Thesis Project Portfolio

Machine Learning: Predicting Graduation Rates of Virginia High Schools

(Technical Report)

Examining Changes of Power Dynamics in The System of Commercial Art After the Incorporation of AI Art Generators

(STS Research Paper)

An Undergraduate Thesis

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In Fulfillment of the Requirements for the Degree

Bachelor of Science, School of Engineering

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Sociotechnical Synthesis

For my technical project, I worked in a group with 2 other students to train and test different machine learning models in predicting the graduation rates of Virginia high schools. For my STS research paper, I analyzed how artificial intelligence art generators could change the power dynamics of the commercial art industry. The connection between my technical project and STS research paper is the role of machine learning in the development of artificial intelligence. The capabilities of artificial intelligence have improved rapidly in recent years, partially due to the incorporation of machine learning models. For example, the groundbreaking DALL-E deep learning model that paved the way for text-based artificial intelligence art generators was released just last year. The sudden and seemingly unexpected appearance of text-based artificial intelligence art generators is what led me to develop my STS research topic. In particular, I was curious about how artificial intelligence art generators could affect artists' job prospects. Through my research, I learned that STS is relevant to engineering practice because it encourages engineers to consider how technology fits into sociotechnical systems and the ethical issues that could arise.

The technical portion of my project produced a script that trains and tests different machine learning models in predicting the graduation rates of Virginia high schools. In order to create a dataset with potentially relevant features to train the models on, my teammates and I combined datasets on graduation rates, free/reduced lunch eligibility rate, advanced classes, suspension, and the number of students at each school. The script includes an analysis of the performance of different models. Eventually, the models could be developed into a tool for schools to understand how different factors potentially contribute to their graduation rates.

The deliverable of my STS research paper is an analysis of how power dynamics in the sociotechnical system of commercial art could shift with the introduction of artificial intelligence

art generators. This is accomplished by creating a list of actors, both in the industry of commercial art and the system of artificial intelligence art generators, by extending knowledge from sources discussing the topics. A modified actor network theory is used to analyze power dynamics. Insights from the are made from trying to position the actor-network of artificial intelligence art generators into the actor-network of commercial art. The analysis considers the ethical issues of artificial intelligence art generators and how the livelihood of commercial artists could be affected with the introduction of a technology that creates art at much faster rates. Overall, the benefit is a greater understanding of how fast-evolving artificial intelligence art technology may affect the commercial art industry, and how commercial artists may respond in turn with the resources available to them.

When developing the design for my technical project, my teammates and I looked through datasets as inspiration for our topic. By going through this process myself, I became more aware of the ethical issues that can arise when using datasets. This experience influenced the topic for my STS research, as my curiosity for how datasets were created for artificial intelligence art generators led me to research the ethics of artificial intelligence art generators.

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