Assessing Crash Risks of Evacuation Traffic: A Simulation-based Approach Dataset

Dataset available at: https://doi.org/10.7910/DVN/BZ6IJN

(This dataset supports report **Assessing Crash Risks of Evacuation Traffic: A Simulation-based Approach**)

This U.S. Department of Transportation-funded dataset is preserved by the SAFER-SIM University Transportation Center in the Harvard Dataverse Repository (https://dataverse.harvard.edu/), and is available at https://doi.org/10.7910/DVN/BZ6IJN

The related final report **Assessing Crash Risks of Evacuation Traffic: A Simulation-based Approach**, is available from the National Transportation Library's Digital Repository at https://rosap.ntl.bts.gov/view/dot/56082

Metadata from the Harvard Dataverse Repository record:

Description: Recently, hurricanes have caused major concern for transportation agencies and policymakers attempting to find better evacuation strategies. This was especially evident after Hurricane Irma, which forced about 6.5 million Floridians to evacuate the state. This mass evacuation caused a significant amount of delays on state highways due to heavy congestion and car crashes. Crashes and accidents on roads and highways are of major concern during evacuation efforts. Though several strategies have been implemented to manage the heavy traffic demand during a hurricane evacuation, current approaches seem to have less of an impact on traffic safety. In this context, this project had three objectives: To assess the impact of hurricane evacuation on crash risks, To identify if there are any changes in traffic flow behavior between evacuation and non-evacuation periods, and To assess the impact of an in-vehicle driving assistance system during an evacuation period. First, to assess the impact of hurricane evacuation on crash risks, we adopted a matched case control approach. After collecting traffic and crash data along a major evacuation route in Florida, we estimated models for three different conditions: regular period, evacuation period, and a combination of both evacuation and regular period data. Model results show that if there is high occupancy at an upstream station and high variation of speed at a downstream station, the probability of crash occurrence increases. We estimate the effect of evacuation itself on crash risk and find that, after controlling for traffic characteristics, during evacuation the chance of an accident is higher than in a regular period. These findings will help us develop advanced real-time crash prediction models which will work for evacuation traffic conditions, and design proactive countermeasures to reduce crash occurrences during evacuation. Second, to understand driver behavior during evacuation and to assess the potential safety impacts of adaptive cruise control (ACC) systems, we developed a microscopic simulation model in SUMO for a segment of the Interstate highway 75 (I-75), and calibrate it using real-world traffic data collected from the evacuation period of hurricane Irma. For the calibrated model, we find that the values of maximum acceleration and deceleration are 4.5 m/s^2 and 6.5 m/s^2, respectively. These values are higher than those in typical car-following models calibrated under regular traffic conditions. Also, higher acceleration and deceleration values indicate abrupt speed variation, which is the most common scenario for evacuation traffic. To evaluate the safety impact of ACC systems, we adopted two surrogate

measures: time to collision (TTC) and deceleration rate to avoid a collision (DRAC). Our experiment results show that during evacuation, about 49% of traffic collisions can be reduced at a 25% market penetration of ACC-equipped vehicles. The findings from this project have further implications for evacuation declarations and highlight the need for better traffic management strategies during evacuation. Based on the findings, we propose several traffic management strategies to reduce the number of crashes during evacuation. We also propose solutions based on in-vehicle driving assistance systems and identify the challenges to increase market penetration rate for such technologies. (2019-12-01)
Subject: Engineering

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Dataset description:
This dataset contains 1 .zip file collection described below.

Assessing Crash Risks of Evacuation Traffic A Simulation-based Approach Dataset.zip:
This collection contains 617 .csv files and 1. txt files. The .csv files contain the data related to this specific dataset and the .txt file is a README file that provides some additional information on the data files contained in the collection.

The .txt file type is a common text file, which can be opened with a basic text editor. The most common software used to open .txt files are Microsoft Windows Notepad, Sublime Text, Atom, and TextEdit (for more information on .txt files and software, please visit https://www.file-extensions.org/txt-file-extension).

The .csv, Comma Separated Value, file is a simple format that is designed for a database table and supported by many applications. The .csv file is often used for moving tabular data between two different computer programs, due to its open format. The most common software used to open .csv files are Microsoft Excel and RecordEditor, (for more information on .csv files and software, please visit https://www.file-extensions.org/csv-file-extension).

National Transportation Library (NTL) Curation Note:
As this dataset is preserved in a repository outside U.S. DOT control, as allowed by the U.S. DOT's Public Access Plan (https://ntl.bts.gov/public-access) Section 7.4.2 Data, the NTL staff has performed ***NO*** additional curation actions on this dataset. NTL staff last accessed this dataset at https://doi.org/10.7910/DVN/BZ6IJN on 2020-07-07. If, in the future, you have trouble accessing this dataset at the host repository, please email NTLDataCurator@dot.gov describing your problem. NTL staff will do its best to assist you at that time.