Using data science to confront policing challenges

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Credit: AI-generated image (disclaimer)

Increasing calls for changes in policing have departments across the country searching for new ways to build trust and protect citizens and officers alike. In response, police in Charlotte, N.C. and Nashville, Tenn. police have turned to a White House-backed project at the University of Chicago that uses advanced data analytics to predict and prevent adverse

incidents, ranging from excessive force to officer injury.

Led by the Center for Data Science and Public Policy at the Computation Institute and Harris School of Public Policy, the initiative applies machine-learning methods to police department data to identify officers and police calls at a higher risk of producing adverse events, such as the use of excessive force or a sustained citizen complaint. The predictive models can be used to guide personalized interventions for at-risk officers or adjust dispatch procedures to reduce high-stress situations.

"The goal is to take historical data about these police officers—their behaviors, citations, arrests, dispatches—and use that data to assign each officer a risk score," said Rayid Ghani, the center's director. "That risk score is then used to predict which officers are at risk of one of these adverse incidents, and provide the police departments with this information so they can then work on interventions to prevent these incidents."

UChicago researchers initially connected with departments through the White House Police Data Initiative, which worked last year with 21 jurisdictions on open data and accountability goals. The initiative produced a collaboration between the Charlotte-Mecklenburg Police Department and the Data Science for Social Good Summer Fellowship, an annual program led by Ghani and the center that partners students studying computer science, statistics and social sciences with government agencies and non-profit organizations on real-world projects.

For the CMPD project, four fellows worked with representatives from the department in North Carolina to build an early intervention system that identifies at-risk officers in need of additional training. Using anonymized data on arrests, citizen complaints, disciplinary actions and

other relevant information, the team applied machine-learning methods to find combinations of factors that predict a future adverse incident. Fellows visited Charlotte as part of the 14-week project to talk with department leadership and ride along with officers, learning valuable context for the data.

By the end of the summer, the model produced by the DSSG partnership outperformed the system CMPD currently uses, which was based on simple thresholds such as three complaints within 180 days. It found more true positives in which officers flagged by the system were later involved in an adverse event, and fewer false positives in which officers flagged as high risk did not have an adverse incident.

Both results were beneficial to the department, improving their identification of officers who needed interventions while avoiding unnecessarily routing too many officers into extra training. The DSSG model also proved capable of identifying exemplary officers at the lowest risk for future adverse incidents, flagging potential role models.

CMPD returned as a partner for this summer's Data Science for Social Good Fellowship, joined by the Metro Nashville Police Department. Working with two departments simultaneously allowed DSSG to assign each a project team, improving and expanding the model in Charlotte, while simultaneously verifying how it performs in another jurisdiction.

The teams added a new component to their model for the departments, incorporating the types of calls to which officers are dispatched. Fellows learned from officers that certain calls, such as domestic violence or a suicide attempt, are more stressful. They took the input and used data from millions of calls to develop a model that flags high-risk dispatches and recommends against assigning officers who already had responded to multiple stressful calls during their shift.

"It's important for us that our model doesn't just provide departments a 'black box' result with no meaningful context," said Joe Walsh, a 2013 DSSG fellow and current DSaPP researcher who has mentored the police projects the last two summers. "We want to produce interpretable results that can help departments create specific interventions and safer operations for their officers."

Building on the initial results, researchers founded a company called Flag Analytics to commercialize the research for use by police departments across the country. In June, the startup received funding from the University's New Venture Challenge. The center also is establishing connections with additional city and county police departments and presenting the research at industry conventions such as the International Association of the Chiefs of Police and Major Cities Chiefs Association.

While the model's predictions still need to be field tested, the research project already has made major advances in applying data analytics to policing. By building an early-intervention system that is transparent, user-friendly and reliable, the research is helping police departments improve training and better protect their officers.

Provided by University of Chicago

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