

Machine Learning and Big Data

A data-driven truck parking study accessible to all agencies

Applying a supervised machine learning techniques to large sample of GPS probe data and land use information to identify recurrent truck parking location and dwell time.



JOANATHAN MCINTOSH



FATEMEH RANAIEFAR

STASA ZIVOJNOVIC

1 WHY IT MATTERS



FHWA considers the lack of available truck parking “a national safety concern,” noting that the shortage may prompt fatigued drivers to continue on the road or seek unsafe parking locations such as the shoulder of the road, exit ramps or vacant lots.

The Federal Highway Administration conducted two rounds of Jason’s Law survey with the goal to increase the amount of safe parking available for truckers. Jason’s Law is named after Jason Rivenburg, a truck driver who was murdered in 2009 during a robbery while parked illegally at an abandoned South Carolina gas station.

Following Jason’s Law survey and FHWA funding support, state DOTs and MPOs with high truck parking deficiencies conducted their own studies to estimate truck parking needs and identify potential truck parking locations.

2 TRUCK PARKING METHODOLOGY

The current methodology for truck parking analysis is **time consuming, costly, and logistically difficult:**

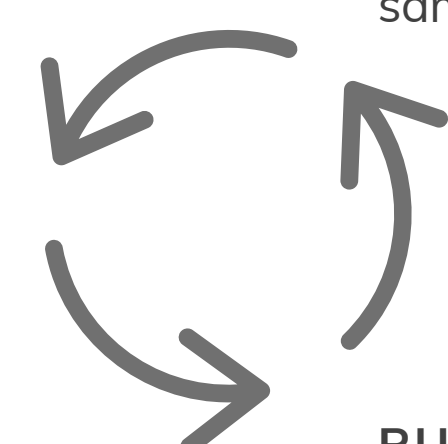
- SURVEYS AND INDUSTRY OUTREACH**
Limited sample, slow to collect and costly. Provides drivers’ preference, but not scalable for a statewide study.
- RAW GPS DATA**
Time consuming, requires high level skillset to interpret terabytes of data. Provides trucks’ GPS coordinates, and timestamp without contextual information.
- FHWA TRUCK PARKING DEMAND EQUATION**
Requires intensive data collection or significant supplemental survey.

3 WHY USE BIG DATA?

Use a data-driven, scalable analytics derived from processed GPS data blended with contextual data

SYSTEMATIC & DATA-DRIVEN
Assist DOTs and local agencies in conducting truck parking analyses efficiently with large samples of empirical data.

REAL IMPACT FOR TRUCK DRIVERS
Conduct before/after analyses efficiently to ensure the effectiveness of the solution



PUBLIC SUPPORT & FUNDING
Increase stakeholders’ willingness to fund future truck studies, and projects

STREETLIGHT DATA: BIG DATA ANALYTICS



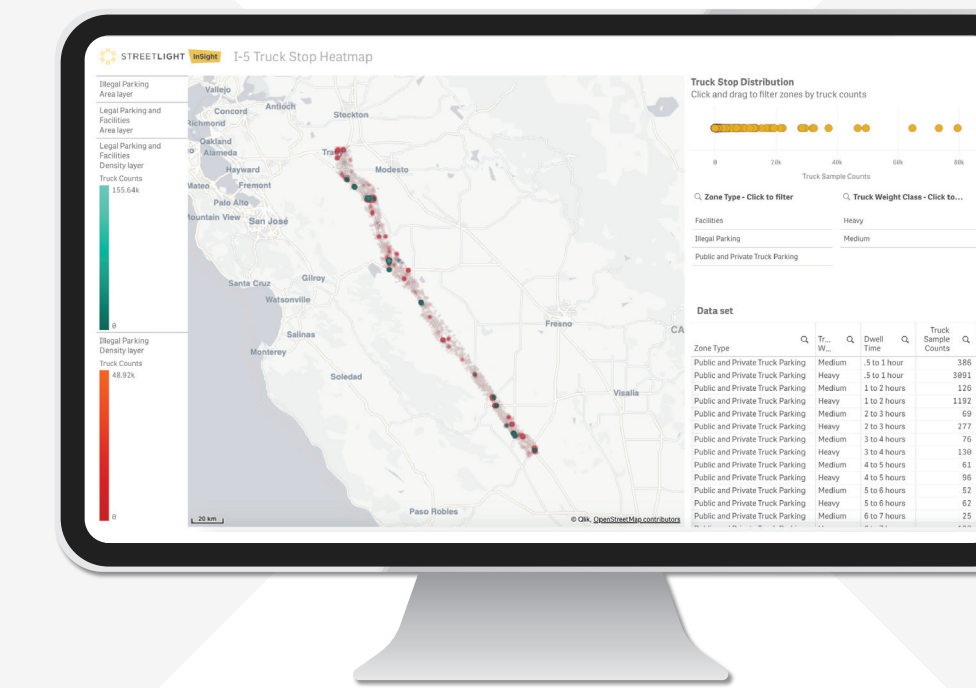
365 DAYS OF GPS DATA + CONTEXTUAL DATA

- Medium/Heavy-duty trucks data in U.S and Canada
- 28B+ data points/month
- Ability to do before and after studies
- Truck Stop Locations, and Road Network Maps



ANALYTICS COMPLETED IN MINUTES

- 2,000+ hexagons to identify legal and illegal truck stop locations on I-5
- Available as interactive visualizations and csv files
- Dwell time in an increment of 0.5 hours for each hexagon



FEHR & PEERS: POWERFUL ANALYSES

GROUND TRUTH AND VALIDATION

- Review sample size, set a threshold for each hex, and disregard hexes with low number of illegal truck parking instances
- Use Google map street view images to review flagged hexes and verify the land use



TRUCK PARKING HOT SPOT ANALYSIS

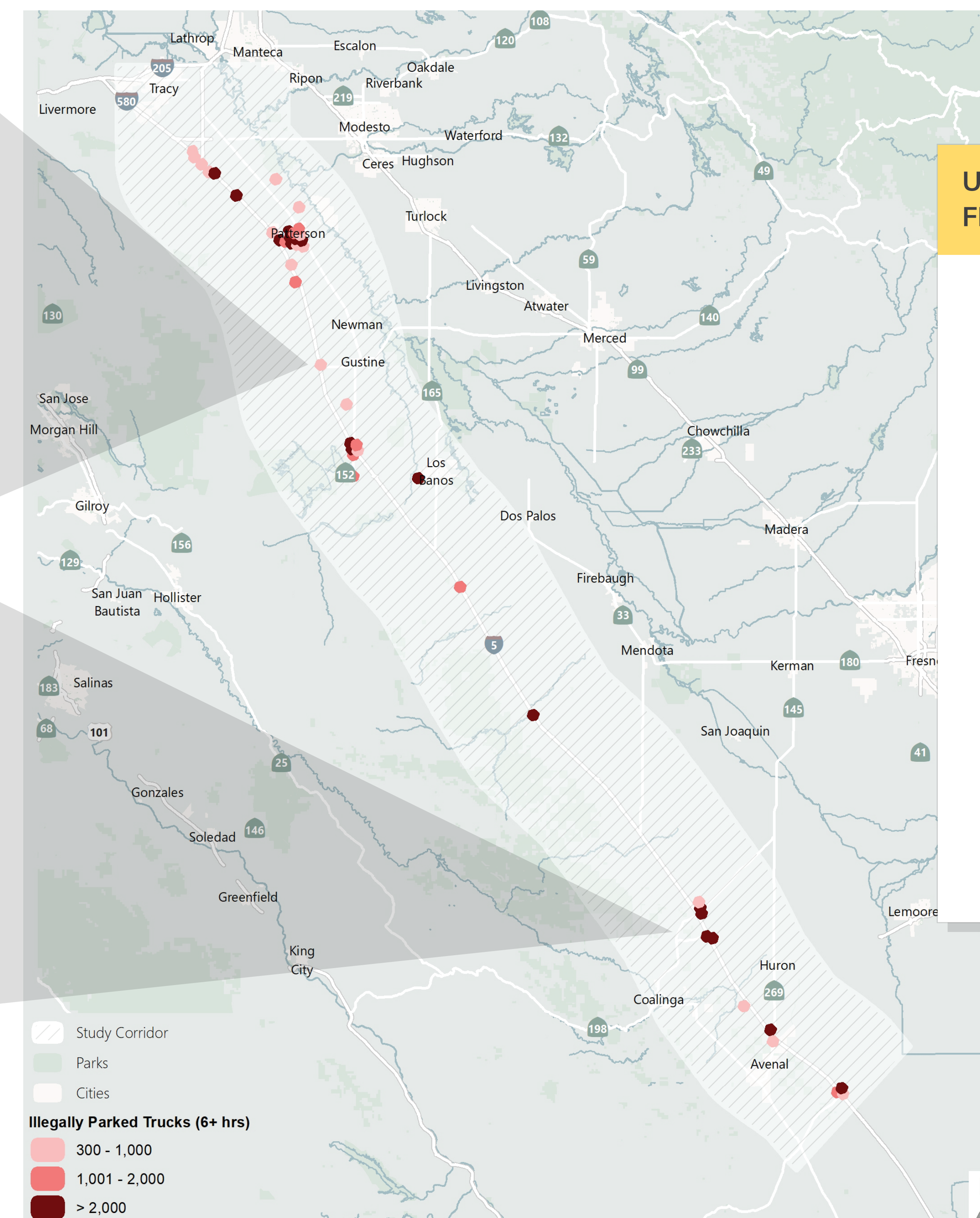
- Create expansion multipliers for each hex using classified truck counts to estimate
- Identify high priority truck parking hot spots
- Review hot spots with local experts



ON & OFF-RAMPS (SR-140)



RETAIL AREA (W. DORRIS AVE)



USING BIG DATA TO IDENTIFY FREQUENT ILLEGAL TRUCK STOPS

