Public Abstract

First Name:Emre

Middle Name:

Last Name:Demir

Adviser's First Name:Timothy C.

Adviser's Last Name:Matisziw

Co-Adviser's First Name:

Co-Adviser's Last Name:

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Many transportation analyses involve fusing multiple sources of data to build a better representation of how a transportation system can be or is used. However, the integration of multiple data sources, each of which may entail a range of uncertainties, can make inferences of system characteristics a challenging problem. In this context, a better understanding of how data on transportation activities, network topology, and geospatial context are related to one another is needed. To address these issues, this dissertation investigates methods for: 1) associating location-based observations of movement with network topology and other measurements of activity, 2) modeling the relationship between geographically referenced observations of transportation activities and other geographic features, and 3) assessing the spatial similarity among network paths. New methodologies for addressing these themes are proposed, and applicability of these methods to a real-world transportation analysis problem is demonstrated through an implementation in a commercial geographic information system (GIS).