NANO CLOUD TECHNOLOGY

CASE STUDY

Machine Learning Based Demand Forecasting for Inventory Control for a Leading Automobile Manufacturer

Overview

The client is a leading automotive manufacturer. Their existing system used for inventory control was maintained manually and led to inaccurate calculations and affected overall production, increasing the costs, and reducing stocking efficiency . Our team developed a machine learning (ML) based automated web application for demand forecasting to control the inventory stocks, labor, and logistics. The solution led to real-time visibility of the inventory flow and enabled quick decision making. It increased the accuracy of forecasting the parts and reduced the inventory costs.

Client Background and Challenge

The client typically manages thousands of spare parts on a daily basis. They were facing significant challenges in handling the inventory of brought-out components used in vehicle production. Safety stock levels for these parts were manually calculated based on intuition and past experience of inventory controllers and analysts at the manufacturing facility . This unstructured and error-prone approach led to inefficient stocking, which negatively impacted production timelines and substantially increased costs related to inventory, labor, and logistics . To overcome this, the client was seeking an automated solution that could improve demand forecasting, calculate safety stock with minimal manual input, and enable inventory classification to distinguish fast-moving and slow-moving items. Additionally, poor data quality, including junk data and missing values, was a critical issue that needed to be addressed.

Our Approach and Solution

The team analyzed a dataset comprising demand patterns, spare part costs, order frequency, item dimensions, sudden demand spikes, and lead time for qualitative forecasting . Data preparation was carried out to resolve quality issues, and the inventory was reclassified into fast- and slow-moving categories . Multiple machine learning-based forecasting models were developed for quantitative forecasting using Holt, ARIMA, and Auto ARIMA techniques, and further optimized through time series modeling.

An automated web application was developed to calculate safety stock for vehicle parts by leveraging time series modeling techniques. It provides product float value recommendations on both hourly and daily intervals and includes a dashboard to deliver analytical insights and MIS reports to management . The web application, deployed in a cloud environment, supports multiple plant locations and empowers inventory analysts and controllers to make more informed purchasing and stocking decisions.

Business and Community Impact

Each model was trained and validated against forecast and actual data, and the model with the lowest weighted average forecasted error was used to forecast the period of lead time to procure the part.

- 90% accuracy in demand forecasting for 42% of the parts
- 85% accuracy in demand forecasting for 64% of the parts
- 10-15% enhanced accuracy for forecast at part level growth
- Real-time visibility of inventory flow assists in quick decision making
- Reduced inventory and logistics costs while ensuring high availability of parts

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