

Thesis Project Portfolio

A Versatile Open-Source Photomosaic Maker

(Technical Report)

Generative Artificial Intelligence: A Social Construction of Technology Perspective

(STS Research Paper)

An Undergraduate Thesis

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Bachelor of Science, School of Engineering

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Sociotechnical Synthesis

With the widespread adoption of smart devices and blooming social media usage, everyone can create digital content at any time and at any place. The increasing speed of digital data production creates new opportunities for novel ways of presentation, synthesis, generation, and manipulation of digital data. At the same time, the lack of regulation and standards for these newborn technologies also introduces challenging problems to society.

My capstone project concerns a visually appealing way of presenting pictorial content. In particular, my project proposes new methods for generating photomosaics, in which a collection of pictures is arranged onto a grid to approximate the visual of another image. My project aims to address the shortcomings of existing methods, which often overlook the fairness of each picture presented in a photomosaic. Experiments show that my algorithm can generate photomosaics with superior visual quality compared to several commercial products while consuming less computational resources.

On the other hand, my STS research focuses on the broader topic of digital content generation and manipulation with artificial intelligence, which has been a controversial topic since the introduction of technologies such as DeepFake. More specifically, my STS research reviews generative artificial intelligence (GAI) technologies, including but not limited to those for image generation, video manipulation, and text generation, from the perspective of social construction of technology. By studying the difference in perception and interpretations of GAI within various social groups, I identify that those conflicts originate from irresponsible and unethical use of GAI through alternative designs introduced in some of these groups. Going a step further, I demonstrate that with the ongoing trend of collaboration across these social groups, beneficial use of GAI will eventually prevail, turning GAI into another stable and immensely useful technology.