

OPTIMIZATION STRATEGIES FOR TRANSPORTATION

organized by

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Workshop Summary

Summary.

The intent of this workshop was to bring together a mix of planning and transportation practitioners and advanced data science and mathematics professionals to explore larger transportation problems, refining these into specific problem statements using mathematics and statistical analysis, and to identify future research opportunities for addressing the problem statements.

Presentations and Workshop Flow.

Workshops each day began with overview presentations. Three formal presentations were provided, one on the state of transportation and transit planning at the VTA, the second on the use of mathematical simulation models at VTA and the third on a description of large data sets developed and used by the VTA for various transportation planning purposes and transit operations analysis. At the conclusion of the presentations, workshop participants were presented with example problem statements and provided input. Problem statements that were refined and discussed included the following:

Optimization of Transportation Supply

This was one of the larger problem statements and was concerned with addressing how an agency might measure and increase the overall efficiency of transportation systems. Participants defined what types of data would need to be provided as well as described specific optimization techniques that could be used to determine system performance. One conclusion was that this problem statement had many facets and optimization of the overall transportation system could almost be an intractable problem. However, given enough data, there are various optimization techniques in practice that could be used to provide meaningful methods to improve transportation efficiency.

Factors that influence pedestrian travel demand

This problem statement addressed how variables can be used to describe and predict pedestrian travel choices. Pedestrian travel and what influences the choice to walk are of significant value to the VTA being the transit provider for the region. Participants discussed what types of data would be useful to determine pedestrian travel as well as possible methods to determine traveler sensitivities to the built environment when choosing to travel as a pedestrian.

Uses of large data sets to solve transportation problems

This was one of the more meaningful problem statements discussed in terms of using mathematics and statistical methods to provide meaningful insights into transportation problems. Specifically, the group discussed what types of data were being produced by VTA from on-board sensors and how that data could be analyzed to produce measure of delay and efficiency. Items such as calculation of vehicle-delay at bus stops, dwell time and segment delay times were identified as potential elements that could be described by analysis of large data sets produced by the VTA.

Concluding Statements/Lessons Learned.

Overall results of the workshop were mixed. One limiting factor was that the variety and number of workshop participants did not provide an optimal group, in particular, participation of the invited transit and transportation planning professionals. It would have been helpful to have many more planning practitioners from several different agencies to provide a larger list of problem statements to be discussed instead of having most practitioners from the VTA. Another factor probably not thoroughly considered is that transportation planning is a broad discipline and considerable research has been done to address many issues in the practice. It was brought up several times that there already is a large body of work to addressing optimization problems in transportation planning. It was difficult sustaining workshop momentum for both of these reasons. Yet given these shortcomings, one positive outcome was that the workshop provided VTA staff an opportunity to become familiar with members of the research community and to provide opportunities to establish partnerships to continue research on the problem statements that were defined. As VTA produces more large data sets to provide metrics for analysis, the opportunities for mining the data for planning purposes and research becomes more significant, and it is anticipated that VTA can follow up to identify and program research funds as well as engage the research community to address the problem statements resulting from the workshop.