

Tennessee Highway Patrol

Using predictive analytics to help prevent road accidents and save lives

Overview

The need

The Tennessee Highway Patrol (THP) needed to improve highway safety and cut accident rates without increasing staff levels. How could it determine the best times and locations to deploy its troopers?

The solution

Working with IBM and using IBM® SPSS® technology, the THP built a model that uses historical data on traffic, accidents, weather and events to predict future incidents with a high degree of accuracy.

The benefit

In year one, traffic fatalities in Tennessee fell to their lowest level since 1963. The state also saw a six percent reduction in traffic accident casualties and a 34 percent rise in driving-under-the-influence (DUI) arrests.

As budgets for law enforcement become ever tighter, how can agencies work smarter with their limited resources to achieve better results? This was the question that the Tennessee Highway Patrol (THP) faced as they looked to improve public safety by reducing the number of motor vehicle accidents and drunk-driving incidents.

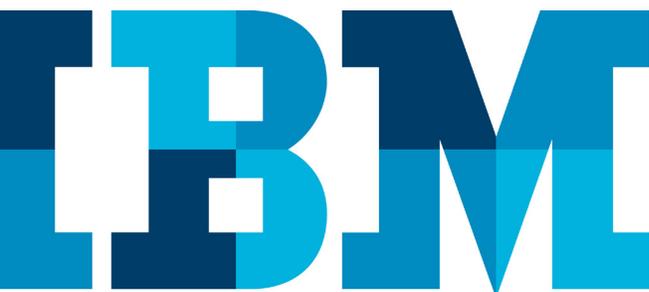
In particular, the THP was aiming to be able to anticipate and prevent accidents by identifying road accident hotspots, prosecute drunk drivers, enforce the use of seatbelts more effectively, and respond to incidents with the most appropriate resources.

“We wanted to be multi-faceted and direct our resources effectively,” explains Colonel Tracy Trott of the Tennessee Highway Patrol. “We wanted to be particularly good at our DUI enforcement, as drunkenness while driving is a major cause of crashes. We also wanted to be more effective in our seatbelt enforcement and get our compliance rate way up. Nobody is going to walk up to me tomorrow and give me 200 new troopers, so I needed figure out how do more with the same human resources.”

Innovative crime prediction and prevention

Using a federal grant obtained through the Governor’s Highway Safety Office (GHSO), the THP set out to enable a new data-driven approach to traffic safety that would look for meaningful patterns in the past and apply them to current conditions to predict future events.

Adopting a new approach is not just about technology. “My job was to sell the analytics solution to the uniformed officers, who customarily had operated on their own knowledge about where they needed to be and what they needed to do. We showed them the benefits of deploying themselves in certain areas at certain times,” says Colonel Tracy Trott of the THP.



Solution components

Software

- IBM® Cognos® Business Intelligence
- IBM SPSS® Modeler

IBM helped the THP build a predictive model for traffic accidents using IBM predictive analytics for crime prevention and prediction, feeding it with geotagged historical crash and DUI data from the previous three years, historical weather data, and data about special events (such as sports games, parades and so on). The model seeks out correlations between incidents (such as crashes or DUI arrests) and external factors: location, time of day, day of the week, time of the year, public holidays, weather conditions and proximity to public events. Given new data on all of these external factors, the model can then extrapolate forward to predict future incidents.

“No one had ever done this before,” says Colonel Trott. “We’re the first state police department in the United States that has applied a predictive analytics model to traffic safety.”

During a six-month pilot phase, the THP focused on geographic areas with the highest propensity for severe accidents, dividing the state up into six-by-six mile squares and predicting traffic risks for each in four-hour increments. Using the Tennessee Integrated Traffic Analysis Network (TITAN), a suite of tools for the electronic collection, submission and management of crash data in Tennessee, THP troopers can access dashboards showing them the statistical likelihood of given incidents in given locations, helping them to plan their working days.

Traditionally, highway patrol and state police agencies are reactive: when a traffic accident occurs, they provide rapid response. Over time, each trooper may get to know his or her own area well, and get a ‘gut-feel’ about likely future events – but this is neither rigorous nor easy to share with colleagues. By enabling a more proactive approach, the analytics solution from IBM helps officers decide how to deploy their troopers for maximum effect, and enables troopers to decide the best routes to patrol for each shift they work.

Smarter government

State-of-the-art predictive analytics make roads safer



Instrumented

Historical data on road traffic flows and the location of accidents is combined with live data on sporting and cultural events and on weather conditions gathered from multiple sources.



Interconnected

THP troopers can access and share data on accident hotspots, contributing local knowledge to the centralized analytics and reporting tools, helping improve the power of the predictive models as they use them.



Intelligent

With accurate predictions of the likely time and location of serious traffic accidents, THP can take preventative measures and improve its response to incidents.

“The first full year the IBM predictive analytics solution was used in Tennessee was the second lowest traffic fatality year since 1963.”

— Colonel Tracy Trott, Tennessee Highway Patrol

“IBM has been a great partner for us,” says Colonel Trott. “We employ one of their business solutions architects to help us build the dashboards that are available to all our troopers, so they can deploy themselves to an area of high probability of a crash occurring.”

Gaining valuable insights fast

Predictive analytics helps the THP sift through huge volumes of new data from multiple sources, correlating it with historical data to accurately predict future events. The IBM solution also helps THP to anticipate what types of intervention will be needed and where. Troopers can be deployed to problem spots ahead of time, either to prevent the predicted crashes from occurring or, failing that, to be on the scene of an accident more quickly to render better assistance.

“The first full year the IBM predictive analytics solution was used in Tennessee was the second lowest traffic fatality year since 1963,” reports Colonel Trott. “The figures speak for themselves.”

Comparing data for the period January 1st to August 15th 2014 – during which time the IBM predictive analytics solution was operational – with data from the same date range in 2013 reveals that the number of people killed and seriously injured in traffic crashes in the state fell by six percent, from 4,914 to 4,629 incidents. During the same period, safety belt citations issued by the THP increased by 46 percent, from 46,118 in 2013 to 67,440 in 2014. DUI arrests increased by 34 percent, from 3,973 in 2013 to 5,313 in 2014. Moreover, the THP recorded an 8.9 percent decrease in alcohol-impaired crashes.

Colonel Trott concludes: “I think right now we’re only scratching the surface of what we can do with predictive analytics. We’re on a good path, and we have a program in place that is showing success. We’ve also had a lot of interest from other states that have heard of our initiative. The next steps for the agency will be to include other organizations to tackle drug offences, drug cartels, and large truck and commercial vehicle accidents.”

About the Tennessee Highway Patrol

Established in 1929 and headquartered in the state capital, Nashville, the Tennessee Highway Patrol is responsible for enforcing federal and state traffic laws. A division of the Tennessee Department of Safety, the organization provides assistance to motorists, investigates traffic accidents and plays a role in criminal interdiction.

About IBM Analytics

IBM Analytics offers one of the world's deepest and broadest analytics platforms, domain and industry solutions that deliver new value to businesses, governments and individuals. For more information about how IBM Analytics helps to transform industries and professions with data, visit ibm.com/analytics. Follow us on Twitter at [@IBMAAnalytics](https://twitter.com/IBMAAnalytics), on our blog at ibmbigdatahub.com and join the conversation #IBMAAnalytics.



© Copyright IBM Corporation 2015

IBM Software Group
Route 100, Somers, NY 10589

Produced in the United States of America
June 2015

IBM, the IBM logo, ibm.com, Cognos and SPSS are trademarks of International Business Machines Corp., registered in many jurisdictions worldwide. Other product and service names might be trademarks of IBM or other companies. A current list of IBM trademarks is available on the web at "Copyright and trademark information" at www.ibm.com/legal/copytrade.shtml.

This document is current as of the initial date of publication and may be changed by IBM at any time. Not all offerings are available in every country in which IBM operates.

The performance data and client examples cited are presented for illustrative purposes only. Actual performance results may vary depending on specific configurations and operating conditions. It is the user's responsibility to evaluate and verify the operation of any other products or programs with IBM products and programs. THE INFORMATION IN THIS DOCUMENT IS PROVIDED "AS IS" WITHOUT ANY WARRANTY, EXPRESS OR IMPLIED, INCLUDING WITHOUT ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND ANY WARRANTY OR CONDITION OF NON-INFRINGEMENT. IBM products are warranted according to the terms and conditions of the agreements under which they are provided. [

The client is responsible for ensuring compliance with laws and regulations applicable to it. IBM does not provide legal advice or represent or warrant that its services or products will ensure that the client is in compliance with any law or regulation.



Please Recycle