Enhanced Shipping Prediction for Retail Logistics

Optimizing order picking and workforce scheduling through advanced machine learning models.

Overview

- QBurst implemented a machine learning-based prediction model to enhance order picking accuracy and automate shift scheduling.

- Integrated sales forecasts into predictive workflows to align staffing with real-time demand.

- Leveraged Prophet and time series modeling to account for seasonality, trends, and promotions.

- Achieved measurable improvements in cost savings, scheduling accuracy, and customer satisfaction.

Client Profile

Leading fashion retailer with more than 3000 physical stores and an e-commerce website that serves over 20 million active users.

Challenges: Mismatch Between Shipping Forecasts and Workforce Allocation

- Inaccurate shipping estimates caused mismatched workforce allocations across distribution centers.

- Overestimation led to overstaffing and inflated labor costs.

- Underestimation triggered delays, stock shortages, and missed delivery targets.

- Manual forecasting systems lacked adaptability to sales fluctuations and seasonal variations.

QBurst Solution: Machine Learning–Powered Demand Forecasting and Workforce Optimization

We deployed a machine learning-driven solution centered on time series forecasting to predict order-picking demand with precision. Multiple models, ARIMA, SARIMA, and Prophet, were evaluated using metrics such as MAPE, R^2, and MAE, with Prophet emerging as the most accurate and robust model.

- Integrated Prophet for sales forecasting and order-picking prediction
- Used sales forecasts as regressors to strengthen predictive accuracy
- Incorporated seasonality, holiday effects, and promotional data to refine forecasts
- Automated shift scheduling based on predicted order volumes
- Delivered interactive dashboards to visualize forecasts and historical performance

Technical Highlights

- Time series modeling with ARIMA, SARIMA, and Prophet
- GCP Vertex AI for scalable model training and deployment
- BigQuery for data warehousing and analytics
- Automated retraining and tuning pipelines using Python, Pandas, NumPy, and SciPy
- Intuitive dashboards for real-time operational insights

Sales Forecasting Graph
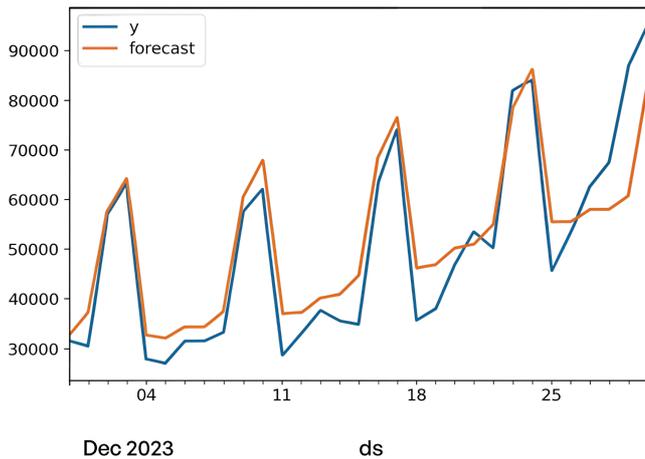
Order Picking Forecasting Graph
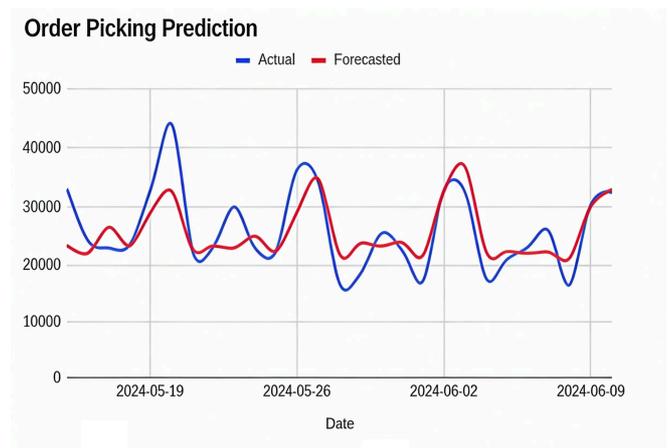
Impact

- **Up to 30% improvement** in prediction accuracy for shipping and order-picking volumes

- **Reduced labor inefficiencies** through optimized scheduling across multiple distribution centers

- **Significant cost savings** from minimized overstaffing and reduced operational disruptions

- **Improved on-time delivery rates** leading to enhanced customer satisfaction and loyalt

- **Scalable solution** capable of adapting to seasonal and promotional variations

QBurst | A **High AI-Q** Company

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