

Appendix A: Plots & Visualizations

Defect Detection

Model Output:



Figure 2: Model inference visualization highlighting defective regions in cast parts.

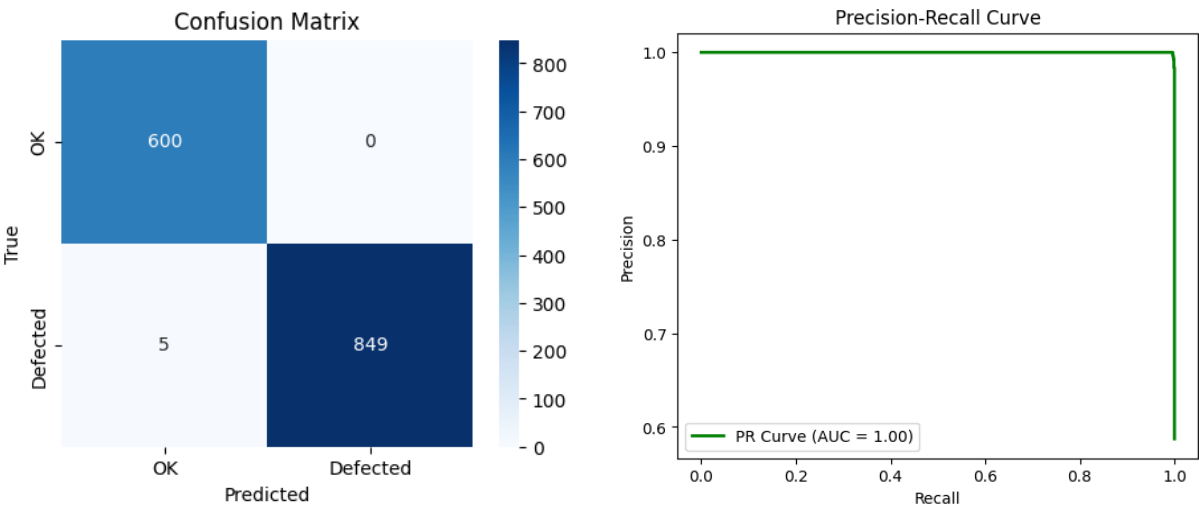


Figure 1: Classification results on the test set (Left), Precision-Recall Curve (Right)

The near right-angled PR curve indicates excellent separation on this dataset, though future validation on larger and more diverse defect images is required to confirm generalization.

Predictive Maintenance

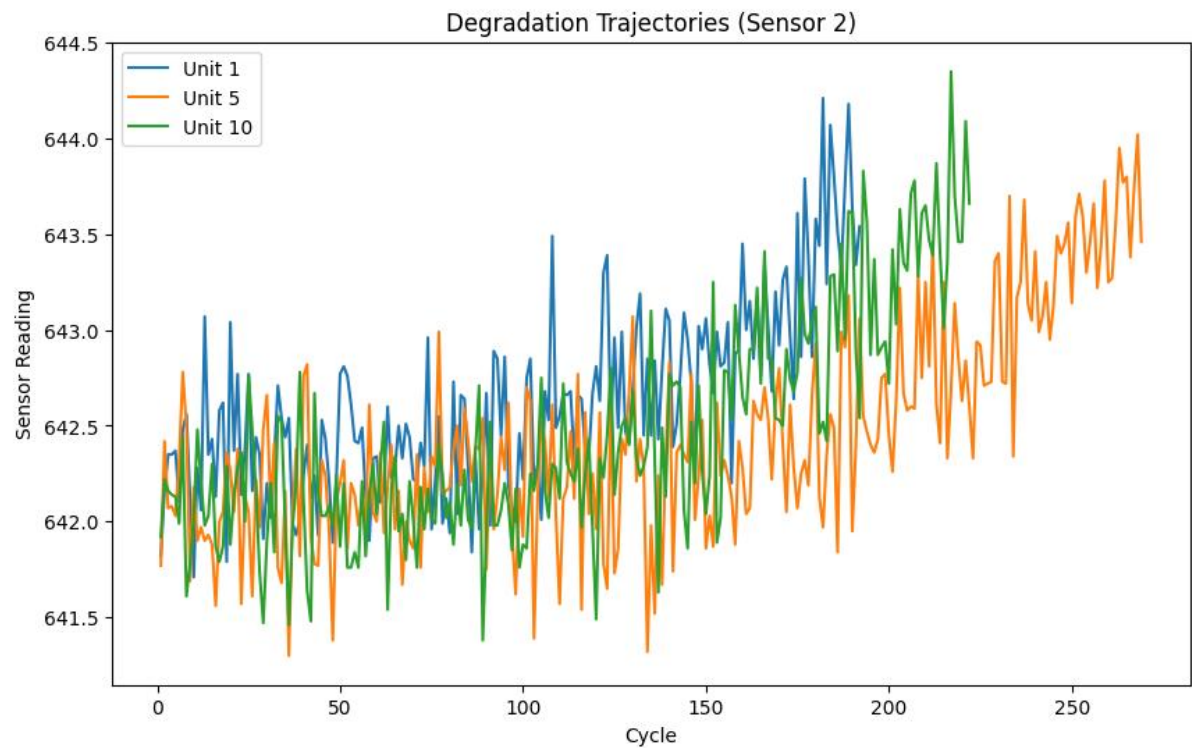


Figure 4: Sensor-2 Degradation Trends

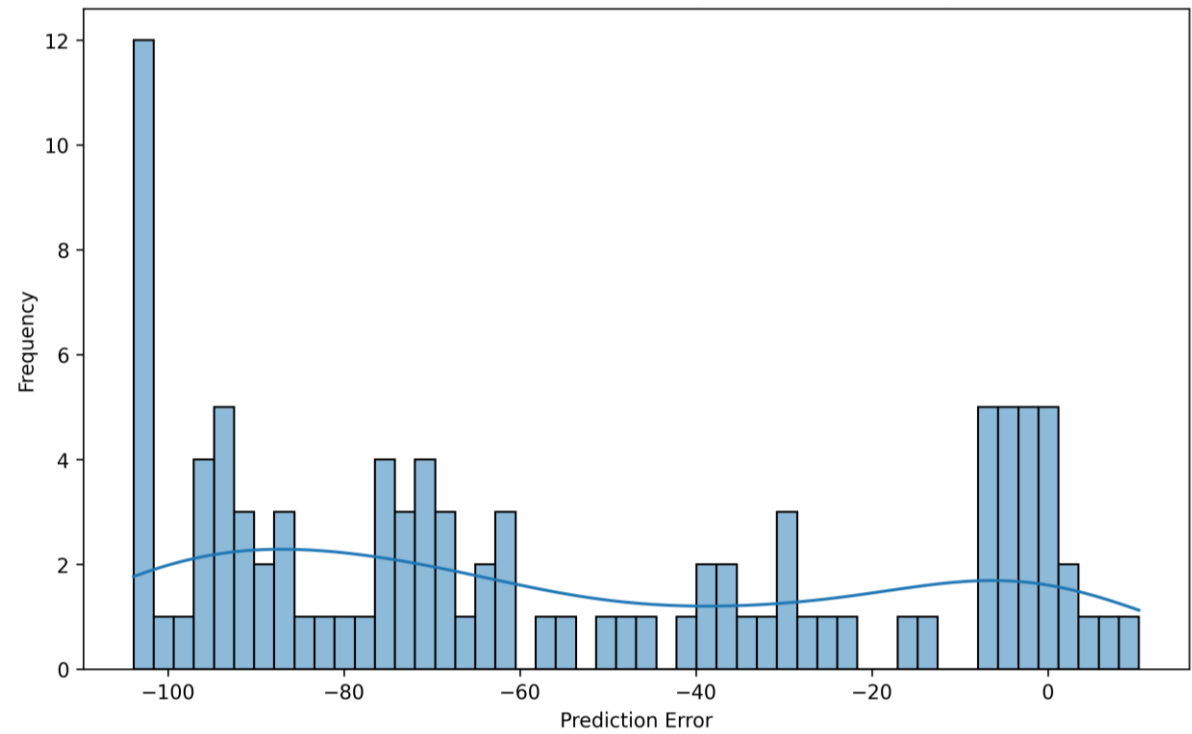


Figure 4: Histogram of prediction residuals

Supply Chain Forecasting

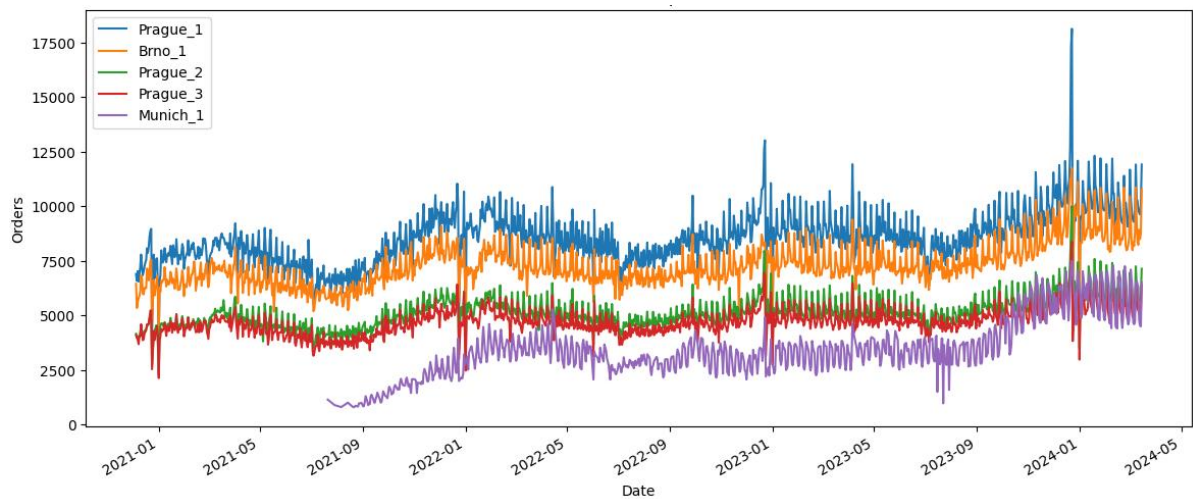


Figure 5: Distribution of Daily Demand Across Warehouses

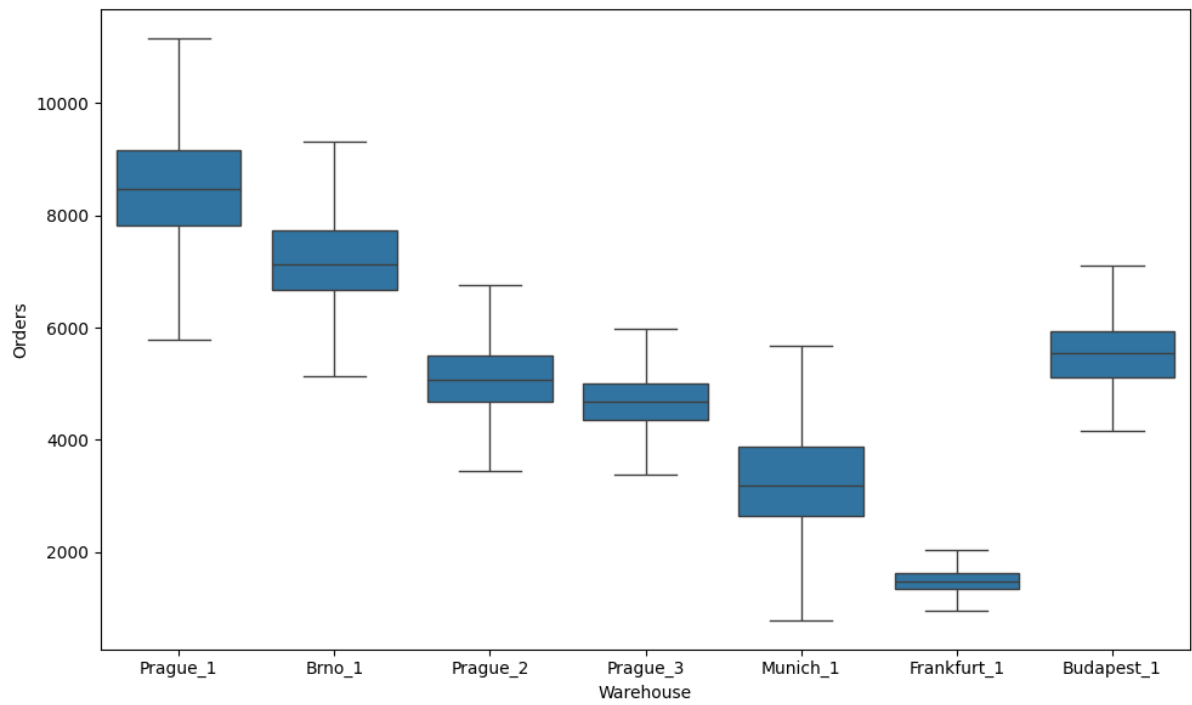


Figure 6: Range of Order Numbers Across Warehouses