Thesis Project Portfolio

Experiential Learning Through an Internship at Capital One

(Technical Report)

AI and Law Enforcement: The Effects of Predictive Policing

(STS Research Paper)

An Undergraduate Thesis

Presented to the Faculty of the School of Engineering and Applied Science

University of Virginia • Charlottesville, Virginia

In Fulfillment of the Requirements for the Degree

Bachelor of Science, School of Engineering

David Dimmett

Spring, 2022

Department of Computer Science

Table of Contents

Sociotechnical Synthesis

The two projects in this portfolio are a technical report on a software engineering internship and an STS research paper on predictive policing.

For many engineering students, industry work is just as important as learning in the classroom. There is a strong relationship between how well courses prepare students for work and how that work reinforces academics. Since this relationship exists in computer science (CS), it is useful to evaluate how effective the UVA CS curriculum is. In my technical report, I use my software engineering internship at Capital One to do such an evaluation. I go over the frontend web application my team of three other interns were assigned to extend. Based on the work, I conclude that UVA's CS curriculum mostly prepares students for real-world work. However, more opportunities for teamwork would benefit students, as communication skills are vital on software engineering teams.

The pace of a 10-week internship is very fast, so there is not much time for reflection while the job is ongoing. By doing a comprehensive retrospective, I was able to see where I could have improved my work. Maintainability is important in software engineering because it is common for existing code to be used and revisited by different developers. In this area, we could have done better by exploring more of the features available in the framework we were using.

The desire for intelligent systems power by artificial intelligence (AI) has been increasing steadily with more research and computing power. Police departments across the US have implemented predictive policing systems to predict where crimes will happen and often who will commit them. These systems appeal to police because they reduce costs and ideally make better decisions than human officers. The police also hope these systems fit into intelligent-led

policing, which takes a data-driven approach to law enforcement. However, AI can be biased, particularly along racial lines. As a result, some groups have objected to predictive policing on ethical and legal grounds. Meanwhile, software companies are selling predictive policing systems to participate in this emerging market. These complex interests show how technology is shaped by human activity and politics.

Since local law enforcement is not centralized across the US, it is difficult to summarize all the variations of predictive policing that exist. Determining a way to select sufficient examples of predictive policing with good sources was important. This project also reinforced the general idea from STS that technology does not exist in a vacuum.

Frontend software engineering and predictive policing are not closely related, except that both involve programming. The fact remains that interests shape engineering. A software engineer working on a business web application has the power to shape accessibility from a user's perspective, and maintainability from another developer's perspective. Time and budget pressures, among others, may affect these outcomes. Similarly, an engineer working on a predictive policing system would have influence on data-collection, modeling, and ultimately, what conclusion law enforcement makes of the system's outputs.