Thesis Project Portfolio

Technological Connection: Improving Resource Access through Technology
(Technical Report)

How Does AI Contribute to Existing Bias in the Technological Hiring Process?
(STS Research Paper)

An Undergraduate Thesis

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Executive Summary

Technology is a powerful societal tool integrated into the daily lives of people worldwide. However, certain tech inventions are detrimental to diversity and wellbeing when they are not developed intentionally. It is the responsibility of engineers to use their expertise to create a comfortable and equitable world with their influence on technology. In my STS research, I explore the issue of machine learning bias in the technological hiring process as well as its effects. Lack of diversity in the tech workforce directly impacts people in all walks of life, and particularly those who have been historically disadvantaged. The effects of this type of marginalization are addressed in my technical report, where I describe the ways in which technology can be used to aid marginalized people in the Charlottesville area.

In the city of Charlottesville, Virginia, there is a disconnect between available non-profit resources and the people who need non-profit resources and services. The greater Charlottesville area has an abundance of helpful non-profit organizations, but there are still citizens below the poverty line. Five UVA colleagues and I teamed up to devise a simplistic solution using problem identification techniques, compiled data, and software development technologies. Utilizing WordPress, we developed and refined a prototype website and matching tool to clearly show user eligibility for services. Ultimately, we found that resources and people in need could be linked easily through technology. In addition, we discovered that technology is easily integrated into many people's lives in the Charlottesville area, whether citizens have direct access to a personal device. In the future, the team will further develop into similar regions in the United States where we will gather additional data to refine the resource eligibility matching quiz with web scraping paired with human volunteers to maximize efficiency and accuracy. The technical

project directly addresses poverty in the United States, which mainly affects underserved communities like people of color and LGBT+ communities.

Underserved communities are also the motivation for my STS research question. Women are marginalized in the technical hiring process, where white men have dominated the industry. These female engineers make up significantly less of the tech workforce than men. In part, the gender gap in the tech industry has been exposed by artificial intelligence language processing algorithms used on resumes and job advertisements that are biased against women. I use the SCOT framework to shed light on the hiring imbalances in technology and understand the impact of this lack of diversity. Ultimately, I determine a cause of bias in the tech hiring process and contextualize what has led to the low numbers of women and other underrepresented minority populations in the industry. Many years of stereotypes and biased hiring practices have caused these underrepresented groups to be pushed out of the industry from a young age. Understanding bias in engineering is the first step to increasing diversity in engineering for the future. Future work will include plans to increase diversity in schools and hiring programs to promote diversity at all stages of the sourcing process.

In addition to exploring the effects of technology on people's lives, I learned the importance of researching and background information in the technical process. By creating a concurrent thesis project while completing the technical report on artificial intelligence (AI), I embarked on combining social ethics research with technical research. The understanding of ethical and social responsibility while completing a research project is very important to shaping the direction of the impacts of the work on society. To work on the conscientious technical project and STS research paper concurrently was to delve into both worlds in an impactful way

to create a groundbreaking yet ethical AI product. The technical report and STS research projects tie together to create a fulfilling and inclusive combined report. Working on the STS and technical projects simultaneously has gone to show the interconnectedness in the world of technology. In order to combine hiring bias and the aid of poverty, it must be recognized that both poverty and hiring bias are derived in part from historical bias. Working on both the technical report and STS research has forced me to recognize the power of technology and its influence on the positive and negative in the lives of people worldwide. Technology plays an important role in people searching for jobs and those who may not even have easy access to the internet. This idea was further explored by analyzing the effects of people in shaping technology through the social construction of technology (SCOT). The combination of ethical research and conscientious technical reports helped primarily in my understanding of the impressions and responsibilities of humans on technology.