an e-commerce shopping system in section 3. Then, the result and discussion are discussed in section 4. Finally, the conclusion provides the overall performance of the e-commerce shopping system and future work.

LITERATURE SURVEY

The research is geared toward improving the process of purchasing goods directly from store shelves without having to wait in a checkout queue. To aid the elderly or those with mobility issues, the suggested System service robot is equipped with robotic arms and linear actuators as lifting mechanisms and is operated by a remote joystick. Barcode detections using transfer learning form the basis of the scanning system. Layers were included in the network architecture to facilitate feature extraction. Compared to employing the layers with DarkNet as feature extraction layers, this network has proved to be the most practical, with 86.4% accuracy and real-time operations at 27. The robot's self-checkout function has been made more secure by the addition of an anti-theft mechanism. Items in the cart are detected using a computer vision and Kalman filter, and their authenticity is verified using structural characteristics, color values, and weight from load sensors attached to the cart's base [8].

As a first step, the System learns what the consumer really wants by interacting with them. Then, using a multi-attribute decision-making approach, the system uses the expertise of experts with the customer's current wants and requirements to suggest the best possible items. Commodity ontology is used to sustain semantic dialog with vendors by providing a shared information structure and representation. The use of agent-based modeling to automate the purchasing and selling process in an e-commerce business is an exciting and worthwhile endeavor. The recommended workflow for facilitating automated price discussions in e-commerce is one of the minimal solutions offered in this research [9]. It's a platform where customers can delegate shopping errands to virtual assistants who will then report back with their findings. It demonstrates how these needs informed the creation of a working prototype of a multi-agent simulation of mall shoppers' actions. This prototype is convincing and practical for end-users, particularly mall managers since agents are given unique characteristics and skills. Demonstrate how a shopping behavior simulator may aid in the selection of a mall's floor plan.

The rapid development of Artificial Internet of Things (IoT) technology paves the door for the creation of digital twin-based remote interactive systems for cutting-edge robotics-enabled industrial automation and online purchasing. For enhanced interactivity and satisfaction, it is recommended that a multifunctional perception system be incorporated. A triboelectric nano-generator tactile (T-TENG) and lengths triboelectric nano-generator tactile (L-TENG) sensors and a poly (vinylidene fluoride) (PVDF) pyro-electric temperature sensors are given as part of smart soft robotics manipulators that may actualize such a system [10]. T-TENG and L-TENG sensor fusion, using Machine Learning (ML) for data processing, can automatically recognize grasped objects with an accuracy of 97.143% for 28 different object shapes; pyro-electric sensor data can be used to obtain temperature distribution. Overall, the suggested remote interactive system promises improved human-machine interfaces for the applications of the unmanned working area by providing more immersive experiences in human-machine interaction [11].

In this research, we propose an AIoT-based automated picking system for the creation of an e-commerce platform and related automated shipping services. Industry 4.0 and Society 5.0 focus heavily on speed and convenience. Integration of an e-commerce platform with AIoT systems and robots that track shoppers' preferences may improve online shopping's responsiveness and ease. As a result, the suggested System Is Designed to support customers who are influenced by AIoT and robotic manipulators, taking over picking duties formerly performed by humans. To demonstrate this, we built a system that uses a tweaked version of the YOLO (You Only Look Once) algorithm to identify and pinpoint customer purchases. Concurrently, the process of retrieving items from disorganized store shelves was carried out using a data-driven mode of improvement.

Experimental results show that the solution performs as expected in terms of efficiency, speed, and convenience in the context of Society 5.0 [12]. The rising use of AI chatbots for online shopper support raises the issue of whether they are superior to AI service robots and under what circumstances. This research investigates how the influence of the service agents on customer satisfaction differs depending on whether the emphasis is on the experience or functional aspects of the product. Five hundred and sixty-seven people took part in an experiment based on hypothetical scenarios. When it comes to the experience quality of a product, it outperforms AI chatbots, but when it comes to functional quality, the converse is true. Employ the three factors of client satisfaction—perceived information quality, perceived waiting time, and pleasant emotion—to clarify the varying functions of various service agent kinds. The results provide actionable insights for businesses to consider when deciding which sorts of service agents to employ for online shopper support [13].

Consumers may now evaluate the pros and cons of using AI products for themselves. While AI has greatly facilitated online buying by reducing unnecessary friction, it has also introduced unintended effects like biased algorithms. As a result of recent data exploitation scandals, customers are more wary than ever about providing any identifying information. Using the examples of contextual and hyper-personalized adverts, this book chapter introduces the current use of AI in the advertising scene. It explores important influences and inhibitors of the adoption of AI. In addition, this chapter uses the FATE (Fairness, Accountability, Transparency, explain ability) paradigm and the idea of perceived autonomy to provide recommendations for enhancing consumers' views of AI recommender systems. Finally, there are implications offered for developing long-term ecosystems for advertising AI [14]. Customers may now outsource shopping-related duties and choices to autonomous systems, demonstrating the growing sophistication of AI. However, barriers to its widespread use include concerns about users' privacy and security. In this research, look at what stands in the way of more widespread use of automated retail systems. The model is expanded to include a trust variable and a privacy concern moderator, yielding a new conceptual framework. The study used a quantitative methodology to gather data from 454 participants, which was then analyzed using covariance-based structural equations modeling. The research shows that people are more likely to trust autonomous shopping systems if they are prepared for favorable outcomes from their use. The favorable correlation between trust and performance expectations is tempered by privacy worries. Furthermore, privacy worries limit the beneficial effect of social impact on trust. Among the first to do so, this research modifies to account for consumers' worries about privacy and trust in autonomous shopping systems. These results shed light on a little-explored topic at the intersection of AI and consumer behavior [15].

PROPOSED SYSTEM

An online shopping system is described as part of the proposed System. Systems in the area may advertise their wares online by registering their information on a website. Customers often purchase a wide variety of oddball bundles. Then, using the customer's current wants and the machine's preexisting expert knowledge, it makes product recommendations based on the most often selected attributes. The commodities ontology approach is also used to help with the style and representation of shareable data to achieve meaningful communication with vendors. The program tallies up the user are input and scans for various items that satisfy his search criteria. Based on the user's prior needs, the System suggests products he is more likely to purchase. The gadget can process several users at once and provide reliable results. The framework for a login page and data interchange is included in this module. Hypertext Markup Language (HTML) is used for classic displays in-app, and php is used for the code. Details such as email IDs, customer names, mobile numbers, and secret keys shown on the data exchange page should be safely stored in a database. Figure 1 shows the system architecture of the proposed system.

System ID or username and password are stored on the login screen. When a user logs into an application, the program should check their input against the database and, if a match is found, allow them access; if not, an alert should sound, and a message should be shown. Only the administrator may add new products. There should only be one value in the product ID field. Product names, types, quantities, and other information are all included in a separate table. Administrators assign these values. The product may be created, edited, and removed by the administrator. The basic goal of product management is to provide value to customers by developing products that meet their needs. In most cases, a product is developed as a means of alleviating a problem identified via market research. The Sales and Distribution module of a good management system oversees seeing orders through from placement to fulfillment. Sales, shipping, and invoicing are all examples of "business processes." Avenues is where buyers can submit purchase requests. Acquiring orders are formal documents that detail the services and goods that a buyer has agreed to acquire from a seller. A buyer's solicitation should focus on meeting his immediate requirements. A formal request is made when a purchase order (PO) is created. The primary goal of a proposal

framework is to identify and recommend more products that will increase the likelihood of a customer making a purchase. When you go to an e-commerce website like Amazon, Flipkart will suggest a few items for you to buy. These tips are based on the item's audit results from previous customers. Suggestion framework refers to the framework or program used to identify these aids. Catering customers' preferences saves time for both parties and increases the company's marketability. Payment plan terminology refers to information that may be used to make installment payments, such as a Visa number or a customer's permission to charge their convention account. It is guaranteed that payment plan installments are acceptable to a customer.

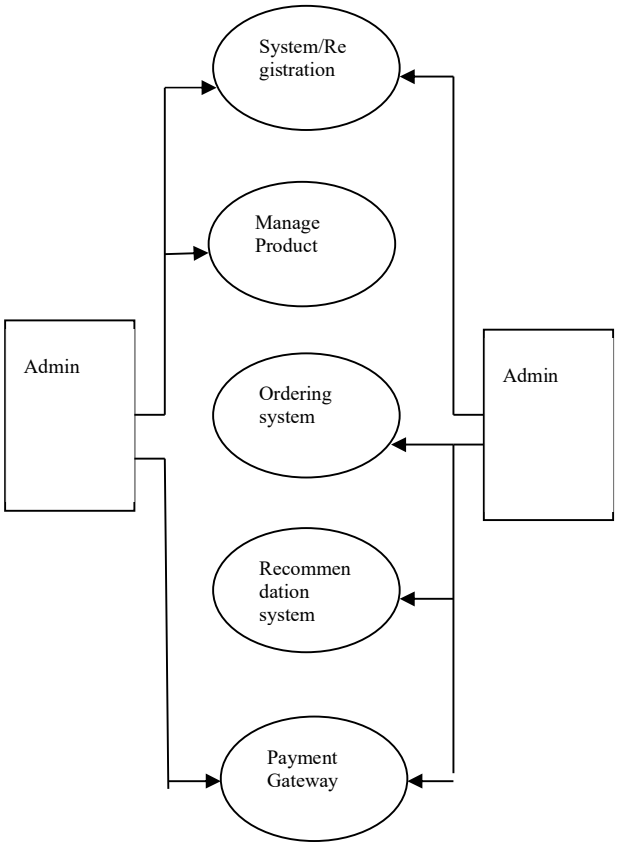

FIGURE 1. System architecture of the proposed System

RESULTS AND DISCUSSIONS

Improve consumer satisfaction, decrease operational expenses, and increase revenue with the help of this innovative AI shopping solution. The suggested method gives the client the option of either visiting a smart mall or receiving home delivery of the necessary goods. When a consumer launches an app or visits a website, that person must first register or log in. The next step is to choose a retailer, compile a shopping list, and determine how you'd want to make a purchase (in-store pickup vs. home delivery). If a customer selects home delivery, their order details are sent to the shop manager so they may fulfill the request. Staff will complete the necessary packing and delivery to the provided location once the things are available. If it's a relatively close distance, the self-cleaning logistic drone will make the delivery. To use the self-pickup service, customers must first visit the business or shopping center and associate their accounts with smart trolleys. Once the consumer has found the correct aisle, row, and product, the trolley will automatically lock when they have finished shopping. After finishing their purchase, consumers are required to make a payment using an online payment gateway in exchange for further discounts and benefits. The procedure will conclude when a gate pass is created, and the package is delivered by a kart. A shopping cart, a node microcontroller (MCU), an Arduino, an RFrequency Identification

(RFID) reader (for scanning barcodes and RFID tags), bar scanner motor drivers, and a battery will all figure into the System. System rent test scenarios and test goods are put through the experimental setup. The method allows the buyer to choose between two shopping options (home delivery and self-pickup). The user is led through the decision-making process to the desired end by the System. The system makes shopping much more convenient for consumers, who may skip standing in line or do their shopping from the convenience of their own homes. Staff manages the whole store and ensures the safety of all transactions and consumer data. If they use a payment method, customers may take advantage of exclusive discounts and cash-back incentives.

Because it is server-based, this solution eliminates the need for human labor and the associated issues. The method is simple and inexpensive to adopt on a wide scale, making smart malls and smart retail solutions more viable options in emerging markets like India. Customers' happiness is the key to Shopping Solution's success. Customers are interested in the brand-new technology and its easy operation. The following are some of the benefits of shopping solutions that set us apart from presently available shopping websites: - The concept of a smart shopping mall is introduced in this project, which has not yet been initiated in India. The most shining aspect of Shopping Solution is a new addition that will help individuals in their hour of greatest need, maybe saving their lives. In the event of a medical emergency, a new feature is about to be released. Even in an outlying place, get a drone or a delivery crew to a client within 20 minutes with an order for first aid supplies or supplementary medications. Young people with skills in software development, hardware design, or project management will find excellent job opportunities because of this initiative. Increasing income streams that support the underlying supply chain? This AI Shopping Solution makes use of simple, automated technology to make shopping a breeze. Figure 2 and Figure 3 show the Total investment every year in AI-related shops and the number of AI-related Bills, respectively.

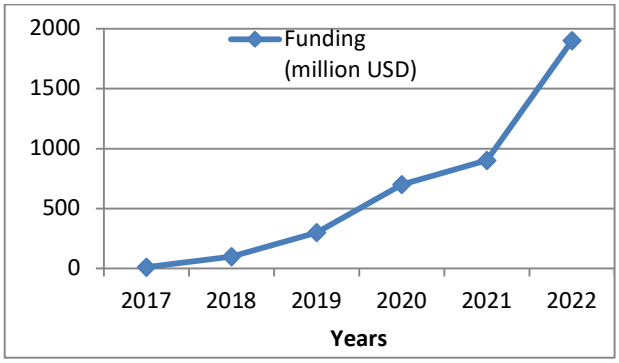

FIGURE 2. Total investment of every year in AI-related shops

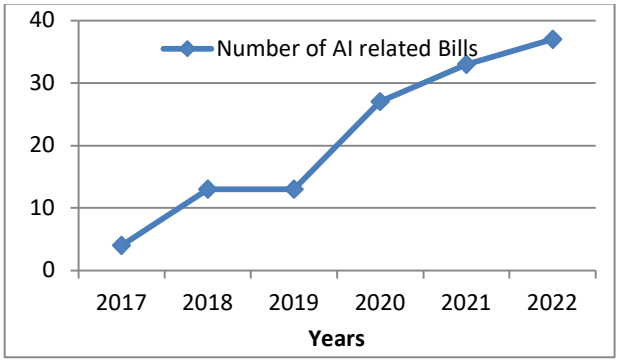

FIGURE 3. Number of AI-related bills

From what I've seen, it's clear that online shopping has established itself as a vital sector of the modern economy. The Internet is and will continue to be an integral part of our lives. Therefore, to remain competitive

with the bigger websites, it is essential for small firms to create their own. Now that web developers have reduced the costs of their services, even tiny companies can afford to market their wares on the Internet. Despite certain drawbacks, small companies have adapted to the changing demands of online shoppers. To make up for the fact that online shoppers don't have access to the counsel and direction of store employees, for instance, many businesses now provide telephone and web-based customer support. It's also worth noting that not every small business should expect to reap the same benefits from e-commerce. The amount of money a company makes from online sales is proportional to the quality of the service it provides. Small businesses selling clothing, for instance, could not gain as much as those selling home goods or specialized literature since most customers like to try on garments before making a purchase. However, even the smallest of businesses may gain from e-commerce. Since e-commerce is rapidly expanding, its impact on small enterprises has far-reaching consequences for the economy as a whole and, therefore, for all of us. Because of this, all must understand this topic.

CONCLUSIONS

AI-powered e-commerce shopping system implementation may have a variety of effects on the platform's functionality, user experience, and financial returns. Personalized marketing, dynamic price optimization, and AI-driven product suggestions all help to boost revenue and sales. The platform performs better when it comes to upselling, cross-selling, and profiting from client preferences. Chatbots with AI capabilities, virtual assistants, and tailored content all help to increase user engagement. Client engagement with the platform is higher, resulting in longer sessions and higher conversion rates. Increased consumer happiness is a result of the tailored purchasing experience, effective customer service provided by AI-powered chatbots, and intuitive navigation. There is a higher probability of favorable user encounters with the platform. Personalized promotions and the use of cutting-edge technology are two examples of creative marketing tactics that may be used to create a more memorable and engaging consumer experience, which, in turn, increases sales. Use AI to learn user preferences in real time and provide hyper-personalized experiences, content, and product suggestions. Incorporate increasingly sophisticated customization approaches.

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