

Incentive Mechanisms for Autonomous Vehicular Crowdsensing (AVCS)



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https://www.nsf.gov/awardsearch/showAward?AWD_ID=1739409

Goal: Developing an incentive mechanism for AVs crowdsensing able to provide spatial and temporal coverage

Challenges:

- Create AVCS data market –cities and communities
- Create game theoretical (GT) approaches that allow communities monetizing their AVs for data collection.
- Create GT frameworks to incentivize participants to provide data with spatial and temporal coverage

Approach:

- Design of compatible utility functions for platform and participants to reach **temporal coverage** under the assumption: *any sample obtained immediately after another offers almost no additional value but waiting too long for sensing in the hope of maximizing reward, may be risky other can take your place.*

Solution: waiting time Nash Equilibrium

- **Spatial Coverage:** By using the **Fréchet distance** we build the concept of spatial diversity; thus, vehicles deviate from their pre-planned trajectory and their collection reward depends on the spread of their trajectories

Impact on Society

- Provide guidelines to city planners to involve community members in crowdsensing campaigns.
- Allow communities to monetize their Avs

Scientific Impact:

- Creating an AVs crowdsourced sensing market
- Improving autonomous vehicle navigation based on utility functions
- Proposing new utility functions for AVs and Crowdsources.

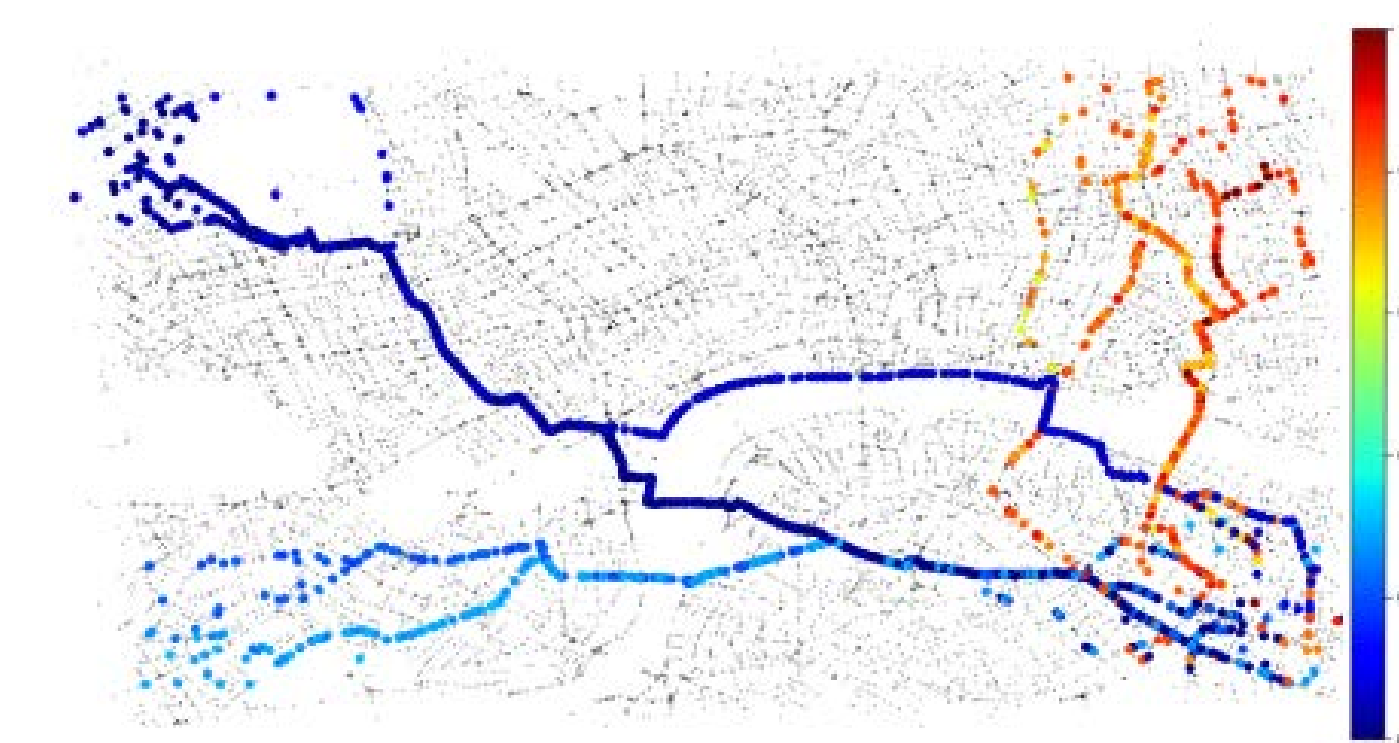
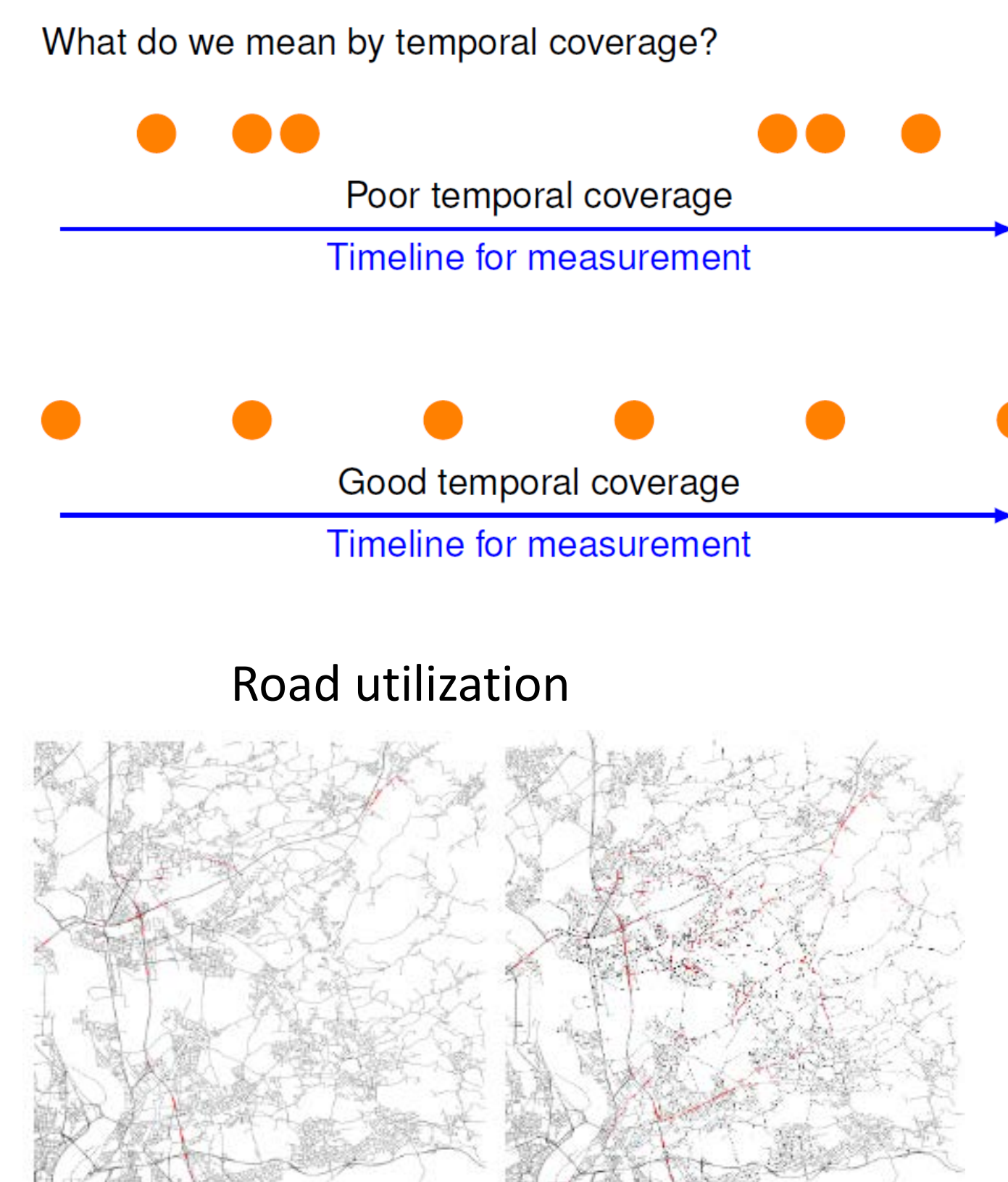
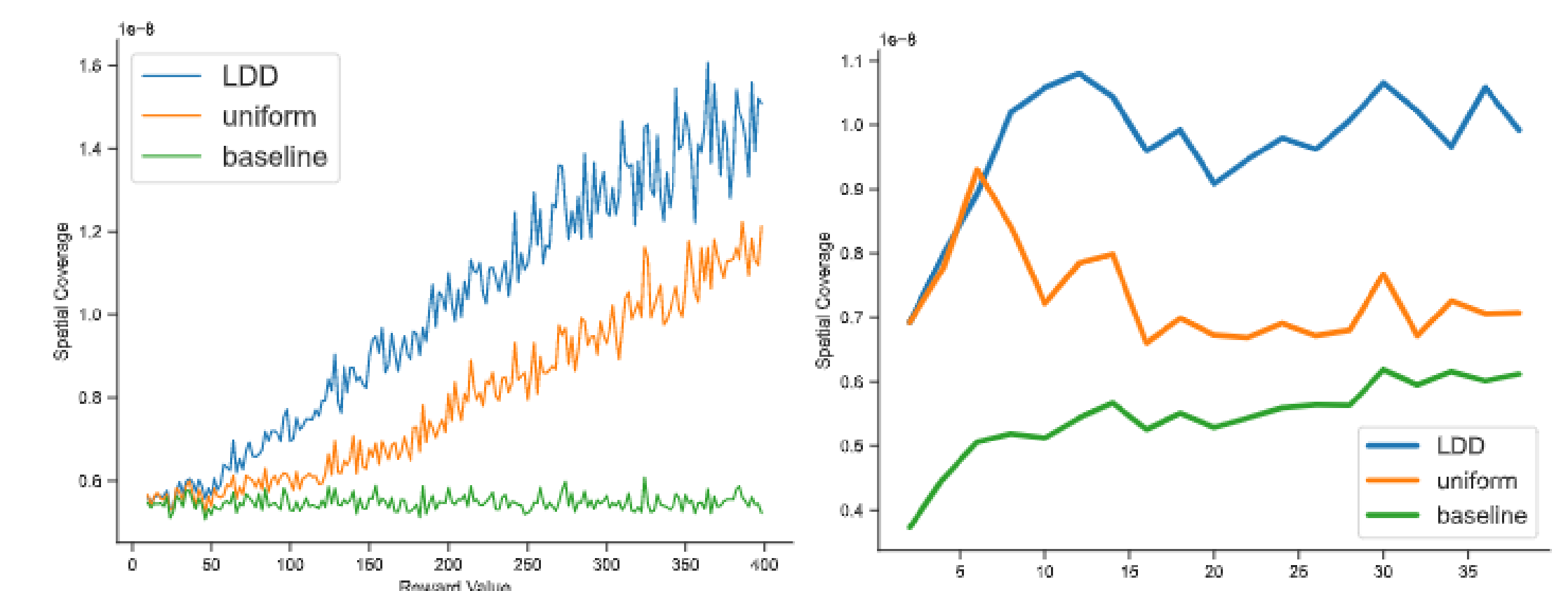


Fig. 1: Diversity heatmap



Potential Impact

- Improves the quality of the acquired data in terms of temporal, and spatial coverage
- Researches will have a platform for simulation with pre-made utility functions to maximize temporal spatial coverage data collection.

Impact on Education and Outreach

- Exposure of students to computational modeling and experimentation
- Engaging multiple undergraduate, and graduate students in research
- Adding new topics to FI Poly curriculum