

Experimental Design and Statistics - AGA46E

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Lab Session 2 - Summer Term 2015

1 Overview of Some Useful Commands in R

- standard mathematical operators: $+$, $-$, $*$ and $/$; In addition symbol $^$ is used for powers;
- basic data description characteristics: `min()`, `max()`, `mean()` and `median()` - for minimum, maximum, mean (sample mean) and median;
- some higher order characteristics: `sd()`, `var()` for standard error and sample variance;
- commands used to make a vector: `c()`, `seq()`, `rep()`;
- commands to create data tables (matrices): `cbind()`, `rbind()`, `matrix()`;
- some other useful commands: `ls()`, `t()`, `length()`, `dim()`, `sort()`, `order()`;

2 Loading Own Data into R

The R software is meant for statistical analysis of different datasets; Some pre-loaded data in R can be found by typing `data()` into the R console. However, it is more important to import our own data into the R environment. This can be done in many different ways.

- The easiest way to load data into the R environment is as follows:
 1. open your data file (e.g. in Excel, text editor, some other program);
 2. highlight the data you want to load in (Shift key);
 3. press CTRL + C (copy the data into the clipboard);
 4. in the R environment type

```
data <- read.table(file = "clipboard", sep="\t", header=TRUE)
```
 5. your data are now stored in `data` object (the command works for windows only);
- for Macintosh one needs to type `data <- read.table(pipe("pbpaste"), sep="\n")`;
- there are many different data types (file types) which can be loaded into R; (e.g. csv, txt, xml, jpeg, png, etc.)
- a few different commands available for loading dataset into R: (e.g. `read.table()`, `read.csv()`, `read.xls()`, `read.spss()`, etc.)
- additional parameters may be required to load a data file properly - see `?read.table()`
- to properly load data into the R environment one needs to correctly specify the data set; It is useful to look into the data file using some appropriate preview software to firstly understand the data;

- download data files `Ldata1.csv`, `Ldata2.csv` and `Ldata3.csv` and try to load them in R; (keep in mind additional parameters like `sep`, `dec`, `header`, `skip`, ... which can be useful)
- try to load the same data directly from the web repository; e.g.:

```
read.table("http://www.mmatthew.matfyz.cz/aga47a/Ldata2.csv")
```

- create your own data (e.g. a small table in Excel or some text editor) and save it; as an appropriate file (e.g. `xls`, `csv`, `txt`, etc.). Consequently, try to load this data file into the R environment;
- install package `png` or `jpeg` and try to load some picture into R; What did you load in? (hint: for package installation use command `install.packages()`)

3 Working with Data Using Graphical Tools in R

- load some data into the R environment and try some graphical tools; (start with command `plot()`, use the help session to get more details on this function and try to make more specific figures - `?plot`)
- try some graphical parameters available in `plot()` to change the picture and to make it nicer;
- try some other graphical functions: `dotchart()`, `pie()`, `barplot()`, `boxplot()`, `hist()`, ...
- plot some figure using the `plot()` command and try some additional plotting functions to add more elements into the existing figure: `lines()`, `abline()`, `segments()`, `points()`, or `legend()`
- for plotting multiple figures into one graphical window, try function `par()`;
- try to save an existing figure - click on the figure and use the main menu to save it as a proper file;
- for more advanced way to save a figure, try commands `jpeg()`, `png()`, `postscript()` or `pdf()`

4 Saving Your Data Files and All Your Work in R

- to briefly see your previous work - a list of commands you used, type `history()`
to save your history, type `savehistory(file="myfile")` - the default file type is ".Rhistory"
use `loadhistory(file = "myfile")` to load it later again;
- to save all your work (including calculations), use `save.image()`, to load it again, use `load()`
- quit R with the command `q()` - you will be prompted to save the workspace;