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## EXERCISES SESSION 8

The topic of this session is *Validation and forecasting*. You will work with one of the specifications for the *Netherlands mode choice* case study developed in previous labs and you will perform different tasks related to the validation of the model and the forecasting and calculation of relevant indicators. The purposes of this lab are the following:

- perform an outlier analysis using the simulation file from Biogeme to generate the probabilities and any statistical software for the analysis,
- compute relevant indicators to better understand the behavior of the population, and
- evaluate different hypothetical scenarios,

First, download the file `Netherlands_Val_For.zip`. It contains:

1. the **data** file `netherlandsRP.dat`, and
2. the **model** file `Netherlands_Base_Model.py`.

### Aggregation

Since the procedure that has been used to collect the sample is assumed to be *stratified random sampling*, we need to associate a weight with each group or stratum, and then with each individual. Create an additional column for the dataset `netherlandsRP.dat` containing the individual weights.

### Simulation file

Now we ask you to create a simulation file (you can call it `Netherlands_Base_Simul.py`) in order to answer the following questions:

1. Compute the predicted market shares for car and rail with stratified random sampling.
2. Compare the predicted market shares with the actual choices. More precisely calculate the following shares:
  - share of users choosing car with a higher probability for rail, and
  - share of users choosing rail with a higher probability for car.

Try to find the possible causes.

### Indicators

Use the simulation file to compute the following indicators:

1. Value of time:

- (a) Provide an estimate of the average value of time in the population in eur/h for each alternative.
- (b) Analyze the distribution of the value of time for each alternative in the sample by identifying the socioeconomic characteristic(s) that play(s) a role in the calculation of the value of time and report its value together with the 90% confidence interval.

## 2. Aggregate elasticities

- (a) Elasticity of the share of car with respect to travel time by car
- (b) Elasticity of the share of car with respect to the cost of car
- (c) Elasticity of the share of rail with respect to travel time by rail
- (d) Elasticity of the share of rail with respect to the cost of rail
- (e) Elasticity of the share of car with respect to travel time by rail
- (f) Elasticity of the share of car with respect to the cost of rail
- (g) Elasticity of the share of rail with respect to travel time by car
- (h) Elasticity of the share of rail with respect to the cost of car

### **Forecasting**

For this part of the lab, we ask you to compute the predicted market shares for an increase of the cost of rail of 10%.

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