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Title: A Mobility Equity Metric for Socially Optimal Emerging Mobility Systems

Abstract: Global urbanization and burgeoning urban populations impose several societal challenges associated with disparities in transportation opportunities, reduced accessibility to essential services for marginalized communities, and increased social isolation due to lengthy commutes. Although emerging mobility systems, e.g., connected and automated vehicles (CAVs), and shared mobility, provide the most intriguing opportunity to mitigate these challenges, research efforts have focused mainly on optimizing their operation efficiency in isolation without deliberating on human acceptance and perception. Addressing the societal issues inherent in emerging mobility systems remains largely uncharted territory. The core of these societal challenges lies in the unequal distribution of transportation modes and access to urban resources, giving rise to "mobility equity." While mobility equity has been studied from multiple perspectives, including socioeconomic parity, equitable spatial infrastructure allocation, and alignment of resource distribution with societal needs, a critical gap remains in integrating mobility equity principles into emerging transportation modes. In this talk, I will present a mobility equity metric (MEM) to quantify the accessibility and fairness in a transportation network consisting of CAVs and human-driven vehicles. I will then present a routing framework integrated with MEM that aims to distribute travel demand for the transportation network, resulting in a socially optimal mobility system. A "socially optimal mobility system" is defined to be a mobility system that (1) is efficient in terms of travel time, (2) improves accessibility, and (3) ensures equity in transportation. To accommodate compliant and noncompliant vehicles to the routing suggestions, the framework incorporates a cognitive hierarchy model commonly used in behavioral economics to predict human decisions in transportation systems. The proposed framework aims to bolster mobility equity by addressing transportation and resource access disparities.

Useful References

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