Planning, Policy and Programming

Learning Drivers' Utility Functions in a Coordinated Freight Routing System Based on Drivers' Actions

Developing a Methodology for Utility Functions for Truck Drivers' Actions

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Project Title:
Learning Drivers' Utility Functions in a Coordinated Freight Routing System Based on Drivers' Actions

Task Number: 3381

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Completion Date: February 29, 2024

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WHAT IS THE NEED?

The development of a centrally coordinated routing system for trucks is a promising upcoming technology. Such a routing system would produce routing instructions based on making the road network more effective instead of decreasing a truck driver's cost for a certain route.

The success of a centrally coordinated system will depend on individual truck drivers responding to incentives from centrally generated routing instructions.

Given that the efficiency of the road network depends on what truck drivers do, it is vital the the Central Routing System monitors each truck driver's actions by developing utility functions. Since utility functions may change over time due to various external factors, the constant monitoring and fine-tuning of these utility functions based on the actual actions of truck drivers is important to keep the centrally generated routing instructions accurate and timely to provide the best road network solution.

WHAT ARE WE DOING?

Researchers will complete the following tasks: 1) develop a methodology to learn drivers' utility functions from their responses to centrally coordinated routing instructions and incentives; 2) evaluate the impact of using wrong utility functions; 3) develop a methodology to reflect changes and updating them; 4) use data and testing equipment that reflects traffic on a large road network, Ports of Los Angeles/Long Beach, inland ports and warehouse locations to evaluate the effectiveness of the proposed method; and 5) using a sensitivity analysis to examine the impact of utility functions and not obeying an instruction on the central coordinated routing system.

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WHAT IS OUR GOAL?

The purpose of this project is to develop a methodology for estimating the utility functions of truck drivers based on their response to a centrally coordinated routing system.

WHAT IS THE BENEFIT?

A benefit of this project to Caltrans and other entities is a more effective road network, reduced operational costs, less traffic congestion, reduced emissions, and improved air quality. Another benefit is to help Caltrans better understand the utility of time savings for truck drivers using a centrally coordinated routing system.

WHAT IS THE PROGRESS TO DATE?
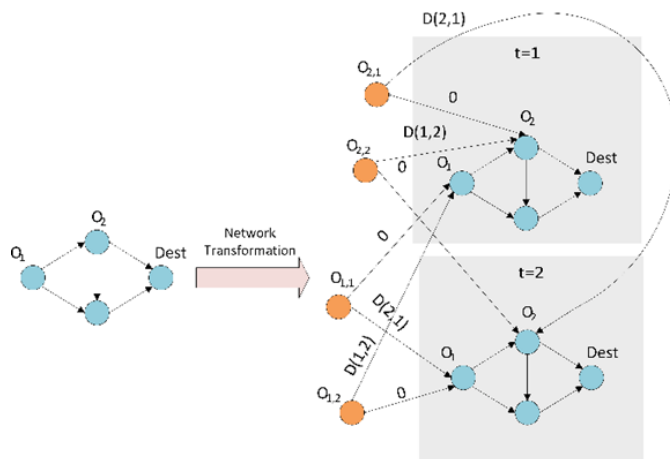
A kick-off meeting will be scheduled in January 2023.

IMAGES

Image 1: Coordinated Freight Routing with Individual Incentives