Homework 9

Due: 11/23

Problem 1 (10 points). Use the *hw9_p1.csv* dataset for this problem. Suppose that you forecast the time series using the single exponential smoothing method that we discussed in the class.

(1). Calculate the RMSE for $\alpha = 0.1$
(2). Calculate the RMSE for $\alpha = 0.6$
(3). Which one is better?

For this problem, you must do all calculations yourself and you must not use any data mining or data analysis software. However, you may use spreadsheet, such as Excel, software for calculations.

Problem 2 (10 points). For this problem, use *hw9_p2.csv* dataset.

(1). Plot the time plot.

(2). Split the time series into a training set and a validation set with the validation set size = 10.

(3). Build a linear trend model from the training set and test it on the validation set. Plot the actual vs. predicted graph and calculate the RMSE.

(4). Build an exponential trend model from the training set and test it on the validation set. Plot the actual vs. predicted graph and calculate the RMSE.

(5). Build a quadratic trend model from the training set and test it on the validation set. Plot the actual vs. predicted graph and calculate the RMSE.

(6). Which model is the best?

Problem 3 (10 points). For this problem, use *hw9_p3.csv* dataset.

(1). Plot the time plot.

(2). Decompose the time series and plot the components.

(3). Split the time series into a training set and a validation set with the validation set size = 12.

(4). Build a model with quadratic trend and seasonality (refer to Slide 43) from the training set and test it on the validation set. Plot the actual vs. predicted graph and calculate the RMSE.

(5). Build a Holt-Winter's triple exponential smoothing model (refer to Slide 57) from the training set and test it on the validation set. Plot the actual vs. predicted graph and calculate the RMSE.

(6). Run the *auto.arima* function to find "best" parameters. Show the parameters in your answer.

(7). Build an *arima* model using the above "best" parameters. Plot the actual vs. predicted graph and calculate the RMSE.

Submission:

Include all answers in a single file and name it *LastName_FirstName*_HW9.EXT. Here, “EXT” is an appropriate file extension (e.g., docx or pdf). You also need to submit an R code file, *hw9.R*. Combine all files into a single archive file. Name it *LastName_FirstName*_HW9.EXT. Here, “EXT” is an appropriate archive file extension (e.g., zip or rar). Upload the file to Blackboard.