

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 (or why not implemented) - First task, the potential critical links related to the evacuation traffic in the evacuation network in Mississippi Gulf coast region were identified using the game-theory approach to determine accessibility and priority of the network links. The calculation result has been mapped and visualized in ArcMap GIS. The second task, look at potential critical links related to the flooding surges of a hurricane were identified using a probability distribution approach to obtain the risk of an inundation over a road surface. Data of the maximum surge heights over the land surfaces of 261,021 selected monitoring locations in the past one hundred years in the study area were analyzed. The probability of the inundation over a road surface was determined by using the estimated maximum surge height over the land surfaces. The study result has been mapped and visualized in ArcMap GIS.
Impacts/Benefits of Implementation (actual, not anticipated) <i>To be determined upon conclusion of the project:</i>
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 1 year extension was granted.
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