

Problem Set 1 - Forecasting

It is Okay to do in pairs, and submit one assignment per pair.

Problem 1 - Bass Model

The year is 2005 and you were hired by a large consulting firm that is analyzing the market for mobile phones in developing countries and forecasting its growth until 2011. Your first task is to analyze the Kenyan market and you receive data on the total number of mobile phone users in Kenya for every year since 1997.

1. Use the Bass diffusion model to estimate total market size N , and also the innovation and imitation parameters, \bar{p} , and \bar{q} . Do the estimated values make sense? How would these parameters affect your marketing strategy? Note: the data is in the file *Kenya-Mobile-2005.csv*.
2. Seven years pass, and now you have data up until 2011 about the Kenyan mobile phone market. How do your estimates compare with what actually happened? Why do you think your estimate is different from reality? Note: the data is in the file *Kenya-Mobile-today.csv*.

Problem 2 - Monthly Rainfall in India

1. Plot the data. Is there a seasonal pattern? Is there trend?
2. Following the method below, use the data to estimate the monthly seasonal factors for the average rainfall in India.
3. Using an appropriate exponential smoothing model, forecast the monthly average rainfall for 2011. How accurate do you respect the forecast to be?

A Method for Estimating Seasonal Factors:

1. Compute the sample mean for the all the data.
2. Divide each observation by the sample mean. This gives seasonal factors for each period of observed data.
3. Average the factors for each month. That is, average all the factors corresponding to January, all the factors corresponding to February, and so on. The resulting averages are the 12 multiplicative seasonal factors. They should add to 12.

Problem 3 - Supermarket Sales in Brazil

1. Plot the data. Is there a seasonal pattern? Is there trend?

2. Using the data, estimate the trend and the seasonal factors. *Comment: There are many ways to do this. However, it might be easier to first estimate the trend and mean using linear regression and then calculate the seasonal factors.*
3. Using an appropriate exponential smoothing model for the years 2003-2010, forecast the monthly sales volume in 2011? How accurate do you expect the forecast to be?

Problem 4 - Your project

1. What are the characteristics of the demand for the product or service sold by your partner company? Is there seasonality? Is there a trend?
2. What data do you need to build a demand model?
3. Is the Bass model appropriate for measuring adoption of this product? If yes, what data do you need to fit it? If not, why?
4. Can one of the methods covered in class be used to predict demand in your project? If yes, which one? If not, why?
5. Propose a demand model and a forecasting strategy to estimate demand in your project. What are the inputs and outputs of this model? How would you validate it with real data?

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