Software pinpoints traffic accident 'hotspots'

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Ohio State University scientists have created software that can identify traffic accident hotspots on state roadways.

The software is publicly available and can be adapted for use by any state, said Christopher Holloman, associate director of the Statistical Consulting Service in Ohio State's Department of Statistics. Currently, the Ohio State Highway Patrol is using it to help position its cruisers during major holidays.

"We can make predictions for every major roadway in Ohio, under all possible road conditions, for every hour of the day, for every day of the week," Holloman said.

The software relies on reports of injuries and fatalities from the highway patrol, and incorporates statistics about what makes accidents happen.

Common accident causes such as speeding or alcohol consumption are fairly easy to model using computers, Holloman explained. Others -- such as when a driver will be distracted by a cell phone -- are impossible. So the software makes general forecasts.

"Everyone would love to be able to predict exactly where and when the next crash would be, but there are just too many factors involved, and too much randomness to do that," he said. "We can confidently make broad statements, like whether a particular piece of roadway is riskier at a particular time."

Not surprisingly, the software indicates that most speeding accidents in Ohio happen during weekday rush hours, and most drunk-driving accidents happen on the weekends between 2:00 and 3:00 a.m. -- after the bars close. But it did reveal some facts that weren't so obvious.

In Columbus, for instance, most speeding accidents happen on the northern potion of the outer beltway, Interstate 270. But Interstate 71, which divides the city north to south, is a hotspot for drunk-driving accidents.

Ohio is the seventh most populated state in the United States, and most residents live in and around the cities of Columbus, Cleveland, and Cincinnati.

Holloman expected to find that most fatal traffic accidents happen near those three cities. He didn't expect to find that most fatalities around Columbus and Cincinnati happen on the interstates, while near Cleveland more fatalities occur on the U.S. routes and state routes, as people cross the border to and from Pennsylvania. He says that his contacts at the highway patrol didn't seem surprised.

"It confirmed what they already knew, which is fine," he said. The software can't indicate the underlying cause of why a particular area is prone to a particular type of accident, but it may help the highway patrol find those answers. "We see the software as a supplement to officer expertise, and to the efforts of the highway patrol's quantitative analysis group, which does its own analysis of crash data."

"It's just one more tool in the patrol's toolbox."

Holloman and his colleagues have been issuing reports to the highway patrol in advance of every major holiday since July 4, 2005. That first report only covered interstates around major Ohio cities. Last fall, they

expanded their computer model to include all Ohio interstates, U.S. routes and state routes for which crash data was available. Now they've combined the software with Google Earth, which Holloman said will make the tool even easier to use.

Google Earth offers an interactive map of the entire globe, including major roadways. The Ohio State software color-codes the roadways in Ohio, so that users can zoom in to see the general likelihood of accidents in any region of the state.

It's not something the average person would run on their home computer, however. The software uses a 900-megabyte database that details every traffic accident that occurred on Ohio highways from 2001-2005, and generates 50 gigabytes of output data. The equations that Holloman and his colleagues developed to connect all that data took two weeks to process at the Ohio Supercomputer Center.

The software would have to be modified to fit other states, and Holloman said the university's Statistical Consulting Service would like to do that. Other states would benefit from the fact that the Ohio State Highway Patrol paid the $50,000 development costs; customizing the software for a new state would cost about half as much.

The key to making the software work in a particular state is the quality of the accident data, Holloman said. The Ohio State Highway Patrol was able to gather precise data from nearly all 88 Ohio counties, including the location of crashes.

"I have to wonder if other states have such good data collection," Holloman said. "Having the latitude and longitude of the crashes was fantastic."

The Ohio Supercomputer Center donated the computing resources for

this study.

Source: Ohio State University

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