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Advancing Transportation Safety and Sustainability Using Big Data and Machine Learning

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Abstract

Transportation systems around the world continue to face significant challenges such as persistent safety problems, rapidly rising traffic congestion, and deteriorating air quality. These challenges can be potentially addressed using the latest developments in information technologies and increasing availability of Big Data. Big Data presents a unique opportunity to apply massive volumes of data from multiple sources for timelier optimization of transportation services and network capacity, while improving the safety and experience of travelers. However, before these potentials can be fully realized, many technical challenges must first be addressed including: the incompleteness and heterogeneity of available data, responsiveness and timeliness of decision-making and information provision, and consideration of complex traveler behavior and responses. In this talk, I will provide an update on our recent work in this topic with a specific focus on managing and controlling transportation systems for maximum safety, efficiency, and sustainability. Specifically, I will present some progress of our research on two research topics: 1) signal control optimization using travel time data, and 2) transportation safety studies using deep learning.