Exponential smoothing models at TrainMax Systems

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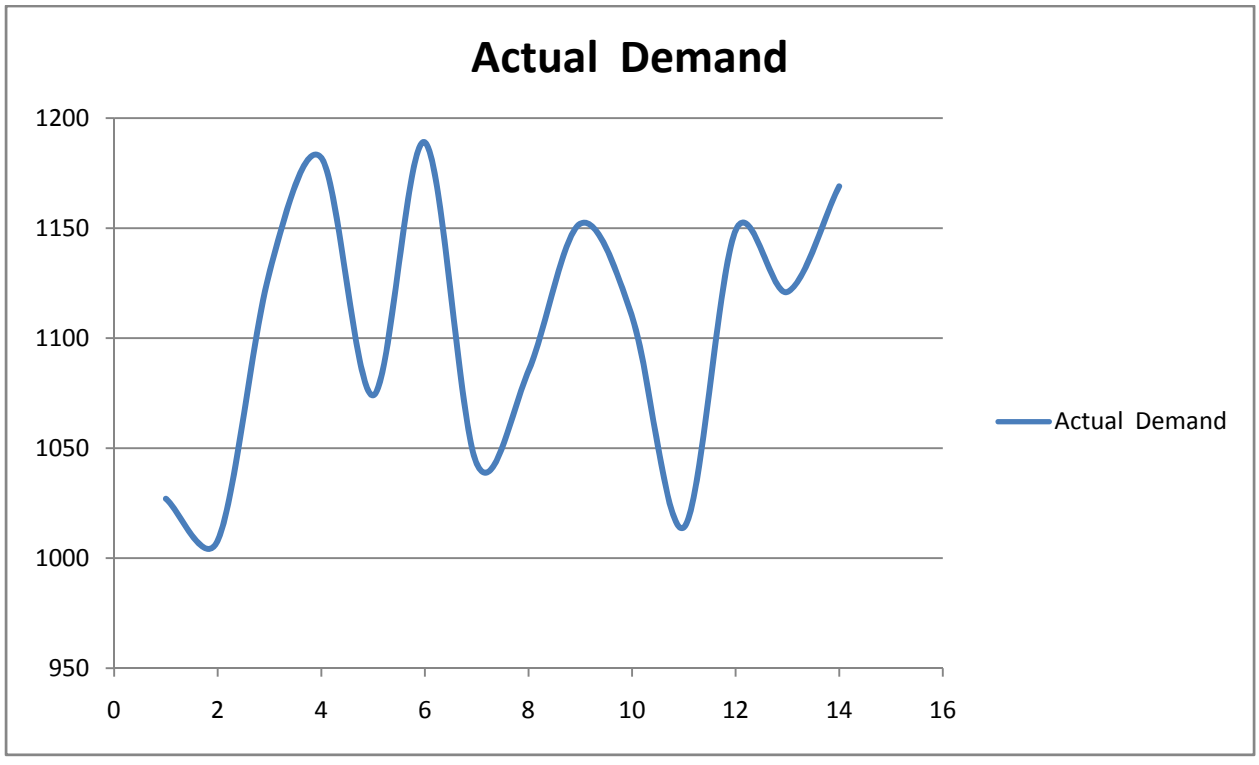
November 23rd 2015

Objective:

Introduction

You have been called in to take another look at TrainMax's forecasting problems. Recall from the earlier problem that TrainMax is a manufacturer of high-end specialty engine equipment for high speed trains. They produce parts that are sent to the original equipment manufacturers (OEMs) for manufacturing new engines. They face a continuing challenge of trying to forecast demand for their products. The demand for one part in particular, XC-288, was highlighted as needing to be examined.

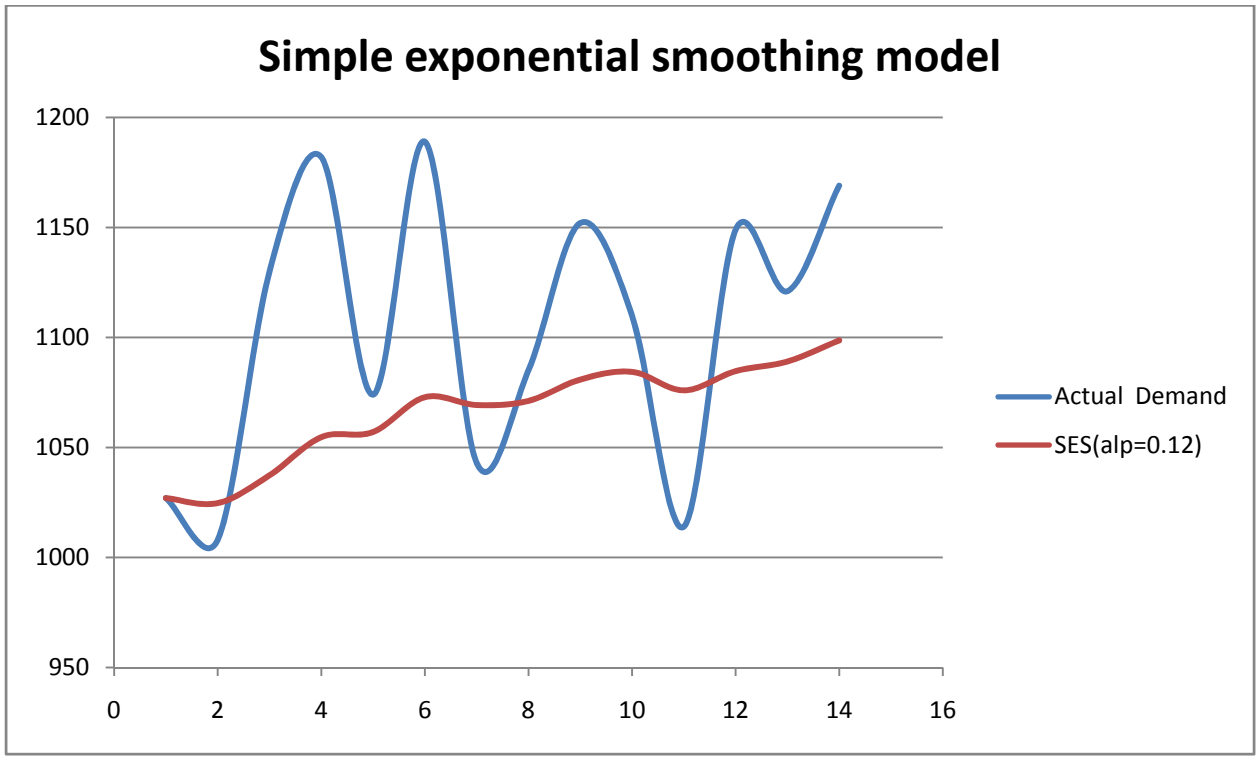
Visualization of the raw data



Simple Exponential Smoothing (SES) model

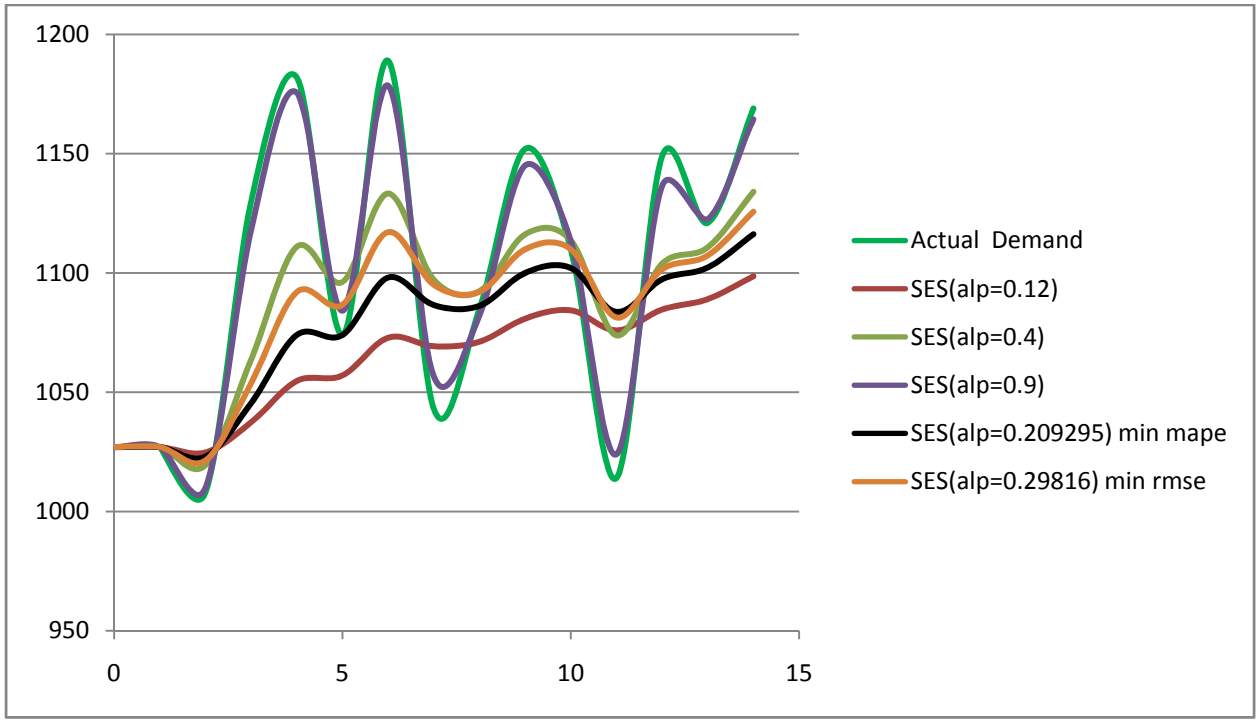
We try this model as it looks like there is stationary demand & no trend. We need to assign the initial parameters first. We start with period 0 where we assume the forecast for the period 1 is the same as the demand for period 1. Also assume initial $\alpha=0.12$

Using this we have



Varying alpha to get the most accurate model

SES alpha	MAPE		RMSE			
0.12	0.052619		74.00847195			
0.20925	0.04772	LEAST MAPE	69.79034			
0.29816	0.048748836		68.96512784	LEAST RMSE		
0.4	0.05095862		69.57546188			
0.9	0.062207335		81.68324857			



Conclusion

By varying Alpha we are merely trying to fit the model & minimize the error to historical data. Such tweaking will not necessarily produce a forecast. Also the coefficient of variation needs to be looked at. Higher CV means that data is more volatile & thus Alpha needs to be high to follow these fast changes.

Also increasing Alpha does not change the forecast much. This shows the robustness of the SES model.

From the above data, an increase between 0.15 and 0.20 would give a good forecasting model. But whatever the value of Alpha to be used in the model, it needs to be tested on new data to see how it performs.