Operations Planning Toolbox

Identifying the Need

The Operations Planning Toolbox (OPT) is a project to develop a user-friendly, well-documented, open-source, multi-modal transportation modeling software for quick, quantitative assessment of operational scenarios in terms of mobility and safety, provided as a desktop application, and supported by UC Berkeley PATH. It was designed to replace FREQ12, also developed by UC Berkeley.

What is the goal?

This new software, a mesoscopic simulator, supports the fast execution of the analysis of freeway and corridor operations as well as highways and multi-lane road analysis.

Project Description

OPT is a corridor simulation program designed to quickly assess the effectiveness of traffic management techniques such as ramp metering and managed lanes. OPT incorporates all of the functionality of its predecessor program -- FREQ -- and also adds new functionality, such as high occupancy/toll (HOT) lane policies. OPT employs Open Traffic Models (OTM) as its computational core. OTM is a traffic simulation engine also recently developed by PATH researchers, for the purpose of advancing research in areas that are currently beyond the reach of most commercial simulators.

Projected Benefits to California

The Operations Planning Toolbox has a clean, accessible, self-explanatory user interface and offers an efficient way of building and modifying road networks. It provides easy tuning of simulation parameters (e.g., freeway capacities) according to established criteria. OPT displays simulation results as contour or timeseries plots that can be easily exported to Excel spreadsheets, simplifying reporting procedures.

What is the progress to date?

The research was completed in February 2021. On November 6, 2020, the Operations Planning Toolbox (OPT)

Version 1 was released. It is a fully functional traffic planning and analysis tool with the following features:

- A configuration module with an intuitive user interface that allows building the road network, specifying input demands and outgoing traffic flows, modeling different types of traffic (e.g., single-occupancy vehicles [SOV's], trucks), defining policies for managed lanes (including high-occupancy vehicle [HOV] lanes and high-occupancy toll [HOT] lanes), and setting ramp metering policies for HOV and low-occupancy vehicle (LOV) traffic.
- A simulation module that handles multimodal traffic, implements lane changing behavior, and accepts outgoing flows in two formats – as off-ramp flows and as split ratios that determine the portions of traffic to be directed to off-ramps.
- Reporting of simulation results in the form of pie charts for summaries, time series charts, and contour plots for spatial-temporal data. Simulation results can be exported to Excel.
- Users can set their preferences about simulation setup, duration, and reporting granularity.
- On August 30, 2021, a hands-on walkthrough tutorial was done for District 4; and on September 28, 2021, OPT was presented at the Caltrans Traffic Operations Research Forum.

Final Report

Home (ucbtrans.org)

About the Developers

OPT was developed by UC Berkeley PATH in cooperation with Caltrans, who sponsored the project, and System Metrics Group.

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Dr. Alex Kurzhanskiy is a Research Engineer at California PATH whose interests and expertise include multi-modal

modeling and simulation, multi-dimensional geospatial and timeseries data analysis, and cloud computing.

Dr. Gabriel Gomes is an Assistant Research Engineer and lecturer at California PATH with expertise in the areas of traffic modeling, simulation, and system control.