MSDS 604: Final Project Description

Administrative Details:
This project is worth **15%** of your final grade and the deliverable must be submitted by **5:00pm on Tuesday December 11th** (i.e. the same date as the final exam).

Learning Objectives
The purpose of this project is two-fold:
1. To evaluate your technical ability to construct an adequate model for a given time series and use this model to forecast future values of the time series.
2. To evaluate your ability to justify your choice of model and hence communicate your analysis approach in a non-technical manner.

Description of Problem
Accurately forecasting national bankruptcy rates is of interest to national banks, insurance companies, credit-lenders, politicians etc. The goal of this project will be to precisely and accurately forecast monthly bankruptcy rates for Canada. In the file "train.csv" you will find monthly data from January 1987 to December 2014 on the following variables:

- Unemployment Rate (%)
- Population
- Bankruptcy Rate (%)
- Housing Price Index

I expect you to use this data in whichever way you see fit, to construct a model for bankruptcy rates. You will then use this model to forecast the January 2015 – December 2017 bankruptcy rates. Should you choose to use it, monthly covariate information (unemployment rate, population, housing price index) for 2015–2017 can be found in the file "test.csv".

Deliverable
The deliverable for this project will be a written report that clearly communicates the information below, in a manner suitable for a reader who has not taken a course in time series.
- A description of the problem (i.e., what is the data, and what are we forecasting?)
- A description of available methods to solve the problem (i.e., different modeling approaches)
- A textual and visual justification of the method you chose to solve the problem (i.e., what type of model did you choose, how did you choose it, and why did you choose it?), and an acknowledgement of any limitations associated with your method.
- A graphical and tabular depiction of your forecasting results

In addition to the report you must submit a .txt file that contains your predictions in a single column with no header. The naming convention for this file shall be "TeamX.Yforecasts.txt" where X = 1 or 2 indicates your section and Y = 1, 2, 3, 4, 5, … indicates your team number within your section. The naming convention of the report

shall be "TeamX.Yreport.pdf". Both files must be uploaded on Canvas by one team member.

Grading Rubric
You will work in groups of size 4. Group assignment will be performed randomly in class. In accordance with the breakdown below, individual variation in project scores will be determined by a combination of peer evaluation and group ranking.

- 10%: Peer Evaluation
    - o On your final exam you will indicate the proportion of work completed by each member of your group (including yourself).
- 5%: Group Ranking
    - o Each group will be ranked based in their ability to accurately and precisely forecast 2015–2017 Canadian bankruptcy rates.
- 85%: Report
    - o The majority of your grade will be determined by your group's report. Specifically, I will be evaluating the completeness of your analysis, and your ability to clearly communicate the technical nuances of this analysis in a non-technical way.

Project Graded out of 20
    2: peer evaluation
    1: group ranking
    17: report

For the report:
    A: 17
    A-: 16
    B: 15
    B-: 14
    C: 13
    C-: 12
    D: 11

For the peer evaluation:
$$2 \times \frac{member\ average}{\max member\ average}$$

For the group ranking:
$$\frac{5 - \left(\frac{4}{numgroup - 1}\right)(rank - 1)}{5}$$