VISUAL ANALYTICS FOR COMMAND, CONTROL, AND INTEROPERABILITY ENVIRONMENTS
A U.S. Department of Homeland Security Center of Excellence

VACCINE

VALET (Visual Analytics Law Enforcement Toolkit)

PRODUCT

What VALET Does

The Visual Analytics Law Enforcement Toolkit, or VALET, developed at Purdue's Homeland Security Center of Excellence, assists law enforcement officers and first responders in reducing crime and ensuring public safety. By providing real-time data, law enforcement officials can be more strategic in how they allocate resources in their communities.

As a computer software program, VALET analyzes high-volume criminal, traffic and civil incident data as well as related emergency management and disaster preparedness events.

The technology creates a picture of what is happening at any given time and what could happen in an hour or a day or a week, enabling law enforcement agencies to interactively visualize and analyze their datasets in linked geospatial or mapping and temporal views of time graphs, calendars and clock views. It can layer in weather information, zoning tracks, census and demographic data — even the moon phase.

VALET can be used on most computers, and its companion software, called iVALET, has been designed specifically for the iPhone and iPad.

> "One of my sayings is, 'We need to work smarter, not harder,' and the VALET toolkit allows us to pull data so we are in a better position to put officers in the right place at the right time when a situation arises. Providing this type of situational awareness gives us the higher level of assessment so we can better cover high-crime areas or give officers context of what is happening so they know what they are walking into when on patrol or responding to a call."
>
> — *John K. Cox, Purdue University Police Chief*

Why it is Useful

Law enforcement relies on data for analyzing high-volume criminal, traffic and civil (CTC) incidents for assistance in preventing crimes and judiciously allocate resources for the law enforcement community. Datasets, however, are increasing in size and complexity. And as budgets shrink and departments scale back, local law enforcement agencies are strained to effectively analyze the helpful data being collected.

VALET explores and analyzes multivariate, spatial and temporal law enforcement data to enable advanced data exploration and analysis of CTC incidence reports. VALET includes temporal prediction algorithms to forecast future criminal, traffic and civil incident levels within a 95% confidence interval. That means estimates of the collected data could be reliably repeated and used to predict future behaviors or actions.

Examples:
- At police department headquarters, officials can plan regular routes based on crime rates and the times of the day or week crimes are most likely to occur.
- Factoring in weather forecasts or scheduled major events that could clog vehicular traffic on main roads.
- Statistical analysis of historical data and temporal prediction algorithms can forecast future criminal, traffic and civil incident levels with 95% confidence.
- Available to officers in patrol cars, who can access it via their onboard laptops. The mobile version, iVALET, works with iPhones and iPads for officers who are on foot.

Data Layers:
- Criminal, Traffic, Civil
- Calendar Events
- Weather
- Census & Demographic
- Geographic Information Systems
- Moon Phase

▶ "We are doing more than providing law enforcement officers with specific data covering their areas, because we've developed a portal for potential other issues such as prominent calendar dates, zoning tracts and even weather reports to help officers in their daily routines to protect the public."

— *Abish Malik, research scientist*

What's Next \\\
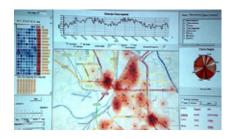
IMPACT
Analyzing high-volume criminal, traffic and civil (CTC) incident data is a crucial component for building and maintaining situation awareness of these incidents to ensure effective policing for maintaining public safety. Additionally, systems that are portable are desired because law enforcement officers are often on the road for duty. Police departments from South Carolina and Virginia to Indiana and Ohio have been tapping into predictive analytics as a crime-solving and -prevention tool — with success and positive results.

By developing a mobile visual analytics toolkit, Purdue-led researchers are able to assist law enforcement in the exploration and analysis of the multivariate spatiotemporal CTC data in detecting unusual criminal occurrences. Other work includes integration with the GARI technology to show gang tags, chemical plume modeling based on current weather conditions, and risk profiling based on the user's current time and location.

COLLABORATORS
- Illinois State Police Department
- Lafayette (Ind.) Police Department
- New York State Police Department
- Ohio State Highway Patrol
- Purdue University Police Department
- Tippecanoe County (Ind.) Sheriff's Department
- West Lafayette (Ind.) Police Department

◀ This image developed through the VALET tool highlights a map of a selected location surrounded by a line graph, calendar view, clock view and crime history, with a time slider that ties the data together so crime reports, for example, can be viewed over a selected time. The screen also includes a Twitter widget to help detect unusual activity, such as a protest or riot.

Contact Us

Want to find out how VACCINE's research can help your organization or group? Email **vaccine@purdue.edu** or visit **www.visualanalytics-CCI.org**.

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