Thesis Project Portfolio

Synthetic Images: Generative Adversarial Networks and Diffusion

(Technical Report)

Rights of Artificial Intelligence and Neural Networks

(STS Research Paper)

An Undergraduate Thesis

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Sociotechnical Synthesis

The trend in the development of Artificial Intelligence is towards machine learning involving deep neural networks that are increasingly opaque to human understanding. Generative Adversarial Networks exemplify this issue as they use unsupervised training and the discriminator model iteratively creates the utility function for the generation model. Diffusion extends this issue as the training involves reversing random Gaussian noise which leads to a level of randomness that is near impossible to decode once the model is trained. The lack of transparency leads to issues detecting bias, bugs, or unintentional outputs from the models. The Technical Report will evaluate the technologies that have led to current AI image models. As these are the technologies develop, we will have to grapple with how rights and protections are afforded to the AI models and their works. The ethical principles for integrating AI into society should be established early due to the rapid and unpredictable trajectory of AI progress, The recent advances in image generation models such as DALL-E 2, Midjourney, and Stable Diffusion have demonstrated AI programs are capable of creative work previously thought to be solely in the domain of human artists. Artists and other rights holders have expressed concerns that copyrighted content has been used to train Deep Neural Networks for these image models. There is now a debate over the degree to which copyrighted content is memorized and stylistically reproduced versus being truly learned by the AI. In the STS Research Paper, Actor Network Theory will be used to evaluate the interactions between the artists, right holders, AI companies, and the models themselves. Image generation models are a useful case study as they are currently disrupting art and creative industries and the ethics of their development remain unclear.