INFPROG2 P05 – Individual Application Project – Variant: Mobility Startup

This project runs over 6 weeks (SW10-SW14 plus extra week) and thus yields 6 points. It is supposed to be solved in teams of 3 students.

This project work targets students who are interested in a cyber-physical setting, combining the real world with software. It entails working with existing data, understanding and processing it, detecting patterns or insights, as well as results data visualisation.

The setting for this particular project variant is in ‘smart mobility’ or ‘digital mobility’, based on the tracking of individual vehicles concerning their arrival and departure times at stops in a network.

1.1 Administrivia

Technical assistance will be given by the lecturer in the five Saturday labs in presence. The international startup coach for this project is Francesco. You are permitted to contact him twice, sending the current progress and asking feedback about the project direction, the ability to execute and follow the code by somebody who has not seen it before, and the convincing business story. You can contact him in English or Italian at francesco.martella@unime.it.

1.2 Dataset

The file ‘**`P05_StartupProjectMobilityDataset.zip`**’ contains a link to the CSV file with the planned and actual times of the arrival of vehicles in the VBZ network during one week in March 2023, as well as documentation on the file format. An excerpt of this file (line 10 in one direction) is directly contained as well to facilitate a first exploration of the data.

1.3 Problem statement

The data is multi-dimensional: Multiple lines, multiple vehicles, multiple courses, multiple stops, multiple paths (indirectly inferrable), and multiple points in time. Delays may occur along any of those dimensions, e.g. a vehicle may be slower than others, or a path has an obstacle affecting all lines. Solve one of the following three associated challenges:

(A) Determine whether the reliability of two lines differ on the same path, and if so, explore the differences further to understand the cause.

(B) Report on the top 10 of most unreliable stops. Where should you never wait for your transportation?

(C) Flexible travelling times: Are ‘Randzeiten’ really better? When would be the best time to travel e.g. between HB and ZHAW buildings in the city of Zurich, and could students use it to optimise their schedules?

1.4 Requirements

Combine your programming know-how from the first two semesters, with emphasis on the content of the second semester: OOP, file I/O, Internet data retrieval if applicable (e.g. for auxiliary data), data format handling and plotting, input validation and sanitisation, testing and tuning, high code quality with documentation, peer review and linting… and reflect on what you used consciously for your solution.

At least one Python module beyond what was mentioned in the lecture slides must be obtained from PyPI and used as part of the solution.

1.5 Submission

On May 21, submit a pitch flyer (one page A4 PDF) to the lecturer. The flyer should convey the name of your startup/solution, the team members with photos, and what the benefits of the solution are, i.e. why somebody in agriculture might want to invest into it.

On May 27, in the last lab, give a brief presentation (5’ per team) pitching the solution to the other students.

On June 3, submit the final solution to the lecturer as a ZIP file. If the ZIP is large, you can use SWITCHdrive to share a file via link. The submission should include:
- all the code and data
- final flyer PDF
- brief description: how to run, how the team was organised, and reflection on how programming know-how was applied