Thesis Project Portfolio

Reading Barcodes: A Computer-Vision-Based Approach to One-Dimensional Barcode Scanning

(Technical Report)

Do We Trust AI: An Investigation into Public Sentiment about Artificial Intelligence and its Trustworthiness

(STS Research Paper)

An Undergraduate Thesis

Presented to the Faculty of the School of Engineering and Applied Science

University of Virginia • Charlottesville, Virginia

In Fulfillment of the Requirements for the Degree

Bachelor of Science, School of Engineering

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Spring, 2024

Department of Computer Science

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Executive Summary

Artificial intelligence (AI) is one of the fastest growing industries today. It has also become an internet sensation with the advent of generative AI models such as ChatGPT, a model seemingly capable of understanding language and responding coherently. Because of its growth, AI is now one of the biggest topics of discussion. We are discussing potential applications, the benefits of using it, its many flaws, the ethics of it all, and much more. For AI to potentially change our world for the better, we need to continue discussion in all of these aspects, and figure out what we think the best way forward is with developing this technology. In my projects, I explore both a technical application and a sociological aspect of AI, showcasing completely different parts of an ever-growing field and technology.

My technical project was done in cooperation with Coros Corp., a company focused on creating automated technologies for distribution warehouses. We created a camera-based system that could localize parcels in a video feed, extract any 1-dimensional (1D) barcodes, and decode them in real time. 1D barcodes are the barcodes you can find in stores, made up of black lines of varying thicknesses. The motivation for this project is because laser-based barcode scanners are quite expensive, and using a camera-based system allows for more flexibility, since you can also track the location of parcels, read text on a parcel, or classify what kind of parcel is in the feed. The system can be broken down into a three-stage pipeline: detection, enhancement, and decode. Detection is done through a large deep learning model that excels at locating objects in images. The enhancement stage uses generative AI to "enhance" a barcode, cleaning up blurry lines or filling in potential gaps in a barcode. Finally, decode uses existing libraries that people have made for decoding 1D barcodes. I cannot precisely discuss the results, due to them being proprietary to Coros, but the system did not perform up to an acceptable level given industry

standards. However, this project showed a lot of promise in the approach, as we were able to improve it significantly over the course of a few months. I believe that further development on the project could eventually lead to a viable product in warehouses.

In my STS project, I investigated the public opinion on AI with regards to how trustworthy it is. More specifically, I investigated the specific reasons why people trust or do not trust AI. This is important to understand, as developers can use these reasons as a feedback system, hopefully leading to better and safer AI for everyone. Additionally, trust is one of the most important factors determining if a technology will be adopted or not. Previous research on this topic has shown that people generally do not trust AI, as a survey showed that 91% of Americans did not fully trust AI and another survey showed that three out of five participants were hesitant to trust AI in the workplace. I conducted my investigation by collecting YouTube videos, online articles, and Reddit posts, and distilled them down to the reasons cited for trust or lack of trust in AI. The results aligned with previous findings, showing that there were more reasons that people did not trust AI compared to reasons for trusting AI. I also found that the two most cited reasons for not trusting AI were bias/prejudice in AI and "hallucinations", which refers to when AI outputs false or not real information. Overall, the public sentiment on AI seemed to be one of skepticism, where people are willing to use AI, but not fully trust its decisions.

The results I got from both of these projects were not too exciting, as my technical project did not meet standards and my STS project reaffirmed previous findings. However, I found both very rewarding to work on, since they allowed me to explore both the technical and sociotechnical sides of AI. Hopefully, the 1D barcode detection system will eventually become a product usable in actual distribution warehouses; the results we got were truly promising. As for

my STS project, I would recommend future research to try and conduct a more rigorous survey or experiment to investigate public sentiment on the trustworthiness of AI. Despite maybe not having the results I was looking for, both projects are a great foundation for future research, and I hope that someone continues with my work.