

STAT 443: Time Series and Forecasting

Lab 6: Model building using $ARIMA(p, d, q)$ processes - Part I

- The lab must be completed in **R Markdown**. Display all the **R** code used to perform your analysis.
- Create a pdf file and use it as your lab submission.
- Please ensure that the file you submit is in good order (e.g., not corrupted and contains the work you intend to submit). No late (re-)submissions will be accepted.

The dataset `TempPG.csv` includes minimum temperatures measured at Prince George, BC, from 1919 to 2008. Read the data into R using either `read.table()` or `read.csv()` commands.

1. The column labelled “Summer” contains the summer minimum temperatures.
 - (a) Extract those data, and coerce them into a time series object.
 - (b) Plot the time series, its sample acf and pacf. Ensure that your plots are properly labelled and are clearly displayed:
 - you may want to use the option “fig.height=8” in the R chunk containing the plotting commands;
 - one way to combine multiple plots into one figure is to use `par(mfrow=c(n,m))` prior to plot commands to display them as an $n \times m$ matrix.
 - (c) Comment on what you observe in these plots.
 - (d) If you were to fit an ARMA model to the above data, which would you select?
2. Fit the ARMA model you proposed above using the `arima()` command. Write down your fitted model.

Note that in the output of the `arima` command, ‘intercept’ refers to the mean of the process, which we denote by μ in class.
3. Use the `confint()` command to find 95% confidence intervals for relevant parameters.
4. Use the `tsdiag()` function to see diagnostic plots for the model you have fitted (remember to include “fig.height” option for a better display of your plots).

Comment on each plot.

How well does the model you proposed appear to fit?