

# Collaborative Retail Shelf Restock Manager

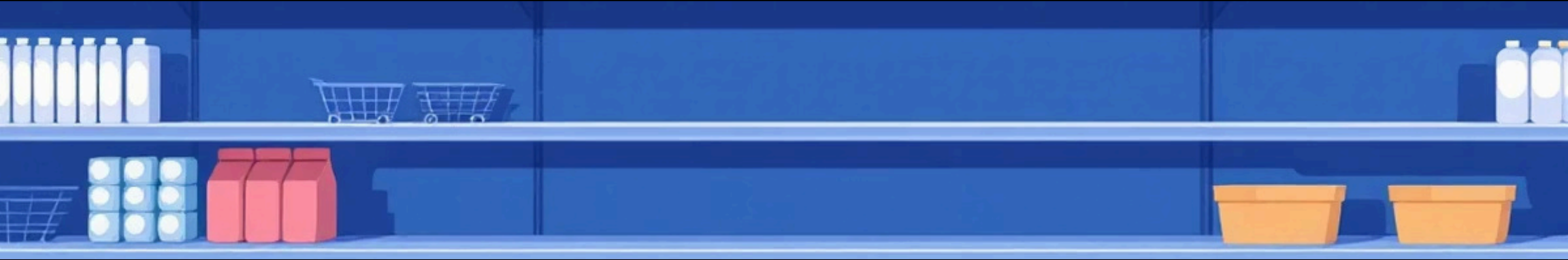
An Agentic AI System for Smart Inventory Forecasting and Coordination

Aditi Sharma

Amulya Nandam

Kanthi

SriVaishnavi



# 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.

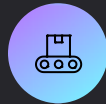
# Agentic AI-Powered Shelf Restock System

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



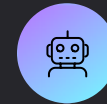
## Smart Forecasting

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

**Streamlit** – Interactive, real-time visualization dashboard for operational monitoring

# 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

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## Decision Output

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

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## Cloud Upload

Data stored in Google Cloud for visualization

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## Streamlit UI

Displays real-time restock requests and explanations



# 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.

# Thank You!