



Joint optimization of bike and car sharing networks

Problem description

In the last years there have been many studies on the planning and operation of shared mobility systems particularly using optimization techniques. Models have been proposed to optimize the fleet size, vehicle relocations, and the operation area of both car and bike sharing programs. Today the reality is of a complex urban system that offers several of the shared modes at the same time therefore there are opportunities to study the synergies of operating both bikes and cars simultaneously since many cities have at least these two modes. In this project the student will work with mathematical modeling for optimizing the functioning of both systems at the same time, including the relocations of both, considering that there are travelers that are willing to use both types of vehicles and that the management of both these systems is different. The solutions should be compared to the solutions of operating these modes individually.

Main references from previous work:

- Jorge, D., Correia, G. and Barnhart, C. (2014) 'Comparing optimal relocation operations with simulated relocation policies in one-way carsharing systems', IEEE Transactions on Intelligent Transportation Systems, 15(4). doi: 10.1109/TITS.2014.2304358.
- Huang, K., Correia, G. and An, K. (2018) 'Solving the station-based one-way carsharing network planning problem with relocations and non-linear demand', Transportation Research Part C: Emerging Technologies, 90. doi: 10.1016/j.trc.2018.02.020.

Assignment

The assignment will consist of:

- Literature study
- Propose and build an optimization model for jointly optimizing shared bikes and shared cars
- Data preparation
- Compare before and after scenarios of the case-study

Background

A student who has affinity with working with software and is willing to work with mathematical optimization models. The project time span will be 6 months and will be mainly guided at the Department of Transport & Planning.

Research group

The project can be conducted as final thesis project for MSc Civil Engineering –Transport & Planning track or MSc in Transport Infrastructures and Logistics.

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