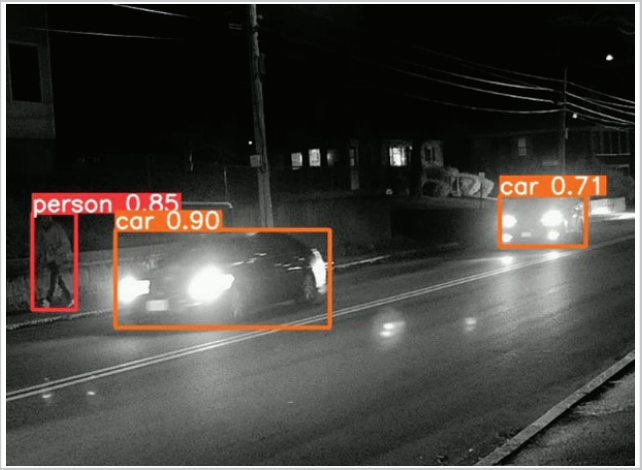
Research Summary

Developing Massachusetts-Specific Trip Generation Models for Land Use Projects

Research Need

In the United States, trip generation estimation typically relies on the Trip Generation Manual published and updated by the Institute of Transportation Engineers (ITE). The ITE manual uses trip generation data derived primarily from suburban project sites that are highly automobile-dependent. It sometimes overestimates the trip generation rates for urban sites such as those in Massachusetts that benefit from their proximity to public transportation.



Goals/Objectives

Over- and under-estimation of trip generation may result in either significant waste and unfair financial burden on developers or inadequate infrastructure to support the state's economic activities. On the other side, collecting data to calibrate the ITE trip generation models is both time-consuming and expensive. This research aims to

(1) Explore the feasibility of using location-based services (LBS) data to develop Massachusetts-specific trip generation models for high-priority land uses.

(2) Develop an accurate and reliable automated trip generation data collection tool. This tool will allow MassDOT to collect ground truth data for future trip generation studies such as model development and validation.

(3) Use the tool to collect trip data and evaluate the accuracy of the developed Massachusetts-specific trip generation models.

Methodology

(1) Conduct a comprehensive review of existing models, data sets, data collection methods, and best practices for trip generation estimation. Identify high-priority land uses.
(2) Develop Massachusetts-specific trip generation models for the identified high-priority land uses using location-based services (LBS) data. Specifically, the StreetLight data is used in this study.
(3) Develop a Trip Generation Model Guidance to help MassDOT utilize and update the developed models.
(4) Develop a computer vision and deep learning based solution to facilitate trip generation ground truth data collection.
(5) Collect ground truth trip data using the deep learning solution and use the data to evaluate the accuracy of the developed Massachusetts-specific trip generation models.

Key Findings

Using LBS data significantly reduces the time and efforts needed for model development, making it possible to frequently update trip generation models and capture temporal trends. The computer vision and deep learning tool is very useful for collecting ground truth trip generation data for future model development and validation. The LBS data is reasonably accurate and can be used as a promising data source for developing Massachusetts trip generation models.

Use of Findings

Given the difficulty in collecting trip generation data, this research has proposed an innovative approach of utilizing LBS data for developing trip generation models. Utilizing the StreetLight data, a popular LBS data set, this research has developed a set of trip generation models for ten high-priority land uses for Massachusetts, which can be used by MassDOT in practices. It demonstrates the feasibility of using non-traditional data sources for quickly developing state-specific trip generation models and frequently updating them.

This research has provided a detailed guidance on how to develop and update trip generation models using LBS data. This guidance together with the scripts prepared for this study can be adjusted to take other non-traditional data sources (such as Replica) as the input if data like StreetLight is not available.

The computer vision and artificial intelligence (AI) tool can automatically extract vehicle counts from traffic videos. Such data can be used to either directly develop trip generation models or to validate the performance of models based on LBS data.

Project Information

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Principal Investigators:
Yuanchang Xie, Danjue Chen, and Benyua Liu
Performing Organization:
University of Massachusetts Lowell
Project Champion:
Lionel Lucien
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Research and Technology Transfer Section
MassDOT Office of Transportation Planning
Planning.Research@dot.state.ma.us

massDOT
Massachusetts Department of Transportation