

STAT 626 Final Project, Summer 1996, Due August 8 (tentative)

The purpose of this project is to provide a complete analysis of your data set. If you still don't have one or if the one you are analyzing has no structure (i.e. it is white noise or a random walk), please try to find another.

Write a macro that does the analysis described below and hand in a floppy disk containing the macro and the data set. Write a report that provides:

1. A description of the data, i.e. where it comes from, what the numbers represent, and what scientific questions are to be answered using time series analysis.
2. Descriptive statistics, i.e. plots of the data and the three descriptive statistics we discussed. Write on each of the plots any comments you may have about them.
3. Transformations, i.e. if you feel that your data contain trends and/or cycles, try out any transformations that you feel may be useful. Provide descriptive statistics for the transformed data and comment on whether or not they indicate that the result is adequately detrended. If you feel that your data has disturbed periodicities, don't try to remove them using detrending.
4. A spectral density estimate for your detrended (if it was necessary) data. Plot the periodogram and use the `WINDSP3` and `ARSP` macros to obtain possible estimates. Give any comments you can from scientific knowledge on which you feel is best and what the estimates tell you about your data.
5. Try to choose a full or subset ARMA model that adequately fits your detrended data. You will find the `IDNEW` macro and the `ARMASEL` command useful in this regard. Make sure to provide the value of AIC for any model that you might think is valid. In order to verify the adequacy of your model, provide the following diagnostics:
  - a. Use `SEASEST` to get residuals from the model and give the results of the `WNTEST` macro and the `QTEST` and `BARTTEST` commands for tests of white noise on the residuals.
  - b. A list of the sample correlations of the detrended data and those of the model you chose. Also a graph of the smoothed periodogram of your detrended data and the spectral density of the ARMA model you found. Comment on how well these match.
6. Obtain forecasts of the next 24 values of your series using the model you found in (5). Use the `SEASPRED` command to get the forecasts and produce a plot similar to that on page 240 of the text.
7. Write a summary of your results which answers the scientific questions posed in part (1).

Please be as brief as you can and please try to use as little paper as possible (for example, put more than one graph on a page if possible). It will be very difficult for me to read all 39 projects so brevity will help me!

Good Luck and please let me know if you are having difficulty in completing the project.