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Traffic Volume Prediction of Unmeasured Locations Using ML Methods

Abstract

Accurate measurement and prediction of Annual Average Daily Truck Traffic (AADTT) is crucial for effective transportation planning, infrastructure design, freight movement analysis, and policy decisions. Although some roadways in Tennessee use permanent count stations and Automatic Traffic Recorders (ATR) to monitor traffic, these stations are typically limited to major roadways due to high installation and maintenance costs, as well as the traffic disruptions they incur. As a result, many roads lack continuous traffic monitoring data, hindering the ability of agencies like the Tennessee Department of Transportation (TDOT) to make informed decisions. To address this gap, this study examines cutting-edge methods employed by various Departments of Transportation (DOTs) and proposes a web-based machine learning (ML) tool specifically designed to predict AADTT with high accuracy. The tool integrates a Graph Neural Network for prediction with an interactive Folium map interface for visualization. By eliminating the need for installing costly permanent count stations at every location and significantly reducing prediction errors compared to conventional average-based methods, this approach provides a more practical and efficient solution.