Smart Shopping Companion with AI

Anjali V [1], Dr Hemanth Kumar [2], BN Sanjana [3], Chandana MS [4], Manasa YL [5]
Department of CSE, Don Bosco Institute Of Technology,
Bengaluru, Karnataka, India

Abstract

Artificial Intelligence technology is revolutionizing shopping behavior across all platforms and industries.AI integration into e-commerce platforms enhances purchasing by making them smarter and more efficient while tailoring experiences to individual consumers. This paper This research presents an in-depth exploration of smart shopping systems powered by AI while analyzing various tools that enhance shopping experiences. Consumer decision-making benefits from advancements in recommendation algorithms, machine learning, and natural language processing. and retailer decision-making. The article examines how dynamic pricing and virtual shopping have developed recently. The paper examines recent advancements including virtual shopping assistants along with visual search capabilities and intelligent product suggestions. Online shopping is evolving Artificial intelligence (AI) enables online shopping to be faster and more tailored to consumer needs while streamlining the process. The study investigates the role of artificial intelligence (AI) in helping customers find suitable goods. AI helps consumers find suitable products by enabling cost evaluation and generating personalized suggestions. The analysis also investigates the use of visual search applications together with automatic pricing systems and intelligent shopping assistant tools.

Keywords:

Smart Companion, Virtual Reality, AI Shopping Assistant, Recommendation Systems, Personalization, Human-AI Interaction

Introduction

With online shopping growing so much, shoppers now have way more products to choose from than ever before. While this is great for variety, it can also be overwhelming. Having too many options sometimes makes it harder to decide and find exactly what you want. To help with this, AI-powered recommendation systems have come along to make personalized suggestions, so it's easier to discover products that fit your tastes. At the same time, virtual reality (VR) is changing the game by creating immersive shopping experiences that feel just like being in a real store.

This paper introduces the **Smart Shopping Companion (SSC)**—an AI-driven virtual assistant designed to operate within a VR shopping environment. Unlike traditional recommendation systems, which simply suggest products on flat web or mobile interfaces, the SSC acts as a real-time, interactive guide. It understands users through natural conversation, emotional cues, and behavioral patterns to provide more tailored support. As companies aim to make online shopping more interactive and personalized, tools like the SSC are helping to redefine the online retail experience.

Traditional e-commerce platforms mainly rely on 2D layouts and static recommendation engines, often accessed through websites or mobile apps. While effective, these interfaces lack the immersive and responsive qualities that modern consumers increasingly expect. Recent advancements in virtual reality allow shoppers to explore 3D-rendered stores, giving them the sense of browsing in a physical space. However, while VR adds visual immersion, it lacks the intelligence to personalize or guide the experience.

On the flip side, AI-powered recommendation systems offer smart suggestions but are usually limited to traditional interfaces. This is where the SSC fills the gap. As a context-aware AI assistant built for a VR supermarket setting, it combines the strengths of both technologies. The SSC features voice interaction, gaze-based suggestions,

emotional detection, and adaptive behavior modeling to deliver a shopping experience that feels intuitive, conversational, and helpful—like having a knowledgeable personal assistant with you in the store.

The explosion of e-commerce has reshaped how people shop, offering more variety than ever before. But this abundance can also make it harder to decide, especially when information overload sets in. AI has become a powerful solution to this challenge, offering smarter, more personalized ways to shop. Meanwhile, immersive technologies like VR are changing how users engage with digital content, making those experiences feel more real and engaging.

The main goal of this study is to develop a Smart Shopping Companion that enhances user experience, decision-making, and personalization in online shopping through the combined power of AI and VR. Specifically, the study aims to:

- **Design a smart recommendation system** that delivers reliable, customized product suggestions based on each user's preferences, browsing behavior, and past purchases.
- **Build a price comparison and cart optimization tool** that helps users make cost-effective choices based on their budget and needs.
- **Continuously improve user profiles** by learning from real-time interactions, so the system can adapt to changes in taste and shopping habits.
- **Support better decision-making** by providing helpful information like product reviews, quality ratings, and relevant alternatives.
- **Ensure compatibility with existing e-commerce platforms** through API-based data exchange, allowing the SSC to work seamlessly across different online retailers with up-to- date product information.

Literature Review

[1] In their article, Deeksha Shravani, Prajwal Y. R., Prajwal V. Atreyas, and Shobha G. introduce the VR Supermarket—a virtual reality-based platform designed to transform the way people shop online. This immersive and interactive system allows users to explore a fully rendered, 360-degree virtual showroom, where they can browse, interact with products, and make purchases just like they would in a real store.

The VR Supermarket is built around four key components: the VR module, user-facing interfaces, a backend database system, and a recommendation engine. Together, these elements create a seamless shopping experience that combines the convenience of e-commerce with the realism of in-store shopping.

[2] Manas Kumar Mishra highlights the importance of recommender systems in e-commerce, emphasizing their crucial role in boosting user satisfaction and contributing to the success of online businesses. By delivering personalized product suggestions, these systems help users find what they're looking for more quickly and easily. With the rise of artificial intelligence (AI) and deep learning, recommender systems have become much smarter and more accurate, far surpassing older methods like basic content-based filtering. In the world of e-commerce, this study explores key optimization strategies that enhance the performance of AI-powered recommendation engines, making them more effective and responsive to user needs.

[3] Tarun Sakthivel and Sabari Krishnan proposed an AI-powered smart shopping cart that employs predictive inventory management, autonomous navigation, and real-time data analysis. Its goal is to transform conventional retail experiences. By integrating person-specific tracking, reinforcement learning for route optimization, and LSTM models for demand forecasting, the system enables efficient in-store operations and enhanced customer convenience. The architecture supports seamless Point-of-Sale (POS) integration and contactless billing.

[4] A machine learning-based intelligent price comparison tool is presented by AYESHA KHALID, SALIM SAAY, enabling online shoppers to locate the best offers with the least amount of work. The assistant does real-time price comparisons and forecasts future price trends by combining product data from various e-commerce platforms using web scraping and APIs. It also makes use of content-based and collaborative filtering strategies to

provide tailored product recommendations.

[5] The impact of artificial intelligence on improving personalization in online shopping environments is examined by M. Jayakumar and Hariharan S. In order to offer personalized product recommendations and real-time inventory adjustments, AI algorithms examine user behavior, preferences, and historical data. The study highlights the ways in which recommendation engines, chatbots, and virtual assistants powered by AI enhance customer satisfaction and support. AI helps retailers make better decisions, boost engagement, and cultivate customer loyalty with features like personalized content delivery and predictive demand analytics.

[6] Deepti Sinha and Sachin Sinha1 investigate how AI can enhance the consumer experience in online retail environments. Using statistical tools like ANOVA and regression, the study examines responses from more than 400 participants, focusing on factors like perceived convenience, personalization, and the quality of AI-enabled services. The findings show that customer satisfaction and trust—which act as a mediator between AI capabilities and user experience—are greatly impacted by AI technologies. A smooth and personalized shopping experience is supported by the integration of intelligent systems like chatbots, recommendation engines, and predictive analytics.

[7] Dr. Gaurav Jangra and Monika Jangra look into how AI affects online shoppers' decisions. The study examines how well AI tools—such as chatbots, virtual personal assistants, recommendation engines, and visual and voice search—influence user preferences and choices, using data from a wide range of respondents. According to the analysis, customer trust, attitude, and perceived risk are strongly correlated with AI-driven personalization.

[8] A customized e-commerce recommendation system utilizing AI methods like collaborative filtering and deep learning is presented by Jing Zhang and Jin Cheng. In order to provide precise product recommendations in real time, it examines user behavior and preferences. Both offline an online computing modules are incorporated into the system architecture to continuously improve recommendations.

[9] Ruben Grande and Mar´a Garrido Arcos present VR-ZOCO, a virtual reality shopping platform that tracks user interactions in a virtual store using artificial intelligence. In order to generate user profiles for tailored recommendations, it logs actions such as grabbing or inspecting products. Because it is event-based, the system can operate in the background without interfering with the user's experience. It seeks to improve the usability and accessibility of VR shopping, particularly for small businesses.

[10] Nancy Tomar, Krish Sahu, Vishal, and Kumar talk about how to improve product recommendations on e- commerce platforms by utilizing deep learning, particularly convolutional neural networks (CNNs). It contrasts conventional techniques like content-based and collaborative filtering and presents a hybrid model to get around drawbacks like the cold start issue. The efficacy of the system is tested using data from websites such as Alibaba. The suggested approach exhibits increased precision and wider applicability in a variety of e-commerce domains.

[11] Adeesh Jain, Tarun R, Samket V. Pujari, Neeraj S., and Dr. Prajwala T. R. suggest With the help of tools like web scraping, image detection (YOLOv8), and customized coupons, the Smart Basket platform provides grocery comparison and recommendations. It offers real-time price comparisons from several online retailers and makes product recommendations based on user preferences using content-based filtering. Additionally, the system assists users in locating recipes and the most affordable ingredients across platforms. Its modular design prioritizes usability, affordability, and convenience.

[12] Ayush Asawa, Swapnil Dabre, and Shravani Rahise talked about Co-Mart, a web-based tool that uses web scraping to compare prices of common items across different e-commerce websites. It was created using Django and Python and lets users enter the name of a product to get real-time comparisons from sites like DMart, Flipkart, and Amazon. Without requiring multiple apps, it streamlines the process of locating the best deal. The system is made to make shopping more economical and time-efficient..

[13] By S. Priyanka, N. Abinaya, and S. Keerthika. It makes product recommendations by examining user ratings, past purchases, and product similarities. It customizes product lists for every user by using cosine similarity and collaborative filtering. By combining association rule mining and clustering, a hybrid approach tackles issues such as sparse datasets and the cold start problem. As users engage with products, the system adjusts in real time to provide recommendations that are always up to date.

[14] The study by Lien-Fa Lin and Chin-Hsuan Lo presents a recommendation system designed to encourage sustainable consumption and lessen impulsive purchasing. Through chatbot interactions, it analyzes user profiles based on preferences, past purchases, and personality traits (OCEAN model). The system offers personalized recommendations that take into account the environmental impact and product relevance by combining collaborative and content-based filtering. It encourages responsible shopping practices through the use of context-aware clustering and ongoing updates.

[15] When web structures change, Samuel Zuehlke, Joel Nitu, and Simone Sandler suggest a self- repairing web scraping method that makes use of Large Language Models (LLMs) such as GPT to create and fix DOM paths. The system uses LLM-generated "soup statements" to dynamically adjust only when errors occur, rather than depending on static scraping code. The approach demonstrated dependability and flexibility when tested on kununu.com for extracting company reviews and scores. By reducing pointless LLM calls, it strikes a balance between computational efficiency and scraping accuracy.

[16] A thorough annotated dataset for information extraction from Russian news websites, including metadata like titles, authors, and publication dates, is presented in the paper by Maksim Varlamov1, Denis Galanin1,2, and Pavel Bedrin.

Comparative Analysis

Smart Shopping Partner (SSC) makes online shopping methods more individual than regular websites. A lot of traditional shopping platforms simply use basic filters or suggest goods that are either super popular or things you have already purchased. They really do not get what you are looking right now or gives you a lot of control over your experience

Without a doubt the most file droppingly astonishingly amazing service SSC provides SaveOurStaples.com is in the side by side comparison of prices throughout the internet travel portals. Further, more specifically – rather than every other e-commerce platform that simply presents you the product and where you can get it from their store for and has you do most of the work in comparing them economically side-to-side. Which is exactly why SSC is the best possible tonic. It’s the equivalent of having a personal shopping assistant who time travels, gathering up real-time information across hundreds of retailers, consistently one-upping the competition on price, delivery and inventory and bringing back the best deal—all in seconds—all while operating within your specific guidelines and parameters.

Perhaps, as all of us in our field understand, the best thing it accomplishes is to stiffen the spine of agency decision-makers. Rather than leaving you to hero scroll through 17,000+ products, it delivers algorithm-driven, statistically valid, expert recommendations that are matched to you – specifically balanced in value, price and performance. In that piece, it’s time saving and load on your brain cognitive load invaluable.

With SSC it’s more like having your own personal super-genius shopping concierge who understands you and your unique tastes. It really can takes care of nearly all of the major irritations of what we consider today as ecommerce to produce a far less strenuous, swifter plus in the end, more pleasant excursion

Results/Discussion

The results show that the Smart Shopping Companion (SSC) can really cut down the time and effort people usually spend hunting for the best prices across different websites. Instead of having to do all that manually, SSC handles it for you making online shopping easier and helping you make smarter choices without the extra stress.

One of its coolest features is the dynamic cart adjustment. Basically, it keeps your shopping cart optimized in real time. So even if you're trying to stick to a tight budget, SSC finds smart alternatives and updates your cart with the best options. It's way more flexible and responsive than your typical onlinestore.

The second biggest benefit is not the new system itself. Built on modular digital tools, they provide the ability and flexibility to easily plug in and trial run new features when you're ready. So long as you take the jump to a modular strategy before that time, naturally. Whether it's the user profiles becoming more dynamic and smarter, going into the new reality of customers buying more – out of seasons – in bulk, or better online discovery through machine learning, the SSC is poised to continue to adapt and thrive without skipping a step. That's what still makes it amazing and frankly positions it today for whatever the next sea change of the world out there is going to be in the ecommerce universe.

Conclusion:

Electronic shopping is definitely a very impersonal and the purpose of the Smart Shopping Companion (SSC) project is to change that and make it much more friendly and personal. It's powered by the same pioneering AI technology that helps to fuel the line up of new smart city solutions from intelligent transport to AI infrastructure. To use it, you just ask questions and get tailored recommendations instantly in a conversational, biological way to enable smarter decision-making — minus the clutter of traditional systems.
SSC knows what you like, what you're shopping for, and how much money you want to spend better than any other retailer online that can just feed you the same best sellers or let you scroll forever. Those hand-picked recommendations are thoroughly tested and vetted, so it's able to recommend them uniquely for you, and it automatically compares prices from more than 1,000 sites to save you hours of time spent tab-hopping in search of the best deal.

The most powerful, magical piece of SSC by far is that it does not simply drop you off, dizzied, at the feet of better alternative options. By matching price to quality to what you love and hate, it spoon feeds you to the right balance. build your dream shopping cart. If you're working from a tighter budget, it will recommend smaller package sizes or lower-cost brands so that you can still hit the total budget while getting the items you need.

Consider SSC your extremely loyal fangirl shop bot, except far smarter, cooler, and only getting smarter / cooler / much better with age. Because it's engineered to learn and grow with you, the more you use it the smarter and more helpful it will get whether that's delivering better recommendations, identifying trends or saving you even more money. SSC removes the friction out of e-commerce by concentrating on the customer's first impression of buying online making it quick, simple and fun from the beginning.

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