Internship proposal: Censored demands estimation in vehicle sharing systems

keywords: Vehicle Sharing Systems, Data mining, Prediction

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Self-service vehicle systems are spreading and diversifying, ranging from electric scooters to TESLA autonomous cab systems.

Such systems have been in use for a long time, for example Vélib' in Paris since 2007 or Citibike in New York since 2013. Due to travel patterns, demand is not evenly distributed and some areas end up with an imbalance between demand and available vehicles. These full (respectively empty) areas result in departures (respectively arrivals) that cannot be served. In order to address this imbalance, vehicle repositioning has been widely studied in literature. However, this work is highly dependent on demand estimation. In particular, it is fundamental to be able to estimate the censored demand (not satisfied by the system).

Your internship will be based on 3 pillars:

- determining the parameters useful for predicting demands in self-service systems,
- propose methods for estimating demands, in particular censored demands,
- evaluate the impact of the parameters on censored demands.

You will work in collaboration with a PhD student from the Operations Research for Production Systems team of the G-SCOP laboratory. The thesis concerned, funded by the LabEx PERSYVAL-Lab (ANR-11-LABX-0025-01), focuses on the integration of the tools needed to study self-service vehicle systems into a reproducible methodology. Data acquisition and correction has already been addressed, and a first estimation model has already been proposed. Your work will also be anchored in the reproducible research movement. You will therefore be attentive to work in an Open-Source context and to automate the processing procedures used. A knowledge of `R` is required.

This internship will allow you to improve your skills on predictive statistics techniques. You will also be introduced to the constraints imposed by reproducible research.

Profile: Student in Master 2 Statistics or Applied Mathematics.

The internship will take place at the G-SCOP laboratory in Grenoble, for a period of 5 to 6 months starting in February 2021.

Remuneration: about 570€.

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