

Research Project Title

Using Big Data and Machine Learning to Evaluate and Optimize the Performance of Traffic Signals in Tennessee

Purpose of the Project

In the state of Tennessee, thousands of traffic signals covering major metropolitan areas and dotting smaller cities and major arterials are an integral part of the State’s transportation mobility system. Most traffic signals utilize fixed-cycle scheduling, and there are no continuing, systematic, and standardized approaches to evaluating and improving their performance; instead, a very small number of traffic signal timing plans are reviewed by consultants only after repeated complaints or unusual crash numbers. This is highly undesirable and has not been addressed so far due to cost, manpower, jurisdiction, and technology issues. Our project will address this problem by finding an economical way to evaluate the performance of the traffic signals in Tennessee and identify the most deficient ones that need immediate attention.

Scope and Significance

We will come up with a ranking formula to evaluate the performance of traffic signals from the perspectives of safety, efficiency, etc. Machine learning algorithms will also be utilized to facilitate the ranking system development. The ranking system will effectively identify and prioritize deficient locations for improvement. The project is expected to help improve the transportation infrastructure in Tennessee. The direct and indirect benefits include: (i) reduced commute time, waste of fuel, and emissions; (ii) increased productivity and quality of life; (iii) more streamlined operations of public transportation; and (iv) enhanced safety.

Expected Outcomes

A traffic signal ranking system will be developed and tested. In addition, a cloud-based database containing the ranking data of different traffic signals will be established. The database will allow users to browse/query the ranking data and identify the traffic signals that need immediate attention.

Time Period

9/1/2020 to 02/28/2022

Contact Information

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