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# The Effect of Information Uncertainty in Road Transportation Systems

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## Abstract

Developments in Intelligent Transportation Systems (ITS), navigation devices and traffic sensors make it possible for traffic participants to not just access real time information regarding the traffic situation but, at the same time, also provide data back to the transportation system. This creates a feedback loop that can have significant consequences on the system performance in terms of total average travel time. In the current paper, the effect that different types of information inaccuracy can have on the system performance is investigated. The different sources of inaccuracy are categorised into three groups: sparsity of data sources, collection and presentation inaccuracy. Subsequently, an agent-based microscopic traffic simulation is used to explore the effects that each type of inaccuracy can have on the transportation system. Experiments reveal certain interesting observations. Firstly, less than twenty percent of the traffic participants need to be data sources for optimal system performance. It was also discovered that lower precision of information presented to participants is sufficient and, in certain cases, better for system performance. This can have important implications on how information is displayed on navigation devices.

*Keywords:* Information Uncertainty, Participatory Sensing, Human Complex Systems, Information Propagation, Dynamical Information, Traffic Dynamics, Transportation Systems, Congestion,

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