Badji Mokhtar Annaba University
Department of Urban Planning

Master in Smart Urban Planning, Semester 1 — UEM1.1.2: Programming Workshop

Lab Session 1: Mobility Analysis in Annaba

Instructor: Dr. Hatem Zehir — Level: Master 1

Objectives

Using a household travel survey (Enquête Ménages Déplacements: EMD) and a road network of Annaba, you will practise the full workflow of an urban data analyst: **cleaning**, **descriptive statistics**, a **flow map**, and the **identification of black spots**.

Set-up

1. Install **Anaconda** (`https://www.anaconda.com/download`), a free package that includes Python and Jupyter Notebook. Open Jupyter Notebook and create a new notebook.
2. Two libraries are used (both already included in Anaconda). **pandas** reads, cleans and summarises tables. **matplotlib** draws charts and maps. If one is missing, type `!pip install pandas matplotlib` in a cell and run it.
3. Put `emd_annaba.csv`, `nodes.csv`, `edges.csv` and `accidents.csv` in your working folder.

Exercise 1: Reading and cleaning the survey

Work on `emd_annaba.csv`.

(a) Load the file, display the first rows, the number of rows and columns, and the type of each column.
(b) Count the missing values and the duplicated rows, delete the double entries.
(c) Harmonise the text of the categorical columns (capital letters, extra spaces) and check the result.
(d) Treat the missing and impossible values (e.g. unrealistic ages or durations). Report the number of rows before and after cleaning.

Exercise 2: Descriptive statistics

Use the cleaned table.

(a) Compute the mean, median, minimum and maximum of trip duration and distance.
(b) Compute the modal share (in %) of each transport mode and the number of trips per departure hour.
(c) Draw a bar chart of the modal share and a histogram of trip duration, with titles and axis labels. Comment on the morning and evening peaks.

Exercise 3: Flow map and black spots

(a) Count the trips for each origin, destination pair and remove trips that start and end in the same zone.
(b) Using `nodes.csv` and `edges.csv`, draw the road network in grey and add the flows as lines whose width is proportional to the number of trips.
(c) With `accidents.csv`, count the accidents per node, identify the three main black spots, and show them as red circles on the map.
(d) Save the final maps at 300 dpi.

Deliverables (maximum 4 students per team, one week)

1. **Lab report** (PDF, 5 pages maximum) with: *Introduction*, *Method*, *Results and Discussion*, *Conclusion*. Interpret your results; do not only paste code.
2. **Notebook** named `TP_name_family_name.ipynb` (or `TP_name_family_name.py`): commented code with all outputs and figures displayed inside the notebook (no separate image files).