Fruit & Veg Forecasting and Replenishment

Executive summary
This project successfully analyzed and developed a solution for Fruit & Veg forecasting and replenishment for Booths Supermarkets. The project deliverable is a solution package incorporating sales prediction function with a replenishment scheme, for the Central Office to integrate supply for 1,231 items across 28 stores efficiently, indicating that there may be a product issue.

Challenge overview
A prototype functioning system was produced that can be used to create forecasts for all established products, and then to deploy an appropriate replenishment plan for each store. To forecast new product lines and improve the promotional modelling, an additional project is needed in the future to specialise in this area.

The problem
This project aims to improve the client's present forecasting support system for product sales, so as to alleviate wastage cost incurred by unsold commodities beyond their expiring dates.

Over its 165 year history, Booths has opened 28 stores across the Northwest England. Its major supply chain providing Fruit and Veg, yielding 88% of the company's annual turnover circa £30 million, is the analysis scope of this project.

Booths' present approach to forecasting demand is based on the bottom-up hierarchy. The replenishment quantities are estimated in each store by their experienced judgments according to the sales performance in the previous 14 days, and then these are compiled centrally to plan their purchase from suppliers.

Results and achievements
840 products were analysed by the entire course includes data exploration, data pre-processing, forecast model building, and replenishment tool construction. Initially the time series were decomposed, to identify components of trend and seasonality, and then it was determined to apply to Holt Winter’s exponential smoothing with additive seasonality as the appropriate modelling method. Next, basic time series were clustered to reduce modelling complexity, and assigned to either a top-down and bottom-up forecasting hierarchy for better accuracy. Finally the replenishment model was designed incorporating both the forecasting model and the current product supply policy.

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