

Safety Applications of Crowdsourced Data



Tennessee Highway Patrol Case Study Report

The U.S. DOT [Safety Data Initiative](#) (SDI) aims to leverage and integrate datasets, and use advanced analytical tools and compelling visualizations to provide new insights to identify and address surface transportation safety risks. Crowdsourced mobile applications from the private sector—such as Waze—offer real-time and historical data about roadway conditions, including user-reported crashes. Funded by the SDI, U.S. DOT Volpe Center researchers are integrating these new data sources with other traffic and roadway information to assess potential safety applications. In the first phase of the project, Volpe Center researchers found that state-wide crash models based on integrated Waze, traffic volume, census, and weather data give reliable hourly estimates of police-reportable crashes in 1-mile area grids. In the second phase, the team focused on pilot projects testing state and local safety applications of Waze data. The Tennessee Highway Patrol (THP) and the Volpe Center are collaborating to evaluate an application of the Waze data to a crash prediction model currently in use by THP. THP is providing data and results from the existing model, and the Volpe Center is integrating the Waze data to develop a prototype model augmented with crowdsourced traffic incident data from Waze.

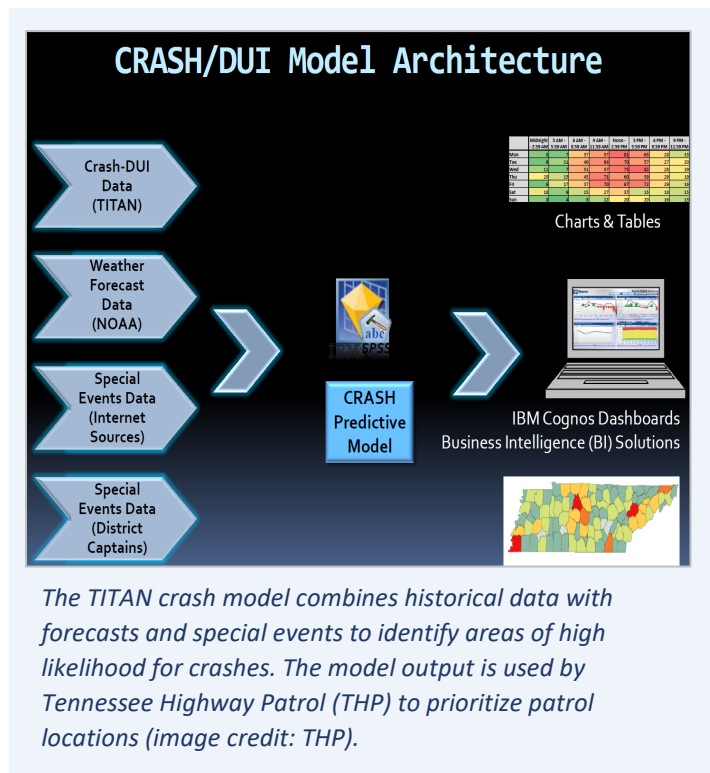
Project Summary

The Tennessee Integrated Traffic Analysis Network (TITAN) crash model is used by THP to prioritize patrol locations. The model combines historical data, such as fatal crashes and DUI arrests with weather forecasts and scheduled special events, to generate heat maps that identify areas of high likelihood for crashes. THP provided training data from the TITAN model, and the Volpe team is quantitatively assessed the value that Waze data adds to the existing TITAN model.

The TITAN model estimates crash propensity in grids 42 square miles in size. This resolution provides the most accurate estimates of fatal crash propensity in four-hour time windows over the upcoming week, based on scheduled special events and weather forecasts. The objective of the THP and U.S. DOT SDI partnership was to test if Waze alerts can improve the spatial resolution of the TITAN model, particularly in urban areas.

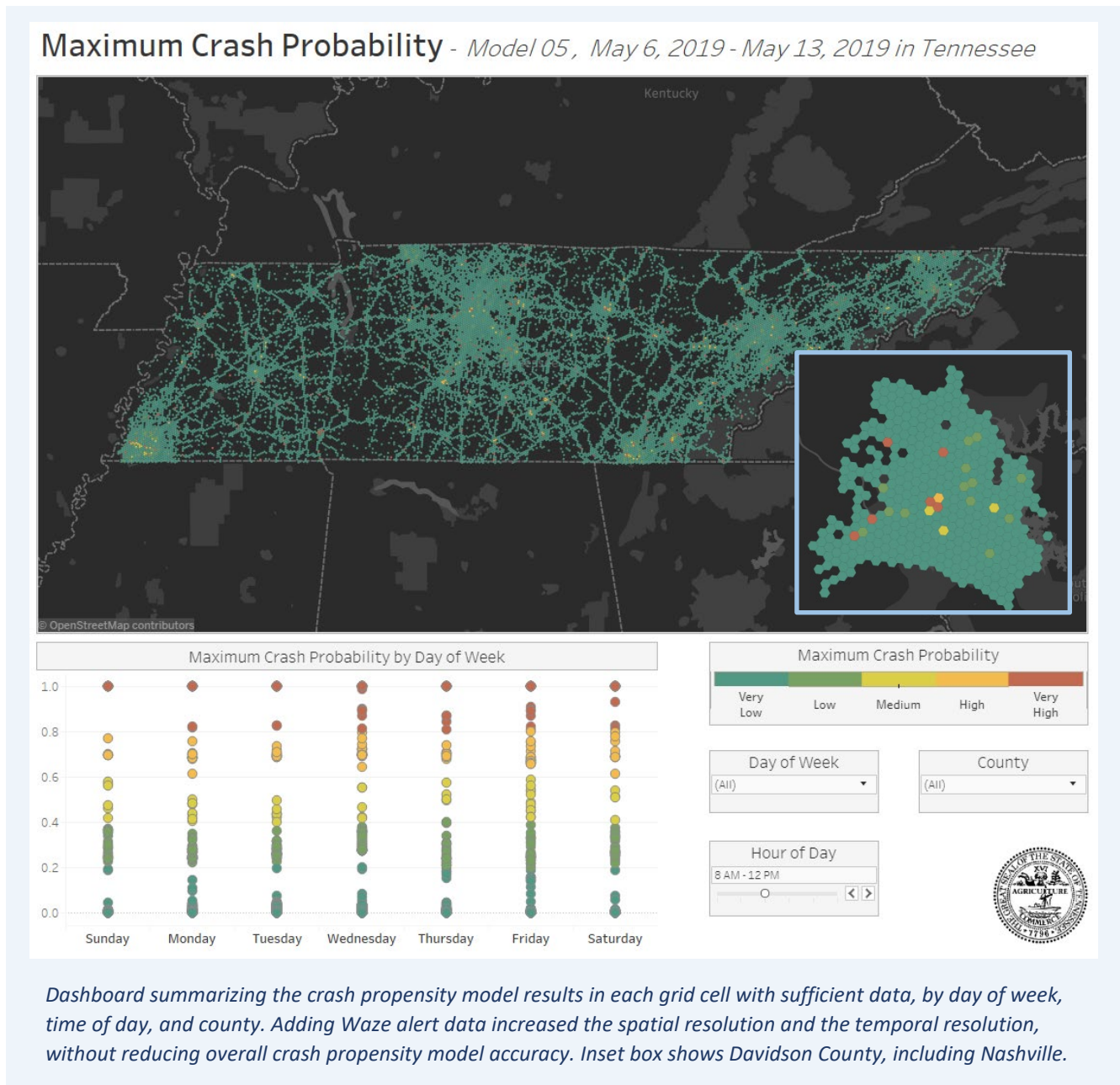
Findings

The THP-SDI partnership found that integrating Waze with existing crash data could help the THP more effectively target high-risk times and areas by increasing the spatial resolution of crash estimates from 42 to 1 square mile, and by increasing the temporal resolution from four hour to one hour time windows, without



The TITAN crash model combines historical data with forecasts and special events to identify areas of high likelihood for crashes. The model output is used by Tennessee Highway Patrol (THP) to prioritize patrol locations (image credit: THP).

reducing over-all model accuracy. The model provides a high-resolution option for THP Troopers to use when scheduling patrols, and the model can also be combined with the original 42 square mile resolution for a hybrid approach.



Key Outcomes

Based on the work of the Volpe team, THP will work to deploy updated crash propensity models that integrate Waze information to prioritize patrol locations. They will also evaluate the model results dashboard as a potential replacement for their current field deployment tool. The THP Case Study findings demonstrate a specific application in which crowd-sourced traffic data can enhance other roadway data to illuminate safety risk patterns and inform decision making. Waze offers a nationwide data source to support crash propensity (or risk) models and could provide roadway safety insights for states, cities, towns, and metropolitan planning organizations (MPOs) that do not have traffic monitoring data suitable for specific applications.