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# Computer Lab I

## Case Studies and BIOGEME

Anna Fernández Antolín

`anna.fernandezantolin@epfl.ch`

# Outline

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- Course website
- Organisation of the labs
- Case studies
  - Available datasets
- BIOGEME
  - Introduction and installation
  - Step-by-step example

# Course website

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Website available at:

<http://transp-or.epfl.ch/courses/decisionAid2014/index.php>

Semester projects available at:

- <http://transp-or.epfl.ch/studentProjects.php>
- IS-academia

# Organisation of the labs

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- Case Studies
  - Choose a dataset;
  - Test and interpret the example models;
  - Workbook: find results and possible interpretation of the examples.
- Material available at:  
<http://transp-or.epfl.ch/courses/decisionAid2014/labs.php>

# Organisation of the labs (cont.)

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## *Your lab participation*

- You will receive an e-mail with your group members before the 28<sup>th</sup> February;
- Work jointly with your group on the exercises given out every week (e.g. exercise-session1.pdf). The first two weeks you can work with the people of your choice;
- Two assignments (one on each part of the course) are to be handed in during the semester. These will be graded and each will count for a 20% of the final grade. Further details will be given.

# Case Studies

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- Goal: Study models
- Datasets to apply and use the models in practice:
  - Netherlands mode choice
  - Optima (Mode choice in Switzerland)
- Problem statement

Can the observed pattern of choice be explained in terms of basic economic variables, such as relative prices, income, and underlying individual characteristics (gender, age, etc.)?

# Datasets

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- Netherlands mode choice

Data on intercity travelers' choices between the transportation modes of rail and car.

- Optima

Data on Swiss inhabitants' mode choice among public transportation, private and soft (walk, bike, etc) modes.

# BIOGEME

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- Created by Michel Bierlaire;
- State of the art software for estimating models in the field of discrete choice;
- Open source;
- All models presented in this course can be estimated with BIOGEME;
- To download it, find documentation and examples refer to:  
<http://biogeme.epfl.ch>

# BIOGEME (cont.)

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- Two versions are available for Windows:
  - GUI
  - DOS
- We recommend the DOS version.

# Today's lab

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## Lab 1

- Install Biogeme
- Read the data descriptions available on the course webpage;
- Step-by-step example with BIOGEME using the Netherlands Mode Choice dataset.

# How to install Biogeme?

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- `biogeme.exe` should be in `C:\Program Files`.
- Open a DOS window (from the Start menu, select Run. In the dialog box, type `cmd` and select OK).
- In order to use BIOGEME from any directory on your computer, the above directory has to be in your “path” (environment variable).
- Type  
`path=%path%; "C:\Program Files\Biogeme_windows"`  
(in the DOS window).
  - This has to be typed every time the DOS window is opened.
- To check if the installation has been successful, just type `biogeme` in the DOS window. A message displaying the version of BIOGEME should then appear.

# How to invoke Biogeme?

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- BIOGEME is invoked in a DOS command window under Windows using the following statement structure:

```
biogeme model_file sample_file.dat
```

- 2 types of file: .mod & .dat
- The graphical version of Biogeme `guibiogeme.exe` (also available in `C:\Program Files\biogeme`) is invoked by a double-click on the executable file.

# DOS Command Window

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Useful commands:

- To select a drive (e.g. C), just type `C :` at the prompt.
- To connect to a directory (e.g. `C:\biogeme`), just type `cd C:\biogeme`.
- To see the content of a directory, use Windows Explorer, or type `dir`.
- In order to return to the previous (top) directory, type `cd ..`

# On Mac OS X (and Linux)

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## Useful commands:

- To connect to a directory (e.g. `biogeme`), just type `cd biogeme`.
- To see the content of a directory type `ls`.
- In order to return to the previous (top) directory, type `cd ..`
- To know where you are, type `pwd` (print working directory)

# How does BIOGEME work?

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- BIOGEME reads:
  - a file containing the model specification  
`model_file.mod`
  - a file containing the data `sample_file.dat`
  - Both are text documents (open with wordpad)
- `biogeme model_file sample_file.dat`
- BIOGEME automatically generates:
  - A file containing the results of the maximum likelihood estimation: `model_file.rep.`
  - The same file in HTML format: `model_file.html.`

# Example

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- Netherlands mode choice
- Choice between rail and car
- 228 revealed preference (rp) observations
- Travel times and travel costs are used as explanatory variables for the model, and the deterministic utility specifications are:

$$V_{\text{car}} = \text{ASC}_{\text{car}} + \beta_{\text{cost}} \text{cost}_{\text{car}} + \beta_{\text{time}} \text{time}_{\text{car}}$$

$$V_{\text{rail}} = \beta_{\text{cost}} \text{cost}_{\text{rail}} + \beta_{\text{time}} \text{time}_{\text{rail}}$$

- The model is specified in `model_file.mod`

# Example (cont.)

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Extract from the file containing the data `sample_file.dat`

id	choice	cost_rail	time_rail	cost_car	time_car
1	0	40	2.5	5	1.167
2	0	35	2.016	9	1.517
3	0	24	2.017	11.5	1.966
4	0	7.8	1.75	8.333	2
5	0	28	2.034	5	1.267
219	1	35	2.416	6.4	1.283
220	1	30	2.334	2.083	1.667
221	1	35.7	1.834	16.667	2.017
222	1	47	1.833	72	1.533
223	1	30	1.967	30	1.267

- 1 row = 1 observation
- 1 column = 1 variable

# Estimate your first model

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- Download the two files from the course webpage to the directory of your choice (e.g. Desktop).
- In the DOS window, move to this directory using the `cd` command.

- Invoke BIOGEME:

```
biogeme model_file sample_file.dat
```

- Open the HTML file `model_file.html`.
- We briefly discuss it.