Thesis Project Portfolio

The Use of Computer Vision in Stat-Tracking High School Sports
(Technical Report)

Facial Recognition Technology: Boon or Bane

(STS Research Paper)

An Undergraduate Thesis

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Saahil Dutta

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Department of Computer Science

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Executive Summary

In recent years, the domain of science-fiction has become a reality in our ever-expanding use of technology–the dystopian society of 1984 could become a reality in the not too distant future. While the technological advancement in video technology, digital images, data storage capabilities and more recently Facial Recognition Technology has some potential benefits, it also makes it feasible for the government to watch through ‘a thousand eyes.’ I investigated applications of this technology for both my STS Research and Technical Capstone projects. For my Capstone, I summarized my experience at Blueprint Stats which was centered around the use of computer vision technology in sports stat-tracking; and in the STS Research paper I delved deeper into the broad societal implication of widespread deployment of this technology and its potential abuse by the government. There is an important societal question to be addressed: whether the implicit conveniences of this technology, such as automated statistics tracking warrant the risk of loss of individual privacy and government overreach?

My Technical Report revolved around my experience with Blueprint Stats, a startup in the athletic domain, which required a trained computer system and used computer vision to automatically track player statistics. This was used to aid underprivileged high school athletes in their search for opportunities at the collegiate level. Through the use of image classification and object detection, my team and I were able to correctly identify sporting events and track individuals based on specific attributes. The initial models trained on Google Cloud Platform were used to identify different sporting events. The system was a huge success among local Indiana schools, particularly for basketball, where a multitude of players' statistics are recorded, now with 97% accuracy. After initial application, the next step is to apply this software to other

high school sports so that it will be adopted by more schools as a comprehensive package for all activities that require automated stat-tracking.

For my STS research, I studied the risks imposed by the widespread implementation of FRT and other recent technological advancements, such as 5G, IOT and AI, which make it easier to collect, store and analyze large amounts of data. Naturally, this development is causing concerns regarding personal privacy and secrecy, leading to demands of laws and regulations to govern this space. The question to consider as engineers is: what are the potential benefits of FRT and what built-in safeguards can limit the invasion of privacy and the use of this technology for unintended purposes. In order to gather information, I conducted a literature review of scholarly articles in philosophy and ethics in technology. I specifically identified three relevant theories: Panopticon, SCOT and IPC and related those to this technology. Through research of news articles and opinion pieces I summarized the benefits and risks of this technology. I conducted a survey of existing and developing government and regulatory guidelines and policies on this subject. While we found some good use of FRT in China, U.K. and U.S.A, we also found examples of government overreach in using technology for spying on law-abiding citizens in China and Mexico. Thus, after analyzing all the evidence in context of the philosophical theories, I surmise that this technology is similar to the Trojan Horse where it seems like a beautiful gift but there are some sinister traps which are concealed. Moreover, the implementation of this technology has a ‘moral hazard’ problem as the ones entrusted to regulate the use of this technology, elected representatives and government organizations, stand to benefit the most from the abuse of this technology, as highlighted through experiences in China and Mexico.

Over the course of my 4th-year, I was able to research and discuss with my peers a current topic that is widely relevant and has the potential to disrupt our way of life. I achieved my goals of learning about a new system that has intrigued me since I became aware of it, and I am considerably more knowledgeable on the topic than I was before. If anyone were to continue studying this new technology, I would recommend continuing to read the relevant literature, however there is a scarce selection currently. I am glad I undertook this research project as it gave me a holistic perspective on this issue. On the other hand, I remain worried about the future of this technology and disturbed by how it could be misused. This underscored the importance of engineers and technocrats to consider the potential societal implications of their innovation.