

Planning, Policy,
and Programming

MAY 2019

Project Title:

Demand Forecasting and Activity-based
Mobility Modelling from Cell Phone Data

Task Number: 2793

Start Date: March 1, 2015

Completion Date: March 31, 2016

Task Manager:

Frank Law
Sr. Transportation Planner
Frank.law@dot.ca.gov

Demand Forecasting and Activity-based Mobility Modelling from Cell Phone Data

Machine learning methods were developed to transform anonymized cellular data collected by carriers into regional activity-based travel demand models.

WHAT IS THE NEED?

Activity-based demand models are powerful tools that provide firm foundation to transportation planning and operations. Unfortunately, it takes several years to collect and process the data required to build such model when approached in a traditional way through manual surveying. Time and costs of travel demand modelling could be drastically reduced using novel big data techniques.

WHAT WAS OUR GOAL?

This project aimed at developing algorithms of big data processing for building activity-based models from cellular data, at a fraction of the time and cost as compared to the traditional framework. It then illustrated the methods by building a micro-simulation of mobility in the San Francisco Bay Area.

WHAT DID WE DO?

We developed machine learning methods that can learn from anonymized cellular data to produce simulated activity and travel sequences representing travel behavior of the population in the region. We have validated this approach by building a travel micro-simulation of a typical day in the San Francisco Bay Area, using data from a national telecom operator.

WHAT WAS THE OUTCOME?

We have achieved the main goal of the project to demonstrate feasibility of fast algorithmic processing of cellular data into



Caltrans provides a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability.

activity-based travel models that can be used to generate realistic travel itineraries of the population in the region. We have observed promising results by comparing our finding with traditional travel surveys. Experimental deployment of the model in the Bay Area has shown reasonable fit to the observed travel volumes data. These results show how to use big data, and cellular data in particular, for transportation planning.

WHAT IS THE BENEFIT?

We have demonstrated that the developed technology, if implemented in an operational practice, could drastically reduce costs and time it takes for a DOT to build and maintain a regional travel demand model.

LEARN MORE

An animation video describing the project goals and results is available at
<https://drive.google.com/open?id=0B11pPzYXyRWgZTVxb2NkbkN1c2s>

IMAGES



The contents of this document reflect the views of the authors, who are responsible for the facts and accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the California Department of Transportation, the State of California, or the Federal Highway Administration. This document does not constitute a standard, specification, or regulation. No part of this publication should be construed as an endorsement for a commercial product, manufacturer, contractor, or consultant. Any trade names or photos of commercial products appearing in this document are for clarity only.