TECH mahindra

CASE STUDY

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

Overview

The client is a leading Japanese 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. TechM developed 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 has thousands of spare parts that it deals with every day. They were facing challenges in managing the inventory of brought-out products of automotive vehicle parts. The safety stock of these parts was manually calculated based on the gut feeling and/or previous experience of controllers and inventory analysts involved in the manufacturing plant. This unscientific and inaccurate method of calculation lead to inefficient stocking, thereby affecting the overall production heavily increasing the cost to the company in terms of inventory, labor, and logistics. Therefore, the client was looking for an automated system that would enhance the forecast required for inventory and calculate safety stock with reduced manual intervention. They also required inventory classification to identify fast/slow moving parts. However, data quality was also a concern with junk data and missing values.

Our Approach and Solution

Tech Mahindra looked at the data set consisting of demand, spare part cost, frequency of order, item dimension, spurt in demand, and lead time for qualitative forecasting. Data preparation was done to fix the data quality issues and the inventory was reclassified into fast- and slow-moving levels. Various ML based forecasting models were rebuilt for quantitative forecasting using Holt, Arima, Auto Arima models and fine-tuned then with time series modelling.

An automated web application was developed that could calculate the vehicle parts safety stock, utilizing the power of time series modeling. It could recommend the product float value hourly and daily and contains a dashboard to facilitate management with analytical insights and MIS reports. The web application deployed on AWS cloud environment supports multiple plants across the company and enables inventory analysts and controllers to take better purchasing / 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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