Forecasting fruit demand - Intelligent Procurement

Group 2

Dinesh Ganti 61310071
Ravi Shankar 61310210
Shouri Kamtala 61310215
Supreet Kaur 61310595
Rachna Lalwani 61310845

Business Goal

- As the fruit supplier to the hypermarket, we wish to match our procurement with the hypermarket fruit demand .This is important owing to the perishable nature of fruits.

- This reduces over-stocking / stock-outs which leads to lesser costs and more profits.

- By matching the fruit demand accurately, we can ensure 100% service to the hypermarket and stay ahead of the competition.

Forecasting Analytics Objective

- Forecast the demand for five chosen fruit SKUs over a forecast period of 2 days.
    - Pineapple cuts (Kg) (Mb)
    - Apple red delicious
    - Watermelon striped
    - Packham pear
    - Premium banana
- Criteria for fruit selection: High volume of transactions.

Data

Transaction Date	Sku Number	Quantity Sold	Extended Price	Item Description	*Rate*
8/15/2012	1690	2.16	162	PINEAPPLE CUTS (KG) (MB)	Extended_Price/Quantity_Sold

- Aggregating quantity sold at daily level.
- Handling missing values
  ◦ Stock outs vs No demand.
  ◦ Seasonal naïve vs Zeroes.

Methods and success metrics

	Holt Winters + ARIMA	Naïve	Linear Regression	Trailing MA + AR	Holt Winters + AR	Double diff. + AR
PineApple	267.00	3,124.00				
Apple		1060.00	654.00			
Pear		13,512.00	6,475.00		4,878.00	12,233.00
Watermelon		946.00		315.00		
Banana	601	75				

- Primary evaluation metric: Combined cost of under-stocks + over-stocks.
  - Cost (Under Stocking) = 3 * Cost (Over Stocking).
  - Cost (Over Stocking) = Price of fruit.

Insights / Deployment Issues

- There could be a certain lag in getting the data as the demand for a day would be known only at the end of business day, however, we would need to forecast and supply demand for the next day by the end of previous business day

- As a fruit vendor, we would be dealing with a lot more variety of fruits than just 5 SKUs. It will be difficult to build manual, model-based models for each SKU. Automatic, data-driven methods are the way to go and for this there must be adequate data collection mechanisms

- Care should be taken that forecasts once given out shouldn't be adjusted to suit personal agendas. A record of the forecasts must be kept so that model performance can be evaluated over time

- The models should be periodically reviewed and revised. We suggest that models be revised every 2 to 3 months.

- We are doing better than the naive for all fruits except banana. For banana, it is possible that external factors have a higher predictive power than the series itself

- Any improvement in terms of cost over the naive is preferable and considered worthy effort in building a model

- Prediction intervals would have been useful but we couldn't come up with the same as the validation period is only 2 days long.