TDOT RDS Data Quality Assurance and High-Resolution Content Enhancement

Problem Description

The need to understand the state of traffic and its dynamics is only increasing on Tennessee's major roadways. Increasing passenger and freight demand is driving congestion and safety concerns. TDOT is taking major steps to address these concerns for the motoring public through capital projects, active traffic management strategies, and real-time incident response. A major source of real-time roadway condition data in Tennessee is the RDS data system. Over 800 detectors across the state provide information on vehicle counts, classifications, and speeds. Crucially, they take high-fidelity measurements that are not available from many alternative sources, while being non-invasive for easy construction and maintenance. The challenge remains that powerful insights from the data can be hampered by suboptimal data quality and usability or availability limitations. Specific limitations that exist in the RDS data stream include degraded system uptime, short periodic data outages, a high degree of noise in data at some fidelity levels, and loss of sensor calibration over time.

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PROJECT SCHEDULE:
August 2022 to January 2025

Research Objectives

Goal 1: Improve the value of radar data for TDOTs current and future operational needs

- Increase the fidelity of RDS data products.
- Ensure complete and high-quality data products
- Improve reliable delivery of data the RDS system

Goal 2: Expand the data distribution, analytics, and visualization capabilities of RDS data

- Implement a high-performance database for all RDS data products
- Deploy GUI tools for executing data queries and generating visuals

Potential Implementation and Expected Benefits

Determining proper traffic management strategies for real-time congestion and incident response requires reliable and high-fidelity measurements of traffic speed and occupancy from the RDS system. When enhanced RDS data is available, TDOT can expect improved incident response and quantification of traffic management effects. The improved data streams that are derived from single-vehicle measurements will provide greater insight into freight traffic by allowing separation of large truck data from passenger vehicle data. In addition to better vehicle classifications, aggregated data measures can be calculated for each class and each lane, independent from other vehicle classes. TDOT can use the data to inform cost/benefit analyses, and to support more efficient investments. Conditions across the State can also be evaluated and compared using a common dataset.

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