Thesis Project Portfolio

Utilizing AI and ML Techniques to Fight Rising Food Costs

(Technical Report)

The Technical, Ethical, and Economical Dimensions of Cheating in Video Games

(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

Jack Donald Halliwill

Spring, 2024

Department of Computer Science

Table of Contents

Executive Summary

In September of 2022 the price of food items in the United States like eggs, milk, and flour were 11.4% more expensive than the year prior (Wiener Bronner, 2022). These drastic price increases were alarming to many as food is so integral to who we are as humans. The price spikes seen today can be caused by production issues or global events resulting in higher grocery store prices for the end customers. These increasing prices and overall volatility in agrifoods are the problems SWARM set out to solve. SWARM works closely with agrifood businesses to reduce their costs. This type of technology is necessary for the future as food is a basic need for everyone and inequitable access to food is unethical. While on the topic of ethics, one of the most unethical things a person can do is cheat others. Whether it be in a food market, a school assignment, or a competition, cheating is always wrong. One area plagued by cheaters is the massively multiplayer online, or MMO, video game player base. This is what inspired my STS project "The Technical, Ethical, and Economical Dimensions of Cheating in Video Games". In this paper the player base of many popular MMO games is analyzed to reveal how cheaters have an impact on the neutral players.

The mission at SWARM Engineering is to help agrifood businesses save millions of dollars in operational costs to, in turn, lower end-costs of the foods provided. SWARM operates a SaaS platform allowing clients to run AI and ML algorithms on their own data in the cloud. I work on a small piece of SWARM's vast architecture, the Solution Engine, utilizing Python, Docker, Kubernetes, Git, Agile Development, and other tools and techniques. SWARM clients saw 100+% ROI within the first year for most optimizations. These savings enable clients to boost their earnings and allow for price cuts to their products in order to be more competitive in the market. Because SWARM is a startup, future work will likely include developing additional

ground-breaking and cost-effective solutions to common agrifood operational problems in order to gain and retain clients.

In recent years, the amount of people playing MMO video games globally has increased rapidly. This growing player base presents a challenge for game development companies and their players alike, cheaters. Cheaters take advantage of vulnerabilities in the game's design to give themselves the upper hand when playing. This creates an extremely frustrating experience for non-cheating players, reducing their overall playtime. The research in this paper asks players to reflect on these experiences and aims to answer the question, "How do cheaters impact a neutral player's experience?" This question is answered using Susan Star's (1999) *The Ethnography of Infrastructure*. This framework is used to analyze certain properties of MMO games and their relation to cheating. Insights from this research include player base satisfaction, impact on company's revenue, and willingness to cheat. These insights are similar to those gained from a survey performed by Irdeto (2018). Using Irdeto's works as a foundation and comparing it with the findings presented in this paper reveals how players' perception of cheaters has changed over time.

Working simultaneously at SWARM Engineering and on my STS paper about cheating in video games provided a unique experience illuminating unexpected connections in both projects. At first, these two may seem disconnected, with one focusing on technical solutions for optimizing agrifood operations and the other analyzing players' personal accounts with cheaters. But there is one thing they both have in common, and that is humans. Doing both of these projects at the same time made me realize that humans are the main factor that influences the technology we build. At SWARM we attempt to make the technology simple to use for our clients, we tailor the database to their specific needs, we allow different methods of

authentication for different groups of people etc. These are all features implemented because humans have specific and varied needs for many use cases. This is also true for MMO video game companies striving to create fair, exciting, and challenging features designed to enhance the user experience. In both projects, humans are central to why the technology is made and how it is used.

References:

Irdeto. (2018). *New Global Survey: Widespread Cheating in Multiplayer Online Games Frustrates Consumers*. https://resources.irdeto.com/media/new-global-survey-widespread-cheating-in-multiplayer-online-games-frustrates-consumers?page=%2Firdeto-global-gaming-survey&widget=619fe088c38ad74c335a025d

Star, S. L. (1999). The Ethnography of Infrastructure. American Behavioral Scientist, 43(3), 377-391. https://doi.org/10.1177/00027649921955326

Wiener-Bronner, D. (2022, September 24). Food prices are soaring, and that's changed how we eat | CNN business. CNN. https://www.cnn.com/2022/09/24/business/food-inflation-habits/index.html