Abstract

Disruptions like accidents or closures on metropolitan freeways have the potential to increase traffic congestion on surface streets. Through spatiotemporal analysis, this project evaluates associations between traffic congestion spikes on arterial streets with freeway incidents. The unexpected increase of traffic on city streets from freeway overflow was expected to not only create severe gridlock negating the expected benefit for the motorist avoiding freeway delays, but also cause undue stress for local traffic normally on those streets. This thesis takes the initial steps in spatiotemporal analysis to assess how strong the associations are between incidents on the freeway and increased arterial traffic. Data preparation models from Alteryx are used in ESRI's ArcGIS Pro to provide a contextually rich multi-dimensional representation of sensor location, time and traffic speeds near freeway incident locations. This enables an intuitive way to recognize potential associations between speed data collection points. The use cases analyzed by this study were predicated on a long-duration traffic accident for which medical services were required. The results show that almost no clear association can be made for incidents of this magnitude. Using data about these effects and more severe use cases like complete freeway closures in concert with the visualization techniques presented, additional studies can be built to support determination of whether or not more significant disruptions may have clear associations. From that point, mitigation options can be designed to reroute traffic through techniques like optimizing traffic lights and active traffic rerouting.