Forecasting and evaluating intermittent demand with timing-aware global models and heterogeneous data

Abstract

Intermittent demand arises from sporadic purchasing, resulting in time-series with many zero values. Traditional demand rate forecasting methods provide no information about when demands will occur, limiting their usefulness in many domains. We propose a global forecasting approach that decomposes intermittent time-series into demand size and interval length components, reduces data skewness through pre-processing, and trains a deep learning model to predict both demand timing and magnitude. To evaluate such forecasts, we introduce a new metric, Intermittent Alignment Error (IAE), which fairly captures timing and magnitude performance across heterogeneous datasets. Our forecasting approach outperforms demand rate and non-parametric baselines by 25–40%, improving both timing performance and total percentage error across the forecasting horizon, while requiring less data and generalising across domains. Although forecasting can still be improved, this study demonstrates the feasibility of structured point forecasts and introduces a robust, fair evaluation metric for intermittent demand on a global scale.