MBDH Transportation Spoke Workshop
June 22, 2017

Alfred O. Hero; Co-Director
Brian D. Athey; Co-Director
Transportation system in 180 CE

Transportation infrastructure at height of Roman empire
Van Tillburg used data to draw inferences on
- Roads, road-users, traffic congestion, traffic policy

Data came from large variety of sources
- Written legal and construction records (Domitian, Nero)
- Written travel logs (Theophanes)
- Frozen-in-time physical evidence (Pompei)
- Archeological evidence for flows of trade
- Remote sensing and hyperspectral imaging
Transportation system today

Transportation system in 2017

http://www.computerworld.com/article/3005436/
Big Data for modern transportation

Autonomous sensing systems

Cloud data services

Data/sensor integration
Telematics
Automated routing
Mobility-on-demand

Ad Hoc Vehicle and Road Networks

Clients and users

Automated routing

Mobility-on-demand

Waiting-for-bus-clip-art
Big Data impact on transportation

• Data for improved transportation accessibility
  • Access to federated and standardized databases and datastreams

• Data for improved transportation safety
  • Prediction and early warning of traffic/weather conditions

• Data for improved energy efficiency
  • Efficient routing, load balancing, and traffic flow control

• Data for improved public service
  • Optimization of essential and emergency services
MIDAS transportation research thrust

Mcity: A 32-Acre Outdoor Lab

Mobility-on-demand systems

Visual analytics and data fusion

Accident and safety data analytics

Smart cities and infrastructures

Connected vehicle cybersecurity

Transportation data ecosystems for connected vehicles

Transportation Domain Expertise
(MTC, UMTRI)

Privacy & Data Handling Expertise
(ISR, SPP, EECS)

DS Methodology Expertise
(EECS, ME, IOE, SI, Math, Statistics...)

MIDAS
MIDAS funded research in transportation

**Building a Transportation Data Ecosystem**: creating a system for data on driver behavior, traffic, weather, accidents, vehicle messages, traffic signals and road characteristics, with a parallel and distributed computing platform.

- Flannagan (PI), UMITRI; Jin, CoE; Rupp, UMTRI;
- Elliott, ISR; Mars, CoE; Shedden, LS&A;
- Hampshire, UMTRI; Murphey, UM-Dearborn; Tang, CoE;
- Jagadish, CoE; Nair, LS&A, CoE; Witkowski, ISR

**Reinventing Public Urban Transportation and Mobility**: using predictive models for travel demand, accessibility, driver behavior, and transportation networks to design an on-demand public transportation system for urban areas.

- Van Hentenryck (PI), CoE; Dillahunt, SI; Merlin, Taubman Coll.;
- Budak, SI; Hampshire, UMTRI; Ortiz, UM-Dearborn;
- Cohn, CoE; Lynch, CoE; Sayer, UMTRI;
- Cunningham, Med, SPH; Levine, Taubman; Wellman, COE