Data Science and Communication in Smart Cities

Day 1: Team Project Topics

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Instruction

- Seven topic candidates to choose from
- Each student group, after discussion, orders their topic preference, from 1 (most preferred) to 7
- Topic assignment and tie-breaker
- You are encouraged to think freely and go beyond the examples mentioned in each application topic :)

Topic candidates

1. Electricity monitoring and coordination

2. Sharing economy services

3. Earthquake/flooding early warning

4. Commute convoying

5. Train/metro emergency response

6. Public transportation integration

7. Traffic orchestration

Topic 1: electricity monitoring and coordination

- Objective
  - Orchestrate city-scale electricity demand and response
- Requirements
  - Data science: visualizing energy generation and consumption statistics
  - Data communication: collecting real-time data of energy generation and consumption
- Analysis of challenges and issues
- Proof-of-concept prototype implmenetation

Topic 2: sharing economy services

- Objective
  - Improving economy services based on usage patterns
- Requirements
  - Data science: identifying and classifying usage patterns for economy services
  - Data communication: data acquisition, distribution, and control
- Analysis of challenges and issues
- Proof-of-concept prototype implmenetation

Topic 3: earthquake/flooding early warning

- Objective
  - Timely notification of incoming seismic wave, flooding, and/or tsunami
- Requirements
  - Data science: estimating epiccenter and earthquake intensity at each city
  - Data communication: data collection at each station; real-time public notification
- Analysis of challenges and issues
- Proof-of-concept prototype implmenetation

Topic 4: commute convoying

- Objective
  - Providing safer commute routes for children and/or elders
- Requirements
  - Data science: commute route recommendation, traffic and volunteer information
  - Data communication: traveller location reporting; patroller recruiting
- Analysis of challenges and issues
- Proof-of-concept prototype implmenetation

Topic 5: train/metro emergency response

- Objective
  - Automatically stop the vehicles in face of emergency
- Requirements
  - Data science: structual health monitoring (rail track, bridge, tunnel, etc.); marking event location
  - Data communication: emergency notification; location reporting
- Analysis of challenges and issues
- Proof-of-concept prototype implmenetation

Topic 6: public transportation integration

- Objective
  - Offering comprehensive travel transfer recommendation
- Requirements
  - Data science: historical traffic statistics, classified by type of transportation; transfer options
  - Data communication: user-specific data subscription; status update
- Analysis of challenges and issues
- Proof-of-concept prototype implmenetation

Topic 7: traffic orchestration

- Objective
  - Reactively and/or proactively tune city-scale traffic condition
- Requirements
  - Data science: identify current and potential traffic congestion
  - Data communication: update traffic light frequency to re-direct or relieve traffic jams
- Analysis of challenges and issues
- Proof-of-concept prototype implmenetation