Thesis Portfolio

Interceptor Models: Simulating Air & Missile Defense Scenarios
(Technical Report)

Societal Impacts of Predictive Policing Algorithms in Crime Prevention
(STS Research Paper)

An Undergraduate Thesis

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Sociotechnical Synthesis

Artificial intelligence and machine learning algorithms have redefined the world, fundamentally reshaping how modern systems and technology behave and transforming every walk of life. This research paper seeks to sociotechnically analyze the application of artificial intelligence and machine learning algorithms towards predictive policing, known as predictive policing algorithms, which aim to predict future locations and victims of crime using previously reported incident data for use by policing forces in crime prevention.

For the technical paper, a technical state-of-the-art research synthesis was researched to determine the statistical effectiveness of predictive policing algorithms in various field trials. The results consistently showed that predictive policing algorithms were moderately effective in considerably reducing the volume of crime in applied areas or in improving the efficiency and crime prevention effectiveness for predictive policing algorithm integrations into pre-existing systems. The most important takeaway being that successfully constructed artificial intelligence and machine learning algorithms serves as a much more effective solution to quantitative problems that are currently being manually solved by human analysts. Based on these results, one can ultimately conclude that predictive policing algorithms are here to stay due to their effectiveness and should look to be refined and improved for an optimal implementation in crime prevention adding maximum benefit with minimal drawbacks.

For the sociotechnical research, I seek to analyze current implementations of predictive policing algorithms and the societal impacts their usage has resulted in. This analysis is done with a net-benefit framework in mind, seeing if the drawbacks brought about by predictive policing algorithm implementations are overwrote by the benefits their usage brings, to come to a determination on if predictive policing algorithms in their current state are worth using.

Similarly, by synthesizing the forefront of academic discussion and research done into predictive policing algorithms, my sociotechnical research seeks to realize which drawbacks are not inherent to predictive policing algorithms, and are instead faults borne of their current implementation. This is to check if the future state of predictive policing algorithms will be even better than current ones, to argue for a place for the algorithms in the future if one might think their current use is not worth it from a benefit standpoint. A social construction of technology framework will then be applied to understand the direction of predictive policing algorithm development to come to a final determination on the future of predictive policing algorithms to understand if it should continue to be used as a technology moving forward.

Through these projects, I learned not only about predictive policing algorithms and the potential of artificial intelligence and machine learning algorithms in the real world, but also more generally the processes that are taken in the development, use and oversight of new technologies. Despite there potentially being huge ramifications from the implementations of technologies like predictive policing algorithms, there is an obvious lack of field trial research and oversight done in the introductory stages of its use. It's not until there is public awareness and potential pushback that these technologies might see some change, and similarly so a majority of the academic discussion and research does not come until after this awareness is achieved. As technology progresses, it will be important to see not only how the developed of predictive policing algorithms shapes their implementations and effectiveness, but also more generally how the onset of new technologies and their development affects us all.

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