20. Optimization Review

金力 Li Jin
li.jin@sjtu.edu.cn
上海交通大学密西根学院
Shanghai Jiao Tong University UM Joint Institute

上海交通大學
SHANGHAI JIAO TONG UNIVERSITY

Overview

- Optimization problems in smart cities
  - Path planning for vehicles
  - Routing for transportation networks
  - Location of urban facilities
  - Rebalancing of shared bikes
  - Trajectory planning for CAVs
  - Balancing for smart grids
- Optimization problems and methods
  - Linear programming
  - Convex optimization
  - Dynamic programming

Network optimization

- Network systems
  - Transportation
  - Electricity
  - Communications
- Network optimization
  - Network flow model
  - Shortest-path problem
  - Max-flow problem
  - Min-cost flow problem
- Linear programming formulation

Static Path Planning

- Path planning in Euclidean spaces
  - One-dimension
  - Two-dimension
- Path planning on networks
  - Minimum spanning tree problem
  - Traveling salesman problem
  - Chinese postman problem

Facility Location

- Introduction
- Facility location in Euclidean space
  - k-median problem
  - Coverage problem
- Facility location on networks
  - k-median problem
  - Center problem
  - Requirement problem

Bike Sharing

- Background
- Formulation

Dynamic Path Planning

- Problem formulation
- Markov decision processes

Dynamic Routing: MDP

- Network dynamics
- MDP formulation

Smart Grid Load Balancing

- Background
- System model
- Stage 1: Power load balancing
- Stage 2: Data workload distribution