Particle Dynamics Model for Hurricane Evacuation and Fuel Shortage: Model Based Policy Analysis

Abstract

News reports indicate that evacuation orders were issued to about seven million people from Florida, Georgia and South Carolina for Hurricane Irma. There is evidence for over 430,000 cars evacuating out of New Orleans highways during Hurricane Katrina in 2004. Mass evacuations lead to traffic jams because of high volume, increased road incidents, and due to fuel shortages. Fuel shortages have been witnessed during many recent hurricanes including Katrina, Rita, Harvey and Irma.

A microscale model of the evacuation process incorporating individual cars and gas stations can be useful in evaluating the effect of gas shortages and traffic incidents in the evacuation process. In this project, we will repurpose our particle dynamics model for this purpose. Large number of automobiles in the evacuation process coupled with variations of random traffic incidents, fuel shortage incidents and policy variations will generate a large parameter space. We will use massive parallel computing to evaluate this large parameter space and identify opportunities and vulnerabilities that enable effective policy design. The project outcome will be a traffic model of hurricane evacuation that incorporates evolution of fuel level in individual automobiles and refueling stations. The model will be used for effective policy design.

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