Forecasting Algorithm and Dashboard

Version 1.0

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**Contents**

[1 Development of the Forecasting Artifact 2](#_Toc1296)

[1.1 Requirements 2](#_Toc1297)

## 1.1 Requirements

* This data set represents pallet movements in a warehouse. The algorithm should take into account of the real data set which may contain missing data occasionally, and days where the demand are exceptionally high.
* The Mutation in the data set means movement of a pallet. Activity ID 1 means inbound, 2 means outbound, 3 means movement within the warehouse. We want to forecast the workload (aka. the number of pallets moved each day).
* There will be two types of forecasts: The first is the overall workload of the warehouse. The second is the workload forecast for each customer. The forecast unit is daily; the forecast horizen is from one day up to 3 years.
* Use Monte Carlo simulation to generate more artificial data so that the algorithm is fed with many years of data with many more customers. This is to ensure the robustness of the trained algorithm.
* Use the ensemble method to forecast. This means we use multiple machine learning algorithms including exponential smoothing, linear regression, LightGbm, and SARIMA, etc.
* The solution should be based on at least six research papers. Some of the papers are provided in the attachment. They are helpful.
* The output of the algorithm should be explainable to the end users. For example, a warehouse manager would like to know how much weight each factor contributes to the forecast such as holiday factor and seasonality. They can be presented as a graph.
* Make a PowerBI dashboard to present the forecasting results. We can aggregate daily workload forecast into weekly, quarterly, etc. It should be understandable for users and easy to use. An example of PowerBI file will be provided.

Literature’s that may be helpful (if you can’t access them on the internet, I can provide pdf’s):

1. Improving warehouse labour efficiency by intentional forecast bias
2. A Forecasting Model for Daily Case Picking Volumes in Warehouses
3. Demand Forecasting in supply chains: a review of aggregation and hierarchical approaches
4. The use of time series forecasting in zone order picking systems to predict order pickers’ workload
5. Improving warehouse labour efficiency by intentional forecast bias
6. High season demand forecasting method in logistics warehouse inventory management
7. Forecasting demand and inventory management using Bayesian time series