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SMART INVENTORY MANAGEMENT SYSTEM

INDUSTRY ORIENTED MINI PROJECT - (CS755PC)

by:

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ABSTRACT

The **Smart Inventory Management System for Small Businesses** is a project focused on developing an efficient and user-friendly inventory management solution. This system aims to assist small businesses in optimizing their stock levels through smart notifications and analytics. Key features include product catalogue management, stock level tracking with alerts for low inventory, sales and purchase tracking, and an analytics dashboard for identifying inventory trends. The project utilizes modern web technologies such as Flask or Django for the backend, Vue.js or React for the frontend, and PostgreSQL or MySQL for database management. This system is designed to help small businesses streamline their inventory processes, reduce overhead costs, and improve overall operational efficiency.

INTRODUCTION

- A Smart Inventory Management System is a digital tool designed to help small businesses efficiently manage their inventory levels, optimize stock usage, and minimize the risk of overstocking or stockouts.
- This system uses smart notifications and analytics to provide real-time updates and insights into inventory levels, helping businesses maintain the right amount of stock.
- The main aim is to streamline the inventory management process, improve operational efficiency, and reduce costs associated with inventory management.

INTRODUCTION

- Features :
 - a. Product catalog management
 - b. Stock level tracking with alerts for low inventory
 - c. Sales and purchase tracking
 - d. Analytics dashboard for inventory trends
 - e. User roles for different access levels

EXISTING SYSTEM

1. Zoho Inventory

- A cloud-based inventory management software designed for small to medium-sized businesses.
- It offers real-time inventory tracking, stock level alerts, and integration with e-commerce platforms like Shopify and Amazon.

2. Odoo Inventory

- Part of the Odoo suite, this module helps businesses track stock across multiple warehouses.
- It features barcode scanning, expiration tracking, and automated stock replenishment.

3. inFlow Inventory

- Focused on small businesses, this software provides tools for inventory, order, and invoicing management.

PROPOSED SYSTEM

- The proposed system, an Inventory Management System, is a user-friendly, feature-rich application built using Streamlit. Designed to simplify inventory tracking for small businesses or individuals, it provides a secure and efficient solution for managing stock, monitoring critical levels, and tracking expiration dates.
- The system begins with a login interface to ensure secure access, allowing only authorized users to manage the inventory. Once logged in, users can view the inventory details, add new items, update existing stock, or remove items no longer needed.
- The system also allows for reducing quantities in case of sales or usage, ensuring accurate stock levels. Key features include a critical stock notification system, which highlights items falling below a predefined threshold, helping users prioritize replenishment.

PROPOSED SYSTEM

- Additionally, an expiration tracking feature calculates the days remaining until an item expires, ensuring better stock rotation and minimizing waste.
- The system leverages data visualization to present inventory insights. Users can view bar charts displaying stock quantities, pie charts representing inventory value distribution, and scatter plots showcasing price versus quantity for better decision-making. These visual aids help identify trends and optimize inventory levels.
- Overall, this system is a scalable and practical tool, ideal for businesses seeking a low-cost, efficient way to manage inventory. With its intuitive interface and robust features, it empowers users to maintain control over their stock, reduce wastage, and make data-driven decisions for improved operational efficiency.

TECHNOLOGIES USED

1. Streamlit

- Purpose: A Python library for building interactive web applications.
- Usage in the Code: Provides the framework for the inventory management app, allowing users to interact with features like login, adding items, and visualizations through a web interface.

2. Pandas

- Purpose: A data analysis library used for handling and manipulating structured data.
- Usage in the Code: Used to store, manage, and perform operations on the inventory data stored in a CSV file as a DataFrame.

TECHNOLOGIES USED

3. Datetime

- Purpose: A Python module for working with dates and times.
- Usage in the Code: Used to handle and process dates, including adding items with expiration dates and calculating days until expiration.

4. OS

- Purpose: A Python module for interacting with the operating system.
- Usage in the Code: Checks whether the inventory data file (inventory_data.csv) exists on the system.

5. Matplotlib

- Purpose: A Python library for creating static, animated, and interactive visualizations.
- Usage in the Code: Used to generate bar charts, pie charts, and scatter plots to visualize the inventory data.

TECHNOLOGIES USED

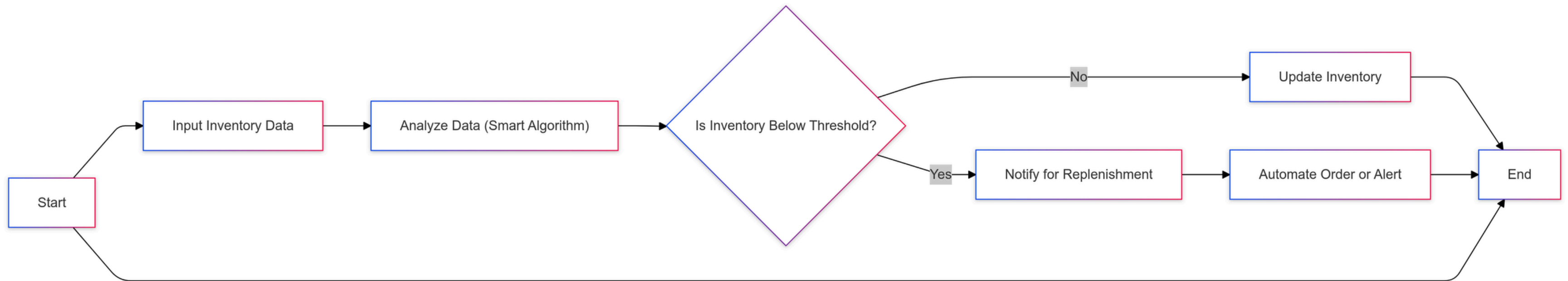
6. CSV File (Persistent Storage)

- Purpose: A file format for storing structured data.
- Usage in the Code: Stores inventory data persistently, allowing it to be loaded and saved between application sessions.

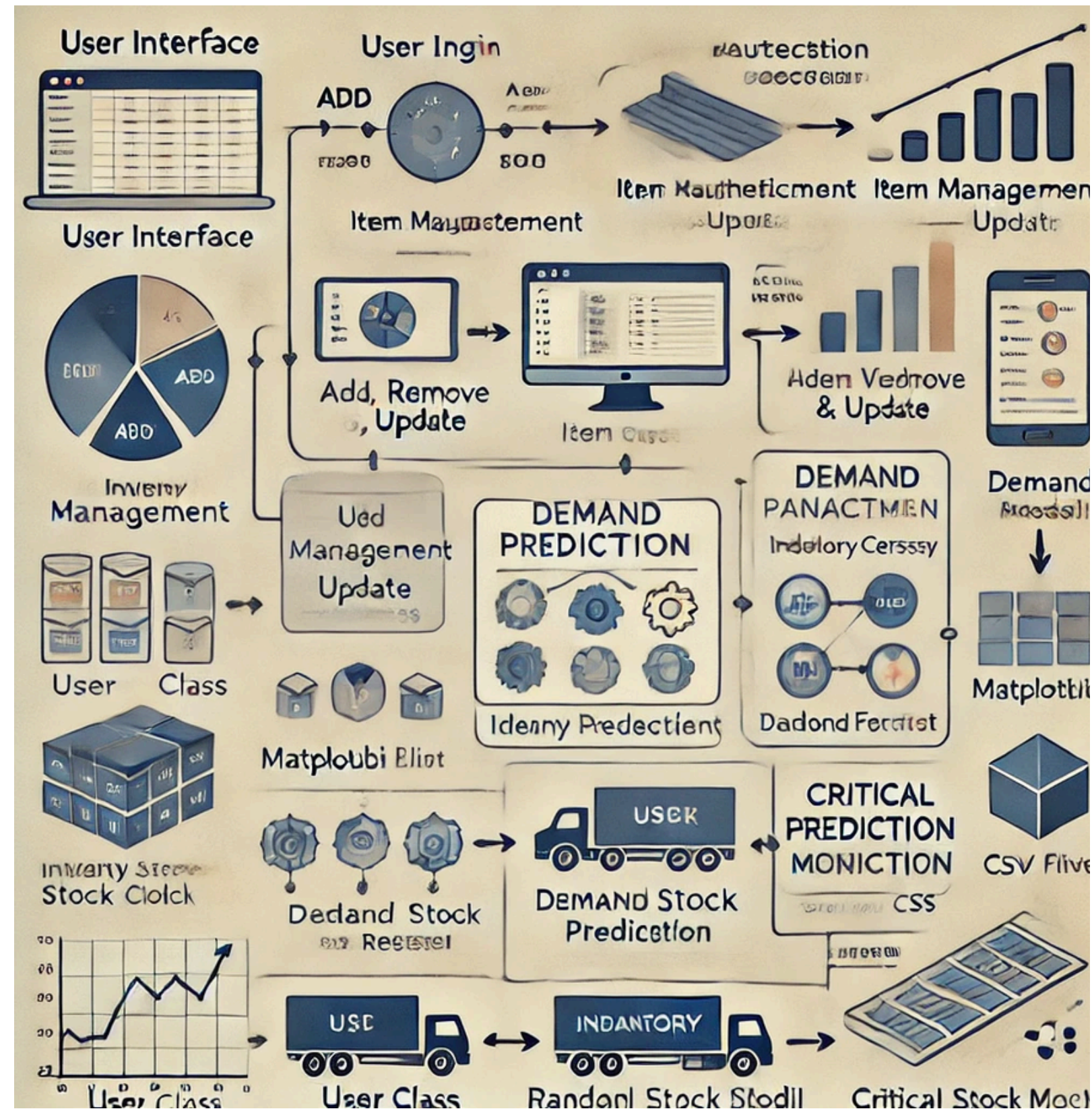
7. Python Standard Library

- Purpose: Includes built-in modules like time and re (implicitly used for string processing and combining).
- Usage in the Code: Provides foundational functionalities for combining date objects and managing Python operations.

SYSTEM DESIGN



SYSTEM WORKING



IMPLEMENTATION

1. Data Storage and Loading

- All inventory data is saved in a CSV file. This file stores details like item name, quantity, price, expiration date, and the date the item was added. When the application starts, it loads the data from this file, so any changes made previously are retained.

2. User Authentication

- A login page ensures secure access. Users need to enter the correct username and password to use the system. This ensures that only authorized users can manage the inventory.

3. Critical Stock and Expiration Alerts

- The app automatically checks for items with low stock levels and highlights them, helping users know what to reorder. It also calculates how many days are left before an item expires, reducing waste.

IMPLEMENTATION

4. Inventory Management Features

- Add or Update Items: Users can add new items or update existing ones by specifying details like name, quantity, price, and expiration date.
- Remove Items: Users can delete items that are no longer needed.
- Reduce Item Quantity: When items are sold or used, the quantity can be reduced.

5. Data Visualization

- A bar chart shows stock levels for each item.
- A pie chart displays the value distribution of the inventory.
- A scatter plot compares item quantities to their prices.

6. User-Friendly Interface

- Streamlit provides an easy-to-use web-based interface where users can view and interact with their inventory data, making it simple and accessible for anyone.

RESULTS

1. HOME PAGE :

< Deploy ⋮

Login

Username

Password

Logged in successfully!

Menu

- ☒ Home
- ☐ Add Item
- ☐ Remove Item
- ☐ Sell Item
- ☐ Check Inventory
- ☐ Recommendations
- ☐ Visualizations

Inventory Management System (IMS)

Welcome to the Inventory Management System

Manage your inventory and get demand predictions.

RESULTS

2. INVENTORY DATA :

<

Login

Username

admin

Password

.....

👁

Logged in successfully!

Menu

☐ Home

☐ Add Item

☐ Remove Item

☐ Sell Item

☒ Check Inventory

☐ Recommendations

☐ Visualizations

Deploy ⋮

Inventory Management System
(IMS)

Inventory

	name	quantity	price	expiration_date	added_date	category	total_value
0	A	8	10.32	2024-12-19 00:00:00	2024-12-04 14:11:41	Miscellaneous	None
1	B	1,000	2.36	2024-12-24 00:00:00	2024-12-04 14:11:58	Miscellaneous	None
2	C	89	65.32	2024-12-30 00:00:00	2024-12-04 14:14:50	None	None


RESULTS

3. ADDITION OF ITEMS :

Login

Username

Password



Logged in successfully!

Menu

- ☐ Home
- ☒ Add Item
- ☐ Remove Item
- ☐ Sell Item
- ☐ Check Inventory
- ☐ Recommendations
- ☐ Visualizations

Inventory Management System (IMS)

Add Item

Item Name

Quantity

Price

Expiration Date

Add Item

RESULTS

4. SELLING OF ITEMS :

Login

Username

admin

Password

.....

👁

Logged in successfully!

Menu

☐ Home

☐ Add Item

☐ Remove Item

☒ Sell Item

☐ Check Inventory

☐ Recommendations

☐ Visualizations

Inventory Management System
(IMS)

Sell Item

Item Name

Quantity to Sell

1

-

+

Sell Item

RESULTS

5. REMOVING OF ITEMS :

Login

Username

admin

Password

.....

Logged in successfully!

Menu

☐ Home

☐ Add Item

☒ Remove Item

☐ Sell Item

☐ Check Inventory

☐ Recommendations

☐ Visualizations

Inventory Management System
(IMS)

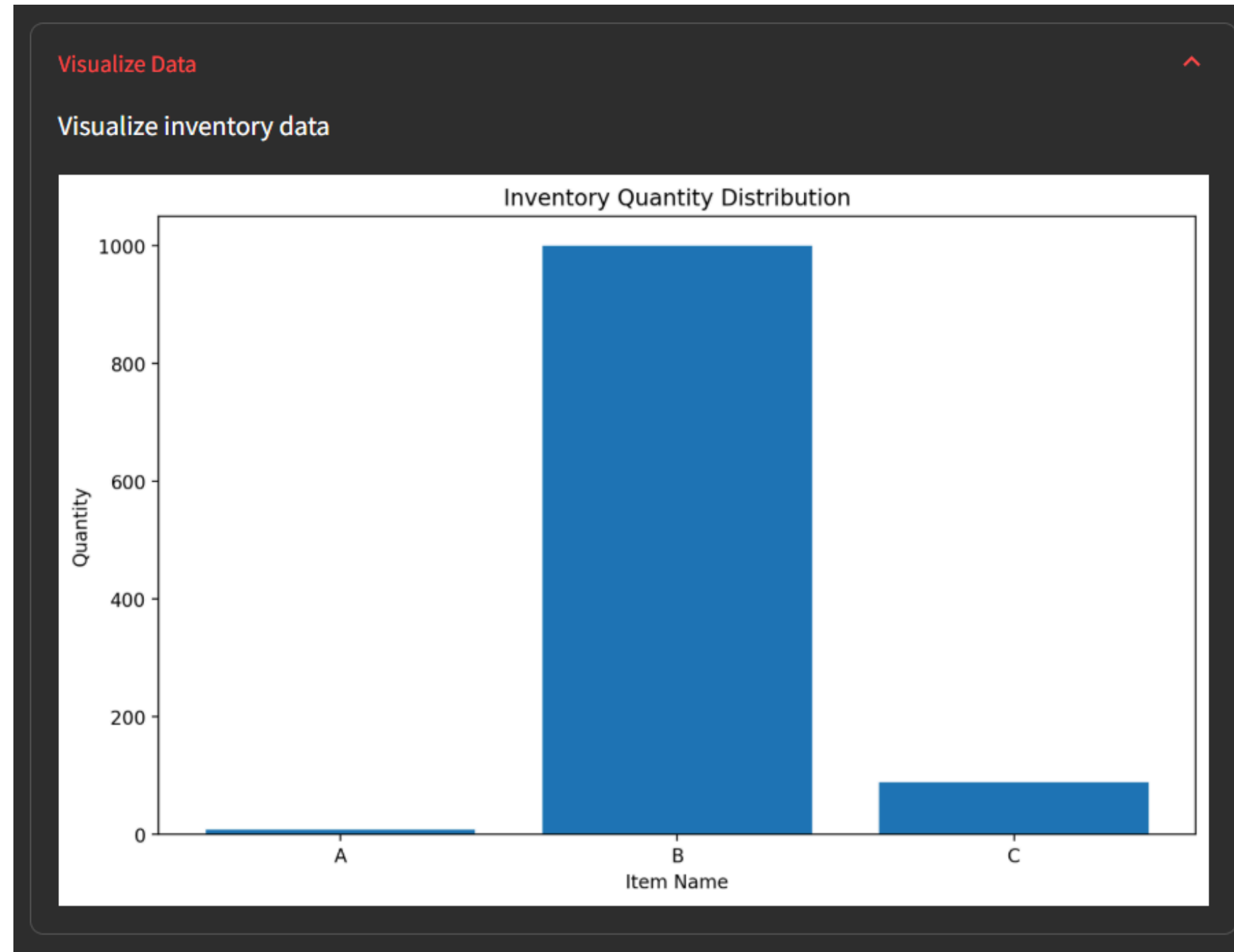
Remove Item

Item Name

Remove Item

RESULTS

6. STOCK VIZUALISATION :



RESULTS

6. CRITICAL STOCK ALERT :

Inventory Management System

Add Item

Inventory

Critical Stock Check

Critical stock items (below threshold):

	name	quantity	price	expiration_date	added_date	category	total_value
0	A	8	10.32	2024-12-19 00:00:00	2024-12-04 14:11:41	Miscellaneous	None

Visualize Data

CONCLUSION

- In conclusion, the Inventory Management System (IMS) project successfully integrates demand prediction, inventory tracking, and sales functionalities using Streamlit and machine learning techniques. By implementing a Random Forest Regressor, the system can predict future demand and recommend restocking actions based on the inventory levels and item attributes.
- The integration of predictive modeling ensures that inventory management is proactive rather than reactive, minimizing stockouts and overstocking. Additionally, the system's capability to visualize data provides valuable insights into inventory trends, aiding better decision-making.
- Overall, this project demonstrates the potential of leveraging AI and data science to enhance business operations, providing a robust, scalable solution for efficient inventory management. The system can be further enhanced by incorporating real-time sales data, automated restocking, and advanced forecasting techniques for even greater accuracy.

Thank You