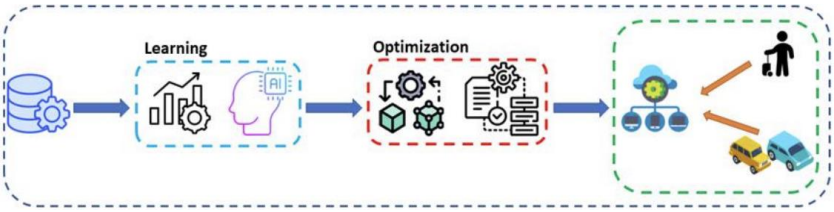
Data-driven optimization for shared mobility systms



Problem description

Shared mobility systems, including ride-hailing and ride-sharing platforms, are foundational to modern urban transportation. Their success hinges on the seamless matching of riders with drivers. However, many existing matching approaches do not consider the information about future rider demand when making matching decisions. This results in unassigned drivers roaming in the city, leading to longer waits for riders and empty vehicle-kilometres. In response to this challenge, this graduation project will leverage demand patterns learned from travel demand data and provides statistically optimal driver guidance strategies to balance the supply and demand of each region. By achieving this, we aim to:

• Decrease riders' waiting time, thus enhancing their overall satisfaction with the service;
• Provide precise guidance to drivers, minimizing their need for detours (and associated externalities), reducing their operational costs, and potentially boosting their earnings.

Assignment

In this project, you will study how to design a data-driven optimization framework based on machine learning and stochastic optimization. The project will involve the following tasks:

- Design machine learning algorithms that utilize historical travel demand data to learn the demand probability distribution of each region in the ride-hailing system
- Design a stochastic optimization model to compute statistically optimal guidance strategies for open drivers
- Compare the designed approach with the currently applied matching algorithms

Candidate

The ideal candidate should:

- have interest in time series prediction
- have affinity and interest in mathematical modelling
- have coding skills in Python or similar

Research group

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