Thesis Project Portfolio

Dynamic Tagging: Tracking Energy Usage on Large Language Models

(Technical Report)

Volkswagen Dieselgate: A Virtue Ethics Analysis

(STS Research Paper)

An Undergraduate Thesis

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Tu-Yen Dang

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Department of Computer Science

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Sociotechnical Synthesis

Introduction

In my technical project, I developed a Dynamic Tagging system to measure the energy usage of software programs in real time. This tool aims to help developers make more sustainable choices by providing detailed energy usage data. My STS research paper investigates the ethical failures of Volkswagen's Dieselgate scandal through the lens of virtue ethics. While these projects are very different topics (software development versus the automobile devices), they share commonalities by focusing on accountability, transparency, and environmental responsibility in engineering practices. The STS research paper highlights how decisions related to technology and engineering can significantly impact society and the environment. It is important to analyze these qualities and apply them to decisions for the technical project to prevent further unethical practices. By exploring the relationship between engineering practice and ethics, my STS research helps contextualize the societal importance of the values in my technical work.

Technical Report Design

The technical project addresses the growing computational power needed for artificial intelligence usage, and how it can affect the environment. One way to aid this is to inform developers how much of an environmental impact their programs have. Current tools like CodeCarbon and AWS's Customer Carbon Footprint Tool try to quantify carbon emissions but fall short in providing specific and accurate results. My Dynamic Tagging system fills these gaps by offering live energy usage tracking and logging capabilities, allowing users to tag specific code instances and monitor energy costs. The tool calculates energy usage on computing resources like CPU, GPU, RAM, and storage. It then outputs these metrics in a user-readable log

file. This data empowers developers and companies to optimize workflows and deployment strategies with sustainability in mind, offering a tangible step toward greener software practices.

STS Research Paper

My STS paper uses the virtue ethics framework to evaluate the moral failures behind Volkswagen's implementation of defeat devices. These devices were used to cheat emissions test results to meet environmental standards, despite their vehicles polluting far beyond legal limits. The paper argues that this scandal was not a technical oversight but a cultural and ethical failure—engineers and executives prioritized financial gain over honesty, integrity, and public welfare. The lack of character and accountability unethical behavior was rooted in the company's work culture, and led to a normalization of deception.

Conclusion

Working on both projects highlighted how deeply ethical frameworks can inform technical design. My technical project promoted responsible decision-making through transparency and data, while my STS research shows what happens when ethical considerations are ignored in pursuit of profit. Considering both aspects of technological development expanded my understanding of the importance of designing tools that not only work efficiently but also encourage ethical behavior in users. Moving forward, I will continue to prioritize ethics and sustainability in my technical work, knowing that these values are essential to building trustworthy and impactful technologies.