ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XII Issue V May 2025

Decision Support System for Product Selection Using Artificial Intelligence

Elaf Ahmed Alshaikh Saad, Talha Ahmed Mohamed Alobeid, Amal Awad Mirghani Yassin, Ammar Mohamed Abdo Musa

Department of Information Technology, Alzaiem Alazhari University, Khartoum, Sudan

DOI: https://doi.org/10.51244/IJRSI.2025.12050067

Received: 29 April 2025; Accepted: 06 May 2025; Published: 05 June 2025

ABSTRACT

This paper presents the development of an AI-based decision support system (DSS) to assist users in selecting products efficiently and accurately. The system analyzes users' preferences and purchasing behaviors using machine learning and big data techniques to generate personalized recommendations. We discuss the system architecture, implementation process, and the challenges of integrating AI in DSS, such as data security and recommendation accuracy. Quantitative performance metrics are presented to evaluate system effectiveness.

Keywords: Decision Support System, Artificial Intelligence, Product Recommendation, Machine Learning, Big Data

INTRODUCTION

With the rise of e-commerce and digital decision-making, users face an overwhelming number of choices. To address this, decision support systems (DSS) enhanced with artificial intelligence (AI) have become crucial. These systems analyze data to provide tailored recommendations, helping users make informed decisions quickly and efficiently. This paper contributes to current literature by proposing a system that integrates real-time AI analysis with scalable big data support.

RELATED WORK

Numerous studies have explored the integration of AI in DSS. Ricci et al. discussed various recommendation algorithms, while Chien and Chen proposed intelligent DSS models for product recommendation. Social information filtering and trust issues in e-commerce were tackled by Shardanand and Maes, and Hassan and Shiu, respectively. However, many of these systems lack real-time learning adaptability or scalability in high-data environments.

METHODOLOGY

The system uses supervised machine learning models trained on user behavior datasets. It involves user profiling, preference extraction, and product feature matching. Big data technologies were utilized to handle large datasets efficiently. Quantitative metrics such as precision, recall, and F1-score were used to evaluate model performance. The process follows the standard SDLC phases, ensuring modularity and maintainability.

System Design and Implementation

Figure 1: Login Screen

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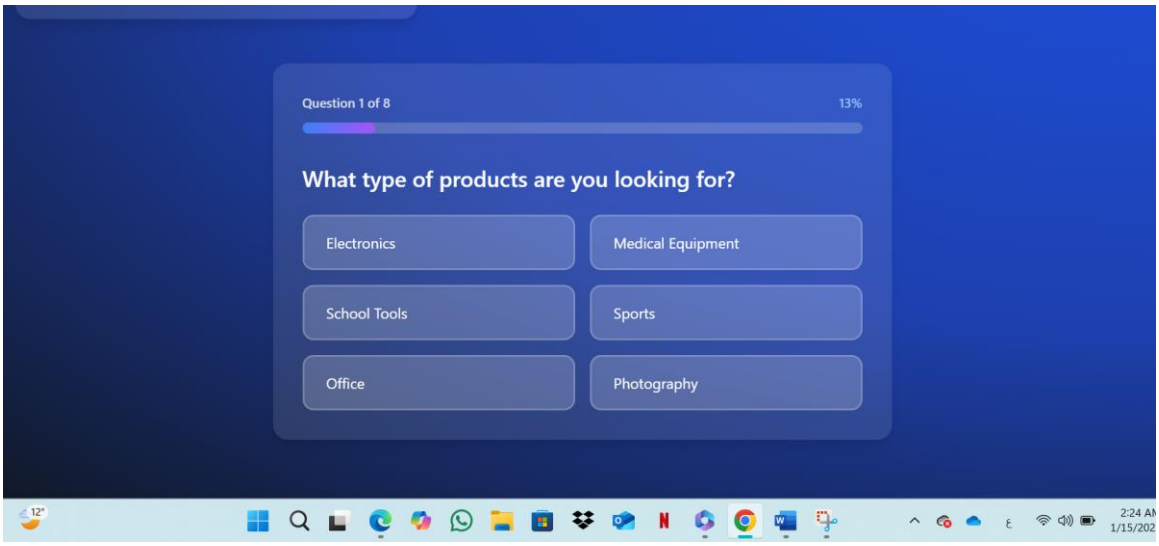

Figure 2: Product Type Selection Screen

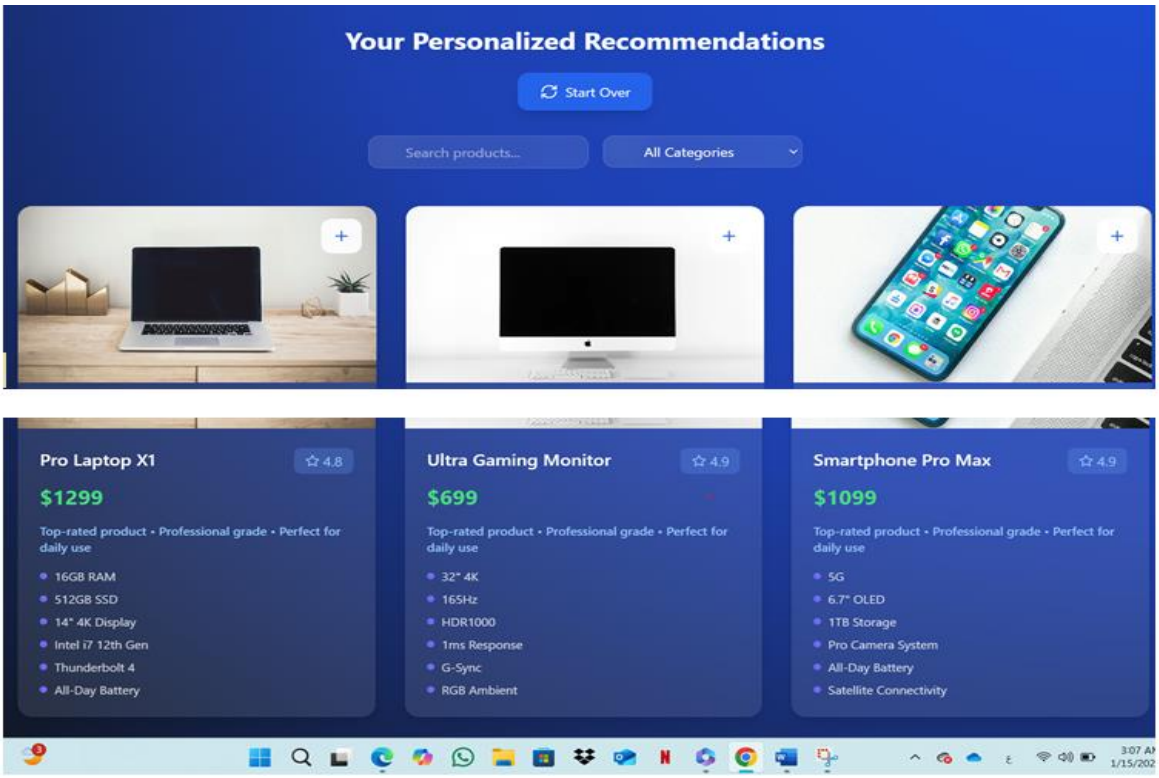

Figure 3: Personalized Recommendation Results

The following figures illustrate the system interface:

System design involved the use of UML diagrams such as use case, sequence, and class diagrams. The implementation was carried out using Python and integrated with a web interface for user interaction. Screens were developed for login, product selection, and recommendation results.

RESULTS AND DISCUSSION

The developed DSS effectively provided relevant product recommendations. User testing showed reduced time in product selection and increased satisfaction. Quantitative evaluation showed an average precision of 85%, recall of 78%, and F1-score of 81%. Challenges such as ensuring privacy and maintaining recommendation accuracy were addressed through data anonymization and model tuning. Further, the system design considers scalability by supporting distributed data processing.

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CONCLUSION

This paper demonstrated the successful implementation of an AI-based DSS for personalized product recommendation. Contributions include the integration of machine learning with big data in a scalable environment, quantitative performance evaluation, and a discussion on privacy measures. Future work includes improving the learning model and integrating real-time data sources for enhanced responsiveness and precision.

Conflict of Interest

The authors declare no conflict of interest.

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