

Thesis Portfolio

Analysis of Masked Facial Recognition Algorithms
(Technical Report)

Use of Facial Recognition by Groups Holding Positions of Power
(STS Research Paper)

An Undergraduate Thesis

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Sociotechnical Synthesis

This thesis portfolio focuses on Facial Recognition, a subsidiary technology derived from computer vision. Facial Recognition is the application of computer vision techniques to identify and/or classify people based on their facial features. The technical portion of this paper analyzes novel facial recognition algorithms and techniques used to identify people with face masks on. A paper written by Walid Hariri detailing new techniques used to address this new problem is selected for careful review and analysis. Several other supporting papers providing context and background information on the topic of facial recognition and masked images were also chosen to support findings in Hariri's work. This research review provides insight on a new technology with all the supporting information needed for a reader to understand advancements in this area of facial recognition.

The social portion of this paper examines the use of facial recognition technology in society. As there are many practical uses for facial recognition, three socially significant use cases were chosen for this research: healthcare, law enforcement, and education. Among these different uses, the themes of bias, privacy, and trust issues resulting from facial recognition technology arise. The use of facial recognition technology is analyzed in these cases to identify problems with its usage in addition to proposing potential solutions to the issues identified. By applying actor network theory to facial recognition and its varied use cases, its applications in modern day society and its interaction with different social groups can be examined and solutions proposed.

Ethical issues result from a technology have origins in its development. The basis of facial recognition is machine learning, which requires large amounts of data to train a model to perform facial recognition tasks. This inherent nature of facial recognition and machine learning results in certain ethical issues in practice. However, not all ethical issues result only from the technology itself. Facial recognition in society also has some effect on interpersonal relations across different use cases, this project brings to attention unexpected uses and corresponding consequences and discusses ethical issues arising from its usage.

These two research topics are tightly coupled and offer insight on the effects a relatively new and unregulated technology can have when interacting with society. Facial recognition has exploded in its use, driven by an increase in pocket computing power, as evidenced by Face ID systems and the myriad of real time filters built into photo applications. By exploring the inner working of facial recognition technology, the information gained can be beneficial to explaining some of the issues arising from the applications of facial recognition technology in real world situations. Through researching its inner mechanics in addition to significant uses facial recognition sees in society, issues with its use as a novel technology can be identified and then addressed in order to aid facial recognition technologies integration into modern society, specifically in situations with power dynamics.