**ACROPOLIS INSTITUTE OF TECHNOLOGY AND**

**RESEARCH**

**Department of Information Technology**

Synopsis

On

# Predictive Modelling Using Historical Sales Data To

# Forecast Future Product Demands

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1. **INTRODUCTION:** 
   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. **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.
* **Minimize Waste:** Reduce excess inventory and prevent spoilage or obsolescence, especially for perishable or time-sensitive products.
* **Enhance Customer Satisfaction:** Ensure products are always available when customers need them, reducing the risk of lost sales due to stockouts.
* **Facilitate Product Diversification:** Allow businesses to manage a wider range of products efficiently, supporting diversification strategies
* **Support Market Expansion:** Enable businesses to enter new markets or regions by providing scalable and adaptable inventory management solutions.

1. **LITERATURE SURVEY:** 
   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
  1. **Proposed Solution:**
* **Real-Time Visibility and Reporting**

Mobile Accessibility: Provide mobile-friendly dashboards and apps for on-the-go inventory management and decision-making.

Customizable Alerts: Configure automated alerts for low stock levels, expiring items, or unusual activity in the supply chain.

Performance Analytics: Generate detailed reports on key metrics like inventory turnover, carrying costs, and stockout rates to identify areas for improvement.

* **Centralized and Scalable Systems**

Cloud-Based Platform: Implement a cloud-based inventory management system for centralized data storage, scalability, and remote access.

Integration with ERP and CRM Systems: Ensure seamless data flow between inventory management, enterprise resource planning (ERP), and customer relationship management (CRM) systems.

Multi-Channel Inventory Management: Synchronize inventory across online and offline sales channels to prevent overselling and improve customer satisfaction.

* **Training and Change Management**

Employee Training: Provide training programs to help staff adapt to new technologies and processes.

Change Management Strategies: Develop strategies to ensure smooth adoption of new systems and minimize resistance to change.

1. **THEORITICAL ANALYSIS**
   1. **Block Diagram:**

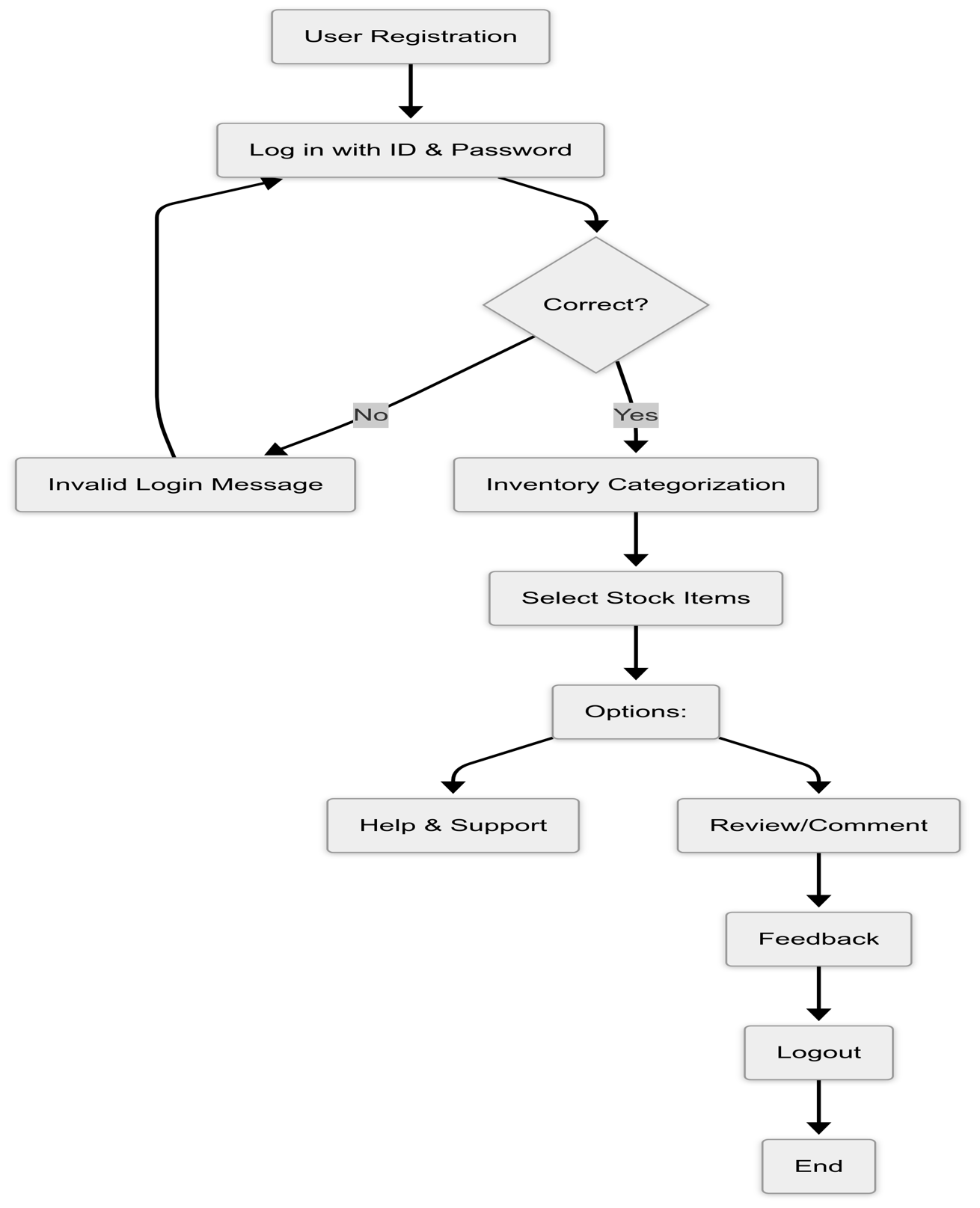
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Fig.1 Block Diagram of Smart Inventory Management.

* 1. **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.

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