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
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=0B11pPzYxRWgZTVxb2NkbkN1c2s

**IMAGES**

The SmartBay Morning Commute