Big Data in Transportation at UMTRI

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Primary “Big Data” Groups

- Engineering Systems (data acquisition design, data collection, database design, data analysis for vehicle system design and evaluation, traffic modeling)
- CMISST ("the data group"—data analysis, analytical methods development, open data)
- Biosciences (large-scale body-shape data collection, finite element modeling and other body-shape modeling)
- Human Factors (data collection, data analysis)
Some “Big Data” Areas

• Human driving behavior
• Vehicle system evaluation
• Traffic modeling
• Travel patterns
• Bike share/car share/dynamic pricing
• Human body-shape and motion modeling
• ...
IVBSS Light Vehicles

- 108 drivers each use an instrumented vehicle for six weeks
- 16 vehicles each with four prototype crash warning systems
- 7 radars, 5 video streams, GPS, >500 other signals at 10 to 50 Hz

LV system: Visteon Corporation & Takata Corp. Thanks to Honda R&D.
V2V/V2I: Safety Pilot Model Deployment

- 2836 vehicles equipped with DSRC wireless communication devices in a concentrated geographic area (Ann Arbor)
- Variety of vehicles, devices, functions, data collection
- Launched 2012-2014, deployment is ongoing

- 19 Intersections
- 3 Curve-related sites
- 3 Freeway sites
- Over-the-air security
- All DSRC communications logged
- Backhaul comm network
- Back-end data storage
- 180 Billion messages, 40M miles
- >3 million miles detailed data
Comprehensive Evaluation of Multiple Active Safety Systems*

Nine faculty, $3M/3 years: Research safety benefits of multiple active safety systems

*Toyota Settlement Safety Research & Education Program
Leveraging detailed driving data for analysis of large-scale, simpler data

Categorizing 1.8M events into scenarios using 3 data snapshots per event from 2000 vehicles X 1 year testing

Analysis using prior data from UMTRI studies using vehicles equipped with cameras and radars allows us to identify these scenarios from the very sparse OnStar data.

*From empirical data to models*
Building a Transportation Data Ecosystem

- Applications
- Analysis Techniques
- Visualization
- Representativeness
- Privacy Protection
- Data Integration
- Data
- Computing Platform
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