Monitoring the response of transportation cyber physical systems in the wake of Hurricane Sandy

Project Description

The growth of data collected from GPS equipped smartphones has allowed a new class of statistical models of surface street traffic dynamics to be developed, which can estimate day-to-day traffic by leveraging historical traffic patterns and some real–time sensor data from sparsely deployed traffic sensors. Unfortunately, during *extreme congestion events* such as natural disasters or sporting events, the accuracy of these traffic estimates can deteriorate significantly. This is because extreme congestion events may change the network topology (e.g. due to planned road closures, or unplanned infrastructure failures), change travel demands (e.g. spikes in numbers of trips near sporting venues, storm evacuations, etc.), or influence traffic control devices (e.g. through restrictions on travel, or overrides of traffic signal timings by traffic control police officers). These factors render the historical information inadequate for real-time inference.

To overcome these limitations, a new approach monitor traffic with cell phones has been developed which enables perishable data collection during extreme congestion events. Inspired by Amazon's *Mechanical Turk* for crowd sourcing human intelligence tasks, *TrafficTurk* enables large-scale temporary traffic sensor deployments to improve data rates and therefore the accuracy of the traffic estimates. *TrafficTurk* has been deployed and in New York following Hurricane Sandy, as well as during several sporting events in Urbana, IL. Potential benefits of the system include improved emergency preparedness and response to future disasters, and enhanced real-time traffic monitoring capabilities.

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