



Transportation Data Science Seminar Series

Using an Interpretable Machine Learning Framework to Understand Mobility and Reliability Considerations in Truck Drivers' Route Choice

Seminar summary

This study explores the relationships between Travel Time Index (TTI) and the Planning Time Index (PTI), two proven indices used to measure real-time congestion and travel time reliability, and their impacts on truck drivers' route choices through training a predictive model based on a machine learning algorithm – eXtreme Gradient Boost (XGBoost). Moreover, this study adopts an interpretable machine learning framework called SHapley Additive ExPlanation (SHAP) on the predictive model to reveal the insights usually hidden inside the so-called machine learning “black box.” The predictive model was trained through a truck trajectory dataset provided by the Maryland Department of Transportation State Highway Administration (MDOT-SHA) and INRIX. The classical logistic regression model is adopted as the baseline model. The results show the XGBoost model can better handle the non-linearity and provide more reliable predictions. Through the SHAP framework, the results indicate that the mobility and reliability indices and the total trip time nonlinearly influence the route choices. Truck drivers are more sensitive to real-time congestion information and reliability information when the difference of mobility and reliability indices on candidate routes reach certain thresholds. Moreover, the interaction study on trip time and mobility index found that truck drivers are more sensitive to real-time congestion information if the candidate routes' travel time is a larger portion of the total trip time. This seminar series is co-organized by Department of Landscape Architecture and Urban Planning, Transportation Institute, and Institute of Data Science at Texas A&M University.

Speaker's information



Dr. Yunlong Zhang is a Professor at the Zachry Department of Civil & Environment Engineering at Texas A&M University with a joint appointment with the Texas A&M Transportation Institute. Dr. Zhang has more than 35 years of professional experience as an engineer, educator, and researcher. He has conducted scholarly research in many areas of transportation engineering, including modeling, simulation, and analysis of traffic flow, traffic control devices and signal systems, safety analysis, and modeling and evaluation of emerging technologies such as connected and autonomous vehicles. His particular strengths include analyzing urban data with advanced techniques such as artificial intelligence. He has published over 100 journal papers, many of which appeared in top journals such as IEEE transactions on Intelligent Transportation Systems, and Transportation Research Part A, B, C, D, E and F.

Time: 8:00-9:00 p.m. US Central Time (Thursday, September 23, 2021)

Zoom Meeting ID: 732 641 0814 Passcode: 575829

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