ACROPOLIS INSTITUTE OF TECHNOLOGY

AND

RESEARCH

Department of Information Technology

Synopsis

On

Smart Inventory Management

INTRODUCTION:

1.1. Overview:

- In today's competitive market, effective inventory management is crucial for businesses to meet customer demands while minimizing costs. This project focuses on utilizing **historical sales data** to forecast future product demands, reducing the risk of **stockouts** and **overstocking**.

- By analyzing **past sales trends, seasonal variations, and consumer behavior**, businesses can make **data-driven** inventory decisions. Poor inventory management leads to **lost sales, high storage costs, and inefficient supply chains**, making demand forecasting a critical requirement.

- This project explores various forecasting techniques to optimize inventory levels, contributing to improved **supply chain efficiency** and **customer satisfaction**.

1.2. Purpose of the project/Innovativeness and usefulness:

- **Reduce Stockouts & Overstocking:** By accurately forecasting demand, businesses can prevent financial losses due to excess stock or unmet orders.
- **Improve Decision-Making:** The project provides a **data-driven** approach to managing inventory.
- **Enhance Operational Efficiency:** Reducing waste and optimizing storage will improve supply chain efficiency.
- **Increase Profitability:** By maintaining optimal inventory levels, businesses can reduce unnecessary costs and maximize revenue.

2. LITERATURE SURVEY:

2.1. Existing Problem:

- **Inefficient Forecasting:** Traditional inventory management lacks predictive analytics, leading to stockouts or excessive inventory.

- **Seasonal Demand Variability:** Many companies fail to anticipate seasonal trends, leading to inventory mismanagement.

- **Manual Processes:** Relying on manual inventory tracking is prone to errors and inefficiencies.

- **High Storage Costs:** Overstocking results in increased holding costs, while understocking leads to lost sales.

- **Supply Chain Disruptions:** External factors like supplier delays, logistical failures, and unexpected demand spikes make it difficult to maintain steady inventory levels.

- **Manual & Error-Prone Inventory Management:** sses still use manual processes like spreadsheets and physical stock counts, leading to: Data Entry Mistakes, Time-Consuming Operations, Lack of Automation

2.2. Proposed Solution:

- Utilize historical sales data and predictive analytics to forecast demand.

- Implement machine learning models to improve forecast accuracy.

- Provide a user-friendly dashboard for real-time inventory tracking.

- Reduce dependency on manual tracking, enhancing efficiency and minimizing human errors.
- Real-Time Inventory Tracking & Automated Alerts.
- Centralized Inventory Management System.

3. THEORITICAL ANALYSIS

3.1. Block Diagram:

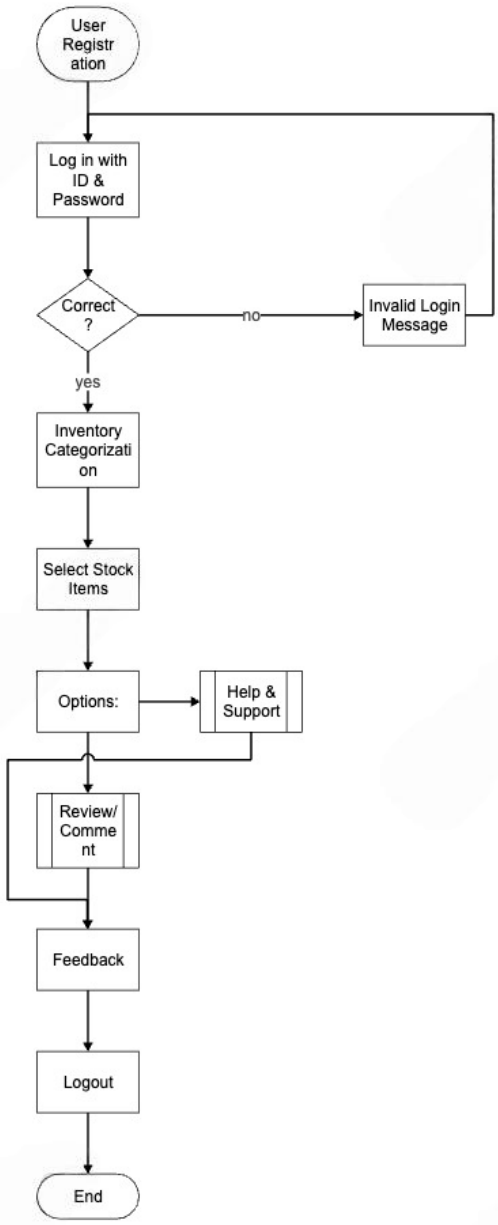

Fig.1 Block Diagram of Smart Inventory Management.

3.2. Required Resources:

- **Hardware Requirements:**

1. **Server / Cloud Hosting** – To store and process inventory data.
2. **Storage Devices** – Hard drives or cloud databases for historical sales data.
3. **Computing Devices** – Computers or mobile devices to access inventory reports.

- **Software Requirements:**

1. **Programming Languages:** Python, R
2. **Forecasting Tools:** Statsmodels, Prophet, Scikit-learn
3. **Database Management:** MySQL, NoSQL (MongoDB)
4. **Visualization Tools:** Tableau, Power BI
5. **Machine Learning Frameworks:** TensorFlow, Scikit-learn

4. APPLICATION:

1. Retail Industry: Enhancing inventory management and customer satisfaction by ensuring product availability.

2. E-commerce: Optimizing stock levels based on predictive analytics to improve order fulfillment rates.

3. Manufacturing: Streamlining production schedules and raw material procurement based on demand forecasts.

4. Supply Chain Management: Improving overall efficiency by aligning inventory levels with predicted sales.

5. Seasonal Products: Assisting businesses in preparing for peak seasons by accurately forecasting demand.

6. Pharmaceutical Industry: Managing medicine stocks is critical due to expiration dates and regulatory requirements.

7. Food & Beverage Industry: Perishable goods require accurate inventory tracking to reduce spoilage and optimize delivery schedules. This system supports:

8. Automotive & Spare Parts Industry: Managing spare parts inventory is challenging due to varying demand for different components.

9. Fashion & Apparel Industry: The fashion industry experiences fast-changing trends and seasonal demand shifts.

10. Aviation & Aerospace Industry: Airlines and aerospace manufacturers need critical component tracking to maintain safety and compliance standards.

5. REFERENCES:

[1]. https://www.researchgate.net/publication/383560175_AI-driven_demand_forecasting_Enhancing_inventory_management_nd_customer_satisfaction

[2]. https://disk.com/resources/inventory-forecasting-methods-to-reduce-stockouts-overstock/#:~:text=Seasonality%20Analysis,-Retailers%20often%20face&text=This%20method%20relies%20on%20historical,by%20managing%20their%20inventory%20carefully

[3]. https://www.pecan.ai/blog/predictive-inventory-management/

[4]. https://thousense.ai/blog/accurate-demand-forecasting-for-effective-inventory-management/

[5]. https://codup.co/blog/how-to-avoid-overstocking-and-stockouts-in-retail-best-practices-for-inventory-planning/

[6]. https://www.netstock.com/blog/demand-forecasting-for-supply-chains-how-to-predict-plan/

[7]. https://ijrpr.com/uploads/V5ISSUE10/IJRPR34021.pdf

Guided By:

Prof. Mahendra Verma

Group Members:

Khushi Agrawal (0827IT221076)

Atharv Sharma (0827IT233D02)

Akshat Soni (0827IT221011)

Amay Saxena (0827IT221014)