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# Exploratory data analysis

Info

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**Master's programme**

**Applied Statistics with Social Network Analysis**

International Laboratory for Applied Network Research

NRU HSE, Moscow 2018



# Outline

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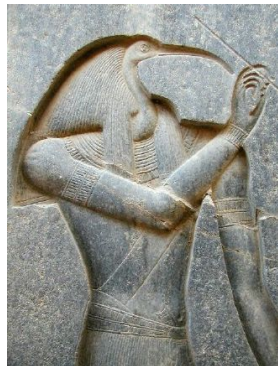
Requirements

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**Current version of slides (October 1, 2018 at 11 :42):** [slides PDF](#)



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Vladimir Batagelj: [vladimir.batagelj@fmf.uni-lj.si](mailto:vladimir.batagelj@fmf.uni-lj.si)

EDA on wiki:

<http://vladowiki.fmf.uni-lj.si/doku.php?id=ru:hse:eda>

Master's program: <https://www.hse.ru/en/ma/sna/>



# Program

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## 13. Exploratory Data Analysis. (4 cr.)

Prerequisites: Two statistics courses at the graduate level, or consent of instructor.

Numerical and graphical techniques for summarizing and displaying data. Exploration versus confirmation. Connections with conventional statistical analysis and data mining.

Applications to large data sets.

- Tukey, J.W., 1977. Exploratory data analysis. (for historical context in this area)
- Bock, H.H. and Diday, E. eds., 2000. Analysis of symbolic data: exploratory methods for extracting statistical information from complex data. Springer.
- Martinez, W.L., Martinez, A. and Solka, J., 2010. Exploratory data analysis with MATLAB. CRC Press.



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## Home projects:

- 1 download and fuse data; save them in CSV or JSON; basic analyses
- 2 collect the data from the web site; save them; basic analyses
- 3 analysis of a large data set: at least 10 000 units with mixed variables



# Time-table

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The lectures will be from 18:30h to 21:30h:

October 1, 2, 3, 4, 5,

October 6,

October 7 - off,

October 8, 9, 10

On October 6th, we ...



# Programming language and environment R

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Ross Ihaka and Robert Gentleman at DSC 2001

In this course we shall use the programming language/environment R.

R was developed in mid nineties by Robert Gentleman and Ross Ihaka from the Auckland University in New Zealand. It started as an open code version of S – a programming language for statistics. S was developed in 1976 by John Chambers and collaborators from Bell Laboratories. The commercial version of S is known as S-plus.

Project R was joined by many statisticians all around the world and gradually R became a language in which most of new statistical methods are developed and published.



# Why R ?

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- R is **free** – we can use it for free; we can install it on our home PC; it runs on all main OSs: Windows, Linux / Unix and Mac.
- R is **open code** – we can inspect all its code: learning, security, adaptations. Project collaborators created over 13128 (October 2018) packages – program libraries for solving specific data analysis problems (**CRAN/Contributed, R-Forge, GitHub**).
- provides procedures for high quality **visualization** of data and results.
- R evolved as a programming language for statistics, but has also many **applications in related fields**: decision support, finance, biochemistry, etc.





# Alternatives

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Computer scientists (data mining) prefer **Python** instead of R.

In the future the new programming language **Julia** could replace R.

To document the analysis the R's **Markdown** is often used or some other type of notebooks. In data analysis are quite popular **Jupyter** notebooks based on Python (**Anaconda Python distribution**) : R and **Julia**.

For collaborative projects we can use **wikis** or **GitHub**.



# Sources

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- Projekt R: <http://www.r-project.org/>
- CRAN (The Comprehensive R Archive Network):  
<http://cran.at.r-project.org/>
- RStudio: <https://www.rstudio.com/>
- The R Journal: <http://cran.r-project.org/doc/Rnews/>
- conference UseR! :  
<http://www.r-project.org/conferences.html>
- [the R graph gallery](#)
- Reference Cards: [R1](#), [R2](#), [RStudio](#)
- Ashlee Vance: [Data Analysts Captivated by R's Power](#). The New York Times, 6. jan. 2009