

Project Title: Measurement of Traffic Network Vulnerability for Mississippi Coastal Region
Project Abstract (Brief Description): Hurricanes are one of the most catastrophic events resulting in severe consequences including loss of life and property damage. The magnitude of devastation was evident in the hurricanes Katrina and Rita in the Gulf coast. The Mississippi Gulf coast region generally refers to the Gulfport-Biloxi-Pascagoula Area that consists of the Gulfport-Biloxi Metropolitan Area and the Pascagoula Metropolitan Area, including five counties and a joint population of about 400 thousand residents and 150 thousand families. The casino industry and tourism in the region also attract thousands of tourists and travelers from everywhere. Through executing an emergency plan already made, emergency management teams play a huge role in safeguarding the lives of people in endangered areas by evacuating them to safer locations as efficiently as possible. An evacuation plan is an essential component of an emergency plan and transportation network vulnerability analysis is an essential work ahead of making an emergency plan. The proposed research will study the vulnerability of the coastal transportation network by applying stochastic game theory to the Mississippi coast region to provide the efficient connectivity measurement with on-demand applications in emergency situations. In a game theory approach, it is assumed that there are two opponents in a non-cooperative zero-sum game with symmetric information. One is the router, a benevolent player who seeks the shortest paths for all travelers, and the other is an evil tester who tries to disable edges in the network to maximally disrupt network performance.
Describe Implementation of Research Outcomes: The study showed that evacuees are more prone to taking flooding risks in selecting evacuation routes as they are more sensitive to the travel time or cost on the routes. On the other hand, the total travel time or cost in all the links of the evacuation paths shows an increasing trend along with the increase of the impact factor on flooding risk, which means the evacuees are more willing to take detours in selecting less risky evacuation routes as they are more sensitive to the flooding risk on the links and routes.
Impacts/Benefits of Implementation: The analysis of the evacuation network in Mississippi coast area using the proposed method suggests that links near the evacuation destinations tend to be more critical, and important traffic corridors such as I-10 in the evacuation network has a high degree of criticality. Web Links:
Budget (Funding) Amounts & Source(s) (US DOT +Match(s) =Total Costs): 57.5k USDOT + 28.75k matching = \$86.25k total
Project Start and End Dates: 11/01/2015 – 10/31/2017. A no cost extension granted to 07/31/17. Project complete.
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