

Nayar Prize II Quarterly Progress Report – April 2018

Project: A Data-Driven Crime Prevention Program

Team: Professors Miles Wernick, Lori Andrews, and Yongyi Yang, as well as students David Haro Alonso, Pauline Panayi, Harshini Tippareddy, and Raven Zeer

Progress Summary

Our project concerns the use of predictive risk models (algorithms) to guide the identification of individuals who may benefit from social services assistance designed to help reduce their risk for involvement in serious crime. In Year 2 of the project, the goals are to improve our risk models, monitor and evaluate the interventions once they commence, and influence the national debate on the use of artificial intelligence in crime prevention. In the second quarter, we have made progress toward each of these goals.

EVALUATE AND IMPROVE RISK MODELS: In preparation for Elgin Police Department's (EPD) selection of individuals to be contacted by social workers, we have worked on refining the data set and improving our risk model. EPD identified instances in their database in which a person was only a suspect of a crime and not a victim or arrestee. We have removed all such records from our analysis, and we have modified and evaluated the algorithm based on these changes. This step proved to be helpful to our model's success.

The new model, Model v1.1, considers eight variables that our risk model automatically found to be the most important for evaluating a person's risk. The importance of the variables is represented by the coefficients used by the machine-learning model, in this case a LASSO algorithm (see Figure 1). Figure 1 shows that the biggest risk factors are associated with a person's frequency of involvement as a victim or arrestee in crime incidents in the past two years, as well as the trend in this activity and the extent to which that person has been coarrested with others having similar and substantial crime involvement.

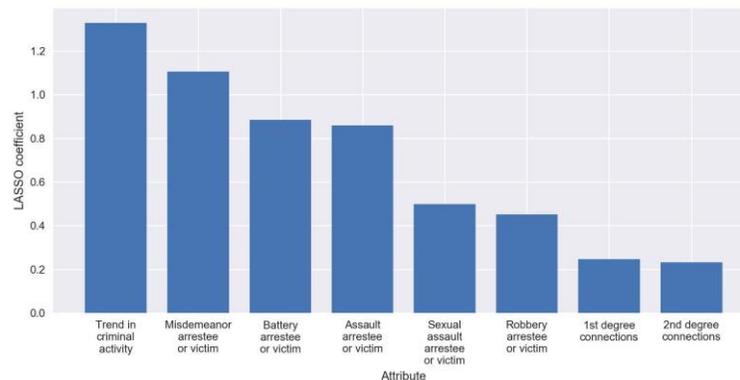


Figure 1. Variables used by Model v1.1 in decreasing order of importance for determining risk.

Our risk model seeks to anticipate crime risk so that social services assistance programs can intervene in an effort to improve the lives of individuals and their families by lowering their crime risk. Model v1.1 successfully identifies individuals whose risk for involvement in serious crimes is very high, even compared with others with a recent arrest history. In Figure 2, the blue bars show the number of people having various values of our model's risk score for those individuals, and the red curve represents the probability that an individual with a given score will actually be involved in a serious crime in the following year. Figure 2 shows that around 50 individuals have a nearly 50% chance of being involved in a serious crime, as opposed to most other recent arrestees whose risk is between 0% and 10%. Of course, Elgin residents with no recent arrest history have an even lower risk than the low-risk arrestees. Thus, the model is proving effective in finding persons who might benefit from assistance.

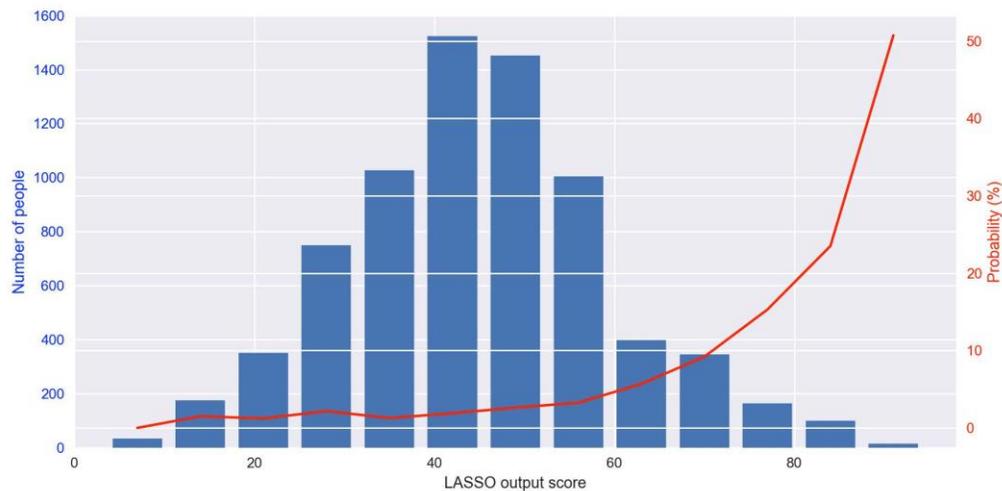


Figure 2. Number of individuals in different ranges of predicted scores (blue bars) and probability of being involved in a serious crime during the following year (red curve)

INFLUENCE THE NATIONAL DEBATE ON THE ISSUE: We have submitted to a peer reviewed journal an article on appropriate ethical and legal guidelines for the use of predictive algorithms in the criminal justice system. In the article, we analyze the history of risk prediction in the U.S. criminal justice system, the scientific and ethical issues raised by those predictions, and the legal precedents for the use of algorithms, including an analysis of 101 court cases involving police officers' predictions about criminality. We then propose a set of ethical and legal policies for the use of algorithms to predict an individual's future involvement in crime.

One of our group's crime risk models was the subject of the January 7, 2018 episode of "60 Minutes." The episode covered an actual instance where a 31-year-old African American gang member and former drug dealer was identified by our predictive policing algorithm as high-risk and was subsequently enrolled into a social services program which helped him get a state ID and find employment. He praised our approach, noting the appreciation he felt for being able to work his first job, a part-time position at an animal kennel: "Man, it was like heaven, you know? Even though I was a drug dealer, you know, like, I always, kind of, had money, but it feels different when you work for it. I wanna keep working. I don't ever wanna go back to the streets."

We have given talks about our approach in Illinois Tech classes, at other universities—including University of California Irvine—and to companies, including the financial technology company Remitly in Seattle.