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(57) Abstract :
ABSTRACT [0012] In today's data-driven retail environment, the ability to understand customer purchasing behavior and provide timely, relevant product recommendations is essential. Traditional recommendation systems, while effective in limited scenarios, often fail to capture the complexity of consumer behavior especially in grocery shopping where item relationships are both frequent and diverse. To address these limitations, this project proposes a Hybrid Grocery Recommendation System that combines the strengths of two powerful methodologies: Apriori Association Rule Mining and a deep learning-based Adaptive Attention Network (IIAAN). The system is designed to process historical market basket data and generate intelligent, context-aware recommendations for users. The Apriori component mines frequent itemsets and generates interpretable association rules based on item co-occurrence, offering transparency and explainability. Meanwhile, the Inter-Basket and Intra-Basket Adaptive Attention Network models both short-term and long-term user preferences using LSTM for temporal behavior and dual adaptive attention mechanisms for learning which items and sessions matter most. This fusion ensures that the model not only recommends items that are commonly purchased together but also aligns with individual user patterns over time. A hybrid recommendation engine is implemented to combine the outputs from both models using a weighted fusion strategy. [0013] This enhances accuracy, diversity, and relevance of the recommended items. The system is deployed with a user-friendly Streamlit interface, enabling real-time interaction, basket entry, and explanation of results. Users can receive recommendations and also see the underlying logic (rules or neural attention) that supports those suggestions. Experimental evaluations demonstrate that the hybrid model outperforms standalone Apriori and deep learning models in terms of F1-score, and NDCG, confirming its effectiveness. The approach offers a balanced solution that brings together the interpretability of rule-based systems and the adaptability of neural networks, making it suitable for real-world implementation in modern grocery recommendation systems.

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