

Forecasting the Fuel Price Index

Assignment related to Chapter 3 of the book.

Many countries have web-access to time series data which contain important information about the social and economic conditions of the country, its workers, and the families. In the US the Bureau of Labor Statistics (www.bls.gov) is the principal time series and fact-finding agency for the Federal Government in the broad field of labor economics and statistics.

In this assignment we shall consider the fuel price index in the US for the period January 1979 to December 2004, and the primary goal is to provide good forecasts for the fuel price index for the first six month of 2005, and finally to comment on the results.

The data `fuel.csv` is found next to the assignment on the WEB¹. The data file contains four columns:

- Column 1 (`year`): The year as a four digit integer
- Column 2 (`month`): The month as a two digit integer
- Column 3 (`rtime`): `year + month/12`
- Column 4 (`fpi`): Fuel Price Index

Question 1

Plot the fuel price index as a function of time.

Question 2

Would it be reasonable to estimate the mean value and the standard deviation for the data? The answer should be elaborated.

¹Assignment (incl. data) is found at www.imm.dtu.dk/~hm/time.series.analysis

Question 3

Let us first consider a model for all the data.

Formulate a GLM model in form of a simple linear regression model for all the data. Estimate the model parameters. Would this model be useful for making predictions of the fuel price index?

Question 4

Now we will consider methods which considers data more locally.

Use simple exponential smoothing to predict the fuel price index for the first half of 2005 (Just choose a value for the smoothing constant, eg. 0.1). Comment on the results.

Question 5

Use a local trend model to predict the fuel price index for the first half of 2005. State the uncertainty on the predictions. Comment on the results (Hint: Consult the example in Sec. 3.6 of the lecture notes).

Question 6

Find an optimal value of the forgetting factor for use in the local trend model suggested in the previous question.

Question 7

Comment on the results. Do you trust the forecasts? Do you have ideas for extending the forecast method?