Exam Bootstrap

The exam will be available on 6 July 2017, 13:00.

Solutions will be submitted (sent via email to `oliver@kirchkamp.de` before 6 July 2017, 14:00. A late submission penalty applies.

For all your answers write down the commands you use to obtain these answers. Also include the answers in a short form (for each question do not include more than one line of output – usually your answer should just be one or two numbers).

1. Have a look at the data `mouse.t` from the package `bootstrap`. The IQR of this data is 89.5.

   a) Use a jackknife to determine the standard error of this estimate of the IQR.

   b) Determine a 95% confidence interval for the estimate of the IQR. Compare a normal, basic, bootstrap-t, percentile, and BC_a interval.

2. You use the dataset `Benefits` from `Ecdat` to explain the successful application for benefits `ui` as a function of the state maximum benefit level `statemb`. You use a logistic regression:

   ```
   library(Ecdat)
   data(Benefits)
   glm(ui=="yes"   ~ statemb,family=binomial,data=Benefits)
   ```

   You use the bootstrap to determine the standard error of the coefficient $\beta_{\texttt{statemb}}$.

   a) Use sampling pairs to determine the standard error (do not use the `boot` function).

   b) Now use the `boot` function to determine a standard error

   c) Now use the `boot` function to determine a 95% bootstrap-t confidence interval.

3. You use the dataset `Icecream` from `Ecdat` to estimate the following time series model:

   ```
   est<-arima(Icecream$cons,c(3,0,0),
         xreg=Icecream[,c("income","price","temp")])
   ```

   You are interested in the standard error of the coefficient of `temp`

   a) What is your estimate with the "moving blocks" method?

   b) What is your estimate if you bootstrap residuals?