NEVADA DEPARTMENT OF TRANSPORTATION

RESEARCH DIVISION

FREEWAY AND ARTERIAL PERFORMANCE ANALYSIS WITH HIGH-RESOLUTION TREJECTORY DATA

Key · Points

Project Number:
500-22-803

Start Date:
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Duration:
29 months

Project Cost:
$471,340.00

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PROBLEM

One critical component of freeway and arterial traffic management is performance analysis, where transportation agencies collect data, evaluate traffic operations, identify performance issues, and develop potential solutions. High-resolution vehicle trajectory data, as an emerging source, provides detailed measures that reflect freeway and arterial performance in terms of operational and safety characterizations. Practitioners can leverage high-resolution trajectory data together with traffic control information as diagnostics for identifying issues and supporting solutions, such as arterial signal retiming, travel time reliability, and freeway work zone management. However, NDOT's current tools lack the granularity and flexibility required to exploit the full potential of high-resolution trajectories, so research is needed into innovative methodologies and software tools that can transform raw trajectory data into meaningful performance measures and provide new insights for traffic management. This proposed project aims to develop such methodologies and a software tool to enhance current practices at NDOT and nationwide.

OBJECTIVES

This research focuses on three major objectives: (1) Leverage high-resolution trajectory data to develop traffic operational and safety performance measures tailored to the needs of transportation agencies in Nevada. (2) Conduct case studies and develop implementation guidelines for using high-resolution trajectory data to enhance freeway and arterial performance analyses. (3) Develop an easy-to-use software tool that can extract and visualize trajectory data. The tool can ultimately be used to examine and enhance performance measures obtained from data platforms, generate custom performance measures to fulfil the performance analysis needs of NDOT and other project stakeholders, and facilitate signal timing projects and traffic management.

METHODOLOGY

The research will study the methodology of using high-resolution trajectory data to measure and evaluate the operational and safety performance for freeway and arterial. The currently available sources of high-resolution trajectory data will be investigated, and the optimal ways to acquire and collect the trajectory data will be determined according to agencies' needs and different scenarios. The feasibility of performance measures affecting safety and operations, other than the current standard of travel time, will be evaluated.

IMPLEMENTATION POTENTIAL

High-resolution trajectory data acquired from data companies or collected through agencies' effort are expected to offer a new perspective for perceiving operational and safety performance of freeway and arterial systems. The potential applications include, but are not limited to: freeway and arterial daily performance monitoring, traffic signal timing diagnosis and evaluation, work zone and detour management, travel time reliability evaluation, project prioritization, and project-related before and after studies.