Answering Tough Mobility Questions with iPeMS Analytics

July 25, 2018
Big Data in Transportation
Manual Data Collection
Big Data Collection

- Probe Data
- Sensor Data
- Historical Data
- Social Data
- Weather Data
- Camera Data
- Transit Data
Iteris and Big Data
Transportation Analytics

From data to insights to actions

Descriptive
What happened

Diagnostic
Why did it happen

Predictive
What will happen

Prescriptive
What should we do to make it happen

Applications / Solutions Stack

ATIS
SPM
iPeMS

Difficulty

Value
iPeMS Overview
iPeMS® Solution

iPeMS collects, analyzes, and visualizes Smart Transportation data in the cloud

USE CASES FOR iPEMS DATA

- Planning Studies and Modules
- Identify the Causes of Unreliability
- Legislatively Required Monitoring
- Pinpoint Congestion & Incident Hotspots
- Monitor Real-Time Traffic Conditions
- Before and After Studies
- Measure Construction Hotspots
- Prioritize Corridors for Retiming
iPeMS in Southern California

- Caltrans PeMS (statewide)
- San Bernardino County
- LA Metro iPeMS (Arterial Performance Measure Pilot)
- Pasadena
- Santa Monica
iPeMS in Southern California

• Caltrans PeMS
  – Kitchen sink of data sets, mostly on freeways (1999-current)
  – NPMRDS data on National Highway System for MAP-21 reporting
  – Specialized multimodal ICM features for I-15 (SANDAG)

• Pasadena iPeMS
  – HERE 3rd party probe data (2013 – current)

• Santa Monica iPeMS
  – HERE 3rd party probe data (2013 – current)

• SBCTA iPeMS
  – HERE 3rd party probe data (purchased by Caltrans D8, 2014 – current)

• LA Metro iPeMS (San Gabriel Valley Pilot Region)
  – INRIX 3rd party probe data (July 2014 – Dec 2016)
  – Traffic volume profiles from 48-hour counts on key arterials
iPeMS Southern California Case Studies
LOS Monitoring for CMPs

- SBCTA transitioned from manual traffic counts and floating car runs to 3rd party probe data

iPeMS produces LOS results for all corridors in a few clicks

Benefits
- Higher sample size
- Less money ($40k savings)
- Less staff time
- iPeMS + probe data can support many other agency projects
Mountain Area Transportation Planning Study

The Big Bear/Lake Arrowhead area is characterized with strong weekend / holiday traffic

• The model was not set up to deal with these non-commute traffic patterns
• The team reviewed 1 years’ worth of data between May 2015 & April 2016

The Team Used iPeMS to:

• Review 24/7 data to identify the peak periods on typical weekends, summer weekends & holiday weekends
• Understand seasonal trends
• Review the impact of inclement weather i.e. snow
• Write an existing conditions report
Incident Management

On 8/16/2016, the Blue Cut Fire began just west of I-15 in Cajon Pass. Later that day, the I-15 and other roads were closed. The I-15 reopened two days later. 89% of the fire was contained by 8/22.

SBCTA monitored conditions region-wide including the performance of the detour routes.
Incident Management
Signal Synchronization

SBCTA uses customized routes to review and to rank the need for resynchronization.

**Method**

1. Define signal synchronization corridors in iPeMS Third Party.
2. Extract the performance for each route in the AM, Midday, PM and Midnight time periods.
3. Fuse with model volumes to calculate the vehicle-hours of delay.
4. Review and rank the delay.
The City of Pasadena uses Monthly Contours to study traffic trends around holidays across their busy corridor.

- Daily and Monthly Contours help users see monthly and seasonal trends.
- Contours are auto generated across a user defined corridor.

**November Month Contour**
Arterial Queue Lengths

Pasadena testing new arterial bottlenecks feature for real-time operations and evaluating congested intersections over time.
Caltrans PeMS NPMRDS module automates MAP-21 system performance measure calculations

- Compare performance month-to-month and year-to-year for target setting
- Access to same UI/measures statewide for MPO/statewide collaboration on target setting
ICM Performance Measurement

ICM Decision Support Visualizations

- User can pick a date
- Incidents and response plans for the selected day are displayed on a timeline
- Signals, ramp meters, DMS and incidents can be toggled for display on map
- Clicking on incident, response plan or ITS element icons shows more information
Metro Arterial Performance Measure Pilot

1. List of Performance Measures
   Transportation System Management (TSM) projects make up a large portion of LA Metro’s investments. As these are often focused on improving arterial traffic flow, the performance metrics that LA Metro gathers must also be applicable to arterials. Example metrics include travel time reliability, vehicle throughput, transit on-time performance, and control delay.

2. Data Collection/Sources
   There are a variety of sources available to LA Metro that have the data needed for calculation of arterial performance metrics. These sources are both public and private, and include detector data, transit vehicle location data, probe vehicle data, and Intelligent Transportation Systems (ITS) data (e.g., CCTV).

3. Data Management
   Integrating data into a single, coherent system requires working with different vendors/owners, interfacing with various database systems, and accommodating a range of data formats and types. Data quality validation tools will need to be developed, and strategies for bridging gaps in the data will need to be identified.

4. Performance Measurement Tool
   When the backend data management system is complete, a performance measurement tool or dashboard is then implemented to generate usable, actionable information from the data. Summary reports on performance are among the outputs provided by this tool.

5. Input to Planning Processes
   Data-driven planning processes are made possible by performance measurement tools. In this step, internal business processes are updated to take advantage of the new performance measurement tool. Projects are prioritized and evaluated based on quantifiable performance metrics and outcomes.

Source: Metro Arterial Performance Measurement Pilot Program
Metro Arterial Performance Measure Pilot

- Evaluate and test an Arterial Performance Monitoring Tool to assess arterial network performance
- Conduct a pilot test based on a subregion in LA County
- Utilize comprehensive arterial volume and travel time data
- Collect user group input and assessment
- Demonstrate application for other subregions

Source: Metro Arterial Performance Measurement Pilot Program
Metro iPeMS

San Gabriel Valley Subregion

31 cities/neighborhoods

- Survey results of key applications
  - Internal reporting
  - Staff reports to council
  - Grant applications
  - Project development
  - Public meetings