An Online Mechanism for Ridesharing in Autonomous Mobility-on-Demand Systems

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AMoD Systems

Components:

- A fleet of electric, driverless cars
- Information Center (Dispatch center)
- Passengers (Demand)
- Environment (Infrastructure)

Objective:

To satisfy passengers’ mobility demand with limited resources
Ridesharing in AMoD Systems

Characteristics:

- No drivers

Challenges:

- Truthful demand information needed
- Passengers may not cooperate
Limits of Existing work

Key Limits:

• require passengers to directly reveal their valuation

• need additional constraints to satisfy desirable properties

• do not work in online settings

(For a complete list, see the introduction in Shen et. al., 2016)
Integrated Online Ridesharing (IORS) Mechanism

An Overview :

- Fare Estimation
- Pickup Assignment
- Payment Calculation
Fare Estimation

Providing an upper bound of the cost
Pickup Assignment

Computing the optimal pickup assignment
Payment Calculation

Calculating the final payment upon arrival
IORS is Desirable

Properties:

- Ex-post Incentive compatibility
- Individual rationality
- Budget balance
IORS is Competitive

Figure 1: A comparison of demand distribution, the social welfare scores and computational time of a system with three different approaches: the IORS, an auction-based mechanism and the optimal solution.

Figure 2: A comparison of the performance of a system with three approaches: the IORS, an auction-based mechanism, and the optimal solution.
Conclusion

Contribution:

• Introduce a posted-price, online mechanism (IORS)
• IORS is ex-post incentive compatible
• IORS is competitive

Future work:

• Distributed mechanisms
• Simulation platform
Thanks!

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