Point of Sale System with AI

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Abstract

The increasing adoption of Point of Sale (POS) systems in Small and Medium-sized Enterprises (SMEs) has underscored the need for advanced functionalities such as real-time inventory management and customizable role-based access. Traditional POS systems often lack the flexibility to meet diverse SME operational requirements, limiting efficiency and personalized user control. This project addresses these limitations by integrating real-time inventory tracking and adaptive role-based access control to enhance operational efficiency and system usability.

The system follows a structured development approach, incorporating a literature review, requirement gathering through interviews and surveys, and a microservices-based architecture. The back-end is built with Spring Boot, while the front-end leverages React for an interactive user experience. Additionally, machine learning models, including Decision Trees and Random Forest, enable predictive sales forecasting and dynamic inventory optimization, allowing SMEs to anticipate demand and minimize stock discrepancies.

Keywords: Point of Sale (POS) System, Real-Time Inventory Management, Role-Based Access Control, Small and Medium-Sized Enterprises (SMEs), Machine Learning.

Subject Descriptors

- Software Engineering – System Development, Agile Methodologies, Microservices Architecture
- Information Systems – Point of Sale (POS), Inventory Management, Transaction Processing
- Machine Learning – Predictive Analytics, Sales Forecasting, Decision Trees, Random Forest
- Database Management – MySQL, Data Normalization, Query Optimization
- Cybersecurity – Role-Based Access Control (RBAC), JWT Authentication, Secure API
- Human-Computer Interaction – User Experience (UX), Material-UI, Frontend Design