

DEVELOPMENT OF AN ERP SYSTEM WITH A MACHINE LEARNING MODULE FOR TEMPLATE CREATION AND PROJECT MANAGEMENT INTEGRATION

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Enterprise Resource Planning (ERP) systems are comprehensive platforms designed to integrate and manage core business processes, such as finance, inventory, sales, procurement, and human resources. Modern ERP systems are increasingly embracing emerging technologies, including artificial intelligence and machine learning (ML), to enhance automation, decision-making, and adaptability in dynamic business environments.

This research presents the development of an ERP system that integrates a dedicated machine learning module for template generation and incorporates project management functionalities. The proposed system operates on a microservices architecture and utilizes a multi-tenant database approach, where each company has its own isolated database instance. The system ensures security and access control through a centralized authentication and authorization service.

The core concept is to identify transaction patterns using historical data and suggest pre-filled templates for future operations. After each save request is committed, the system asynchronously sends key information – such as transaction type, items, quantities, warehouse, partner, responsible employee, and payment method – to an external Python-based ML service.

This ML service applies preprocessing steps like normalization, encoding categorical data, removing noise. Then it performs clustering using the Density-Based Spatial Clustering of Applications with Noise algorithm. DBSCAN is chosen due to its ability to find arbitrarily shaped clusters and handle outliers, which are common in real-world data.

Each cluster represents a group of requested domain objects with similar characteristics. From these clusters, the system generates up to 5–10 templates that capture the most frequent combinations of parameters. These templates are stored temporarily and recommended to users on the frontend interface, allowing them to accept, modify, or discard suggestions.

The system aims to reduce time spent on data entry, minimize human error, and promote standardization in business operations. The ML model is retrained periodically as new data becomes available, improving its adaptability over time.