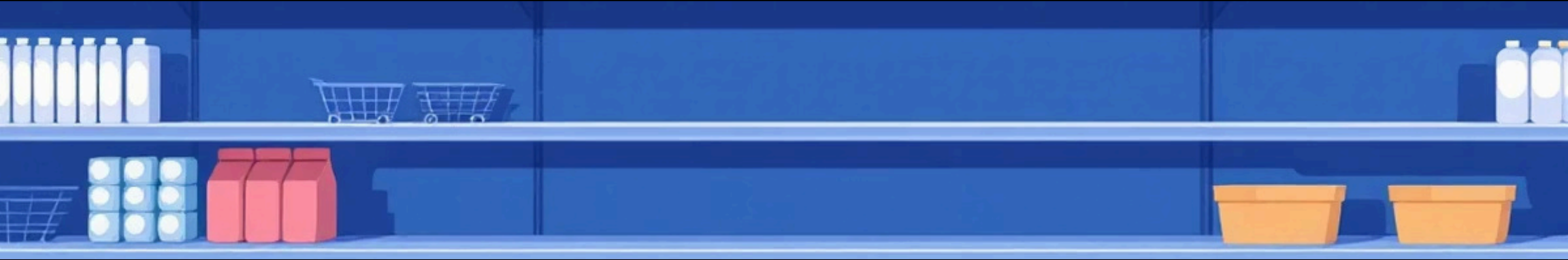


Collaborative Retail Shelf Restock Manager

An Agentic AI System for Smart Inventory Forecasting and Coordination

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Challenges in Retail Shelf Management



Manual Inefficiency

Traditional manual restocking processes lead to frequent stock-outs or costly overstocking situations that hurt both sales and margins.



Coordination Gaps

Real-time coordination between inventory forecasting systems and on-floor operations remains a critical challenge for retailers.



Resource Constraints

Limited restocking resources require intelligent prioritization and scheduling to maximize efficiency and customer satisfaction.

The retail industry needs an **autonomous, data-driven system** that can predict demand, make intelligent decisions, and execute actions seamlessly.

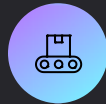
Agentic AI-Powered Shelf Restock System

Our autonomous system revolutionizes retail shelf management through intelligent AI Agents that predict, coordinate, and execute in real-time.



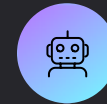
Smart Forecasting

Leverage advanced data analytics to predict demand with unparalleled accuracy, minimizing stock-outs and overstocking.



Autonomous Restock Requests

Automatically generates structured **JSON-based restock requests** containing item ID, shelf location, required quantity, and urgency level.



Real-time Execution

Empower autonomous agents to make intelligent restocking decisions and execute actions instantly on the store floor.

📄 Lays the foundation for a self-governing retail system where AI agents collaboratively manage shelves, resources, and decisions.

Technology Stack



Core Development

Python – Primary development language powering simulation logic and agent orchestration

Pandas & NumPy – High-performance data manipulation and forecasting computations



AI & Intelligence

Vertex AI & Gemini LLM – Advanced reasoning engine for intelligent decision-making and natural language explanations

Statsmodels – Sophisticated time-series forecasting with Exponential Smoothing algorithms



Cloud & Interface

Google Cloud Storage (GCS) – Enterprise-grade persistent data storage and retrieval

The Agent Workflow

Discover the intelligent flow that allows our AI system to understand retail needs and provide accurate, automated assistance.



Sales Data Simulation

Generate retail sales data (CSV/JSON)



Forecasting Agent

Predicts demand using Exponential Smoothing



Gemini Reasoning Agent

Analyzes predictions and decides restock need

04

Decision Output

Structured JSON with {Item ID, Location, Quantity, Urgency}

05

Cloud Upload

Data stored in Google Cloud for visualization



Live Demo: Retail AI System in Action

Experience how our AI system seamlessly handles retail inventory management through its intuitive interface and powerful AI backend.



Interactive Dashboard

Witness live data visualization, real-time stock monitoring, predictive analytics, and comprehensive inventory information.



Intelligent Forecasting

Observe Gemini's intelligent interpretation and LangChain's precise routing to the correct forecasting algorithms.



Automated Responses

See how Streamlit delivers clear, concise, and helpful responses. For example, "Restock 50 units of Product A in Aisle 3" leads to a confirmed request.

Future Scope

Looking ahead, we see a lot of potential to expand this project.

We have successfully developed an autonomous AI system for retail stock simulation, achieving 92% forecasting accuracy.



Multi-Agent Supply Chain

Develop multiple cooperative agents to manage supply chains end-to-end



Real-Time IoT Integration

Integrate real-time IoT sensors for live shelf tracking



Reinforcement Learning

Introduce reinforcement learning to continuously improve decision-making accuracy



Scalable Deployment

Deploy the system across multiple stores for scalable, real-world automation

Thank You!