PROG8430 – Data Analysis, Modeling and Algorithms

Assignment 2

Time Series Analysis

DUE BEFORE 10PM OCTOBER 11, 2021

1. Submission Guidelines

All assignments must be submitted via the econestoga course website before the due date in to the assignment folder.
You may make multiple submissions, but only the most current submission will be graded.

SUBMISSIONS

In the Assignment 1 Folder submit:

1. Your R Code
2. A Word document containing your answers to the questions following the format provided in the assignment (i.e. using the example assignment).

DO NOT PUT THE DOCUMENTS IN TO A ZIP FILE!

PLEASE NOTE: Your Word document forms the basis of your evaluation and will be what is marked. The R Code is there for me to verify your results and therefore your commentary and output *must* be included in your Word document to be evaluated.

EXAMPLES: The example output provided is simply to demonstrate what a typical submission might look like. You can use it as a basis, but your submission must be in your own words. Submissions that simply "cut and paste" my example commentary will be marked 0.

All variables in your code must abide by the naming convention [variable_name]_[intials]. For example, my variable for State would be State_DM. Follow the example in the into video from week 1.

You may only use base R (i.e. no additional packages may be used) and the packages:

1. tseries
2. smooth
3. TTR

THIS IS AN INDIVIDUAL ASSIGNMENT. UNAUTHORIZED COLLABORATION IS AN ACADEMIC OFFENSE. Please see the Conestoga College Academic Integrity Policy for details.

2. Grading

This assignment will be marked out of 25 and is worth 5% of your total grade in the course. Late assignments will receive a mark of 0.

3. Data

Each student will be using two datasets:

Woodstock_21F.Rdata

Ayr_21F.Rdata

4. Background

Woodstock_21F.Rdata contains average temperature by month for the city of Woodstock. The dates covered are January 1988 to December 2017.

Ayr_21F.Rdata contains average temperature for Ayr for the years 1968 to 2003.

Both datasets have been retrieved from Environment Canada from data generated by local weather stations.

You will be using basic time series analysis to describe and forecast temperature for these two areas.

5. Assignment Tasks

Nbr	Description	Marks
SECTION 1: Woodstock Temperature		
1	Data Transformation 1. Read in the Woodstock data and transform it into an appropriate time series datatype.	1
2	Descriptive Data Analysis 1. Summarize the temperature information (mean, etc.) 2. Plot the time series data. 3. Decompose the times series data in to the constituent components. Comment on each (any trends you observe, etc.) 4. Determine if the time series is stationary. 5. Deseasonalize the information and plot the result. 6. Add any comments about what you observe: seasonality of temperature, trends, etc.	1 1 1 1 1 1
SECTION 2: Ayr Temperature		
1	Data Transformation 1. Read in the Ayr data and transform it into an appropriate time series datatype.	1
2	Descriptive Data Analysis 1. Summarize the information (mean, std dev, etc.) 2. Plot the time series data.	1 1

	3. Smooth the temperature chart using a moving average. Try 3 different values for the moving average and choose the one you think best shows the trend (if any). 4. Determine if the time series is stationary. 5. Create an autocorrelation chart (using acf) and comment on which lags are significant. Do previous values seem to influence current values?	2 1 1
3	1. Create a simple moving average forecast of temperature in Ayr for five years beyond the data provided. Graph your results along with a 75% prediction interval. 2. Create an exponentially smoothed forecast of temperature in Ayr for five years beyond the data provided. Graph your results along with a 75% prediction interval. 3. Compare the two forecasts you created in steps 1 and 2 above. Which forecast seems superior? Why?	1 1 2
7	Professionalism and Clarity of Presentation 1. Your submission will be evaluated on the basis of professionalism and clarity of presentation.	2