

Special Session title

Data Driven Optimization and Predictive Modeling for Smart Cities

Special Session proposer(s)

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Abstract

The term Smart-city widely refers to the adoption of a digital ecosystem of digital services and policies aimed at improving the design, operation and efficiency of urban assets and tools, with a focus on mobility and energy efficiency, among other objectives alike. In order to realize a holistic smart city strategy, data-based technological services such as demand profiling and the optimization of public mobility assets are critical and must be embraced by both service providers and end users. To this end, design drivers such as energy efficiency, scalability and robustness must be pursued for the data-based services to become fully actionable. In addition to these technological challenges, smart mobility services devised for their application over smart cities must also ensure the access to all the traditional services demanded by rising urban populations, as well as their environmental sustainability towards a greener and more efficient mobility. Going deeper into technical details underneath smart mobility services, in most cases a shared computational problem emerges: a scarcity of resources that need to be optimized. For instance, the allocation of shared transportation means, routing with electric vehicles, multi-mode transportation planning, bike sharing, etc. From a scientific point of view, optimization problems deal with real-world situations that are not that simple to formulate analytically, thereby entailing a great computational complexity that require sophisticated algorithmic means to address them efficiently. Usage and demand forecasting models are an essential instrument for urban transport planning. It is evident that while the complexity of models increases, their performance seems to have reach its upper limit. Hence, research should steer its focus to other important, yet neglected, aspects of predictive modeling, like their explainability and actionability, by applying novel AI and ML techniques. Thus, this Special Session aims at disseminating the latest findings on data-driven optimization and predictive modeling, with an intention to balance between theoretical research ideas and their practicability and industrial applicability.

Keywords

- Data Mining and Data Analysis
- Theory and Models for Optimization and Control
- Automated Vehicle Operation, Motion Planning, Navigation

Topics of interest

- Novel Distributed Optimization methods, including cellular and island-based schemes.
- Meta- and Hyper-heuristics for optimization.
- Multi-objective and many-objective solvers.
- Online optimization based on real time traffic sensing data.



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- Novel Transportation predictive models, particularly those that take advantage of state-of-the-art techniques
- Actionability of predictive models for smart cities, taking into account aspects like output confidence or explainability
- Application of novel AI concepts to predictive modeling.
- Hybrid models encompassing traditional urban traffic models and data-based models (e.g. Deep Learning)