Northeastern University
College of Professional Studies

# Time Series Analysis in R

## Overview and Rationale

This assignment provides practice in decomposing the seasonal time series data and then subtract that effect from the data and then to show how to address issues of correlations between successive values of the time series.

## Course Outcomes

This assignment is directly linked to the following key learning outcomes from the course syllabus:

- Apply time series models for making better business decisions.

## Assignment Summary

Before beginning this assignment, review the learning resources for this module, especially focus on Decomposing Time Series, Forecasting using Exponential Smoothing and ARIMA Models sections of A Little of R for Time Series by Avril Coghlan.

Complete the following steps and write a report to record your work, results and analysis.

A. Decompose seasonal time series data and subtract that effect from the data:
    1. Identify an appropriate time series data set, this can be a data set in R or a data set you find.
    2. Then, use R to display decompose the seasonal time series and seasonally adjust to subtract the seasonal components from the time series.
    3. In your report, provide insights to the results.

B. Address issues of correlations between successive values of the time series:
    1. Identify an appropriate data set, this can be this can be a data set in R or a data set you find.
    2. Then use R time series functions to address autocorrelation issues in data sets. In many cases you can make a better predictive model by taking correlations in the data into account. Address autocorrelation issues (irregular components of

the time series) using a technique called ARIMA (Autoregressive Integrated Moving Average) models for irregular components of time series.

3. In your report, provide insights to the results.

**Report**

Your assignment/project should have a good cover/title page, introduction of what the goals of the project and the methods you use. It also should follow APA format with at least 1000 words (excluding title page and references page) and references page. In the body of your project you should incorporate the R codes and R outputs with interpretation of your results. Be sure to show all the elements in the official hypothesis, including the null and alternative hypothesis, the critical values, calculation of the test statistics and p-values. Finally, you need to make sense of your results to make good points with proper conclusions, to show your understanding of the course material and its application to the dataset.

Graphs, figures, charts, tables are very useful to increase visual effects to impress your readers. You also should do your best to give insight and understanding to the project with a good conclusion. Please use subtitles to make your assignment more reader friendly as well.

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**Assignment Rubric**

| Category | Meets Standards | Approaching Standards | Below Standards |
|---|---|---|---|
| **Introduction** | Introduction provides a brief and intelligible overview of the goals and methods of the assignment | Introduction provides an overview of the goals and methods of the assignment, but is ambiguous or not concise | Does not introduce project goals, project questions or methods. |
| **Analysis** | Provides all R code and the outputs. Includes interpretation of the output, graphs, figures, charts, and tables and the significance of the results in the analysis. | Provides R codes and outputs, but the R code does not match the outputs or is missing some code or outputs. Includes limited interpretations, charts, and tables and the significance of the results in the analysis. | Does not provide R code or its outputs or minimal R code is provided. Includes few interpretations, charts, or tables. Does not identify the significance of the results in the analysis |
| **Data Visualizations** | Data visualizations are appropriate for the level and type of analysis. Graphs, figures and tables communicate insights and significance to the reader. | Data visualization are useful for the level and type of analysis, but graphs, figures and tables do not clearly communicate significance of the results to the reader. | Data visualization are used minimally or not at all. If graphs, figures and tables are used, it is unclear what they are intended to communicate or why. |
| **Interpretation & Conclusions** | The conclusion summarizes and makes sense of the results, making good points that reflect clear understanding of the assignment material. | The conclusion summarizes and makes sense of the results, making good points that reflect a basic understanding of the assignment material. | The conclusion does not summarize or attempt to make sense of the results. Conclusions do not reflect an understanding or reflect a misunderstanding of the material |
| **Report: Writing Mechanics, Title Page, & References** | There are no noticeable errors in grammar, spelling, and punctuation; and completely correct usage of title page, citations, and references. The report contains approximately of 1000 words | There are very few errors in grammar, spelling, and punctuation; and completely correct usage of title page, citations, and references. The report contains approximately 1000 words | There are more than five errors in grammar, spelling, and punctuation; or the usage of title page, citations, and references are incomplete; or the report contains far less than 1000 words |

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