

Thesis Project Portfolio

CNN and K-NN for Music Recommendation Model

(Technical Report)

Unveiling Video Game Monetization Dynamics: A Sociotechnical Analysis through Actor-Network Theory

(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

Tho Vu

Spring, 2024

Department of Computer Science

Table of Contents

Sociotechnical Synthesis

CNN and K-NN for Music Recommendation Model

Unveiling Video Game Monetization Dynamics: A Sociotechnical Analysis through Actor-
Network Theory

Prospectus

In today's rapidly growing market, businesses must compete with each other to sell their products and services. Retailers like, Amazon or Walmart, leverage machine learning models to develop a profile for each of their customers. These profiles can keep track of what the user does, buys, and how much time the user spends looking at a product. In combination with these profiles, human psychology also plays a factor in getting consumers to spend. Using techniques such as time constraints, business can seemingly influence consumers to spend more than they have to. Driven by my interest to learn more about machine learning models, I developed a music recommendation model for my technical project with three other students. This model would output song recommendations based on the user's preference of the features of the song. Additionally, to explore the psychological aspects of marketing, my STS research topic investigated how the video game industry utilizes these techniques for consumers to purchase their products.

The technical report focuses on the development of a music recommendation system that utilizes a Convolutional Neural Network (CNN) for feature extraction and a K-Nearest Neighbors (KNN) algorithm for generating song suggestions. This project addresses the challenge of navigating the vast and diverse world of music genres, aiming to provide users with a personalized and efficient way to discover music aligned with their preferences. By converting audio files into spectrograms and employing a CNN to extract features, the model can identify and analyze characteristics of individual songs. Subsequently, the KNN algorithm leverages these features to recommend songs with similar attributes to a user-inputted track. This project contributes to the field of music information retrieval by exploring the potential of CNNs and KNNs for music analysis and recommendation. It has the potential to enhance user experience by providing tailored music suggestions and facilitating the discovery of new artists and genres.

The STS research paper applies Actor-Network Theory (ANT) to dissect the network of actors involved in video game monetization, encompassing players, developers, and non-human elements such as loot boxes and battle passes. Case studies of popular games like *Fortnite* and *Battlefront 2* serve to illustrate how these actors interact and influence consumer spending behavior, shedding light on the power dynamics at play. The analysis reveals the ethical implications of certain monetization strategies, particularly those that exploit psychological vulnerabilities such as fear of missing out (FOMO) and the allure of randomized rewards. Additionally, it underscores the importance of player agency in shaping industry practices, as evidenced by instances where community backlash has prompted developers to reconsider their monetization approaches.

While the technical report and STS research paper explore seemingly disparate topics, they both delve into the complexities of user experience and choice within technology-driven systems. The music recommendation system empowers users to discover music aligned with their preferences, offering a personalized and efficient approach to navigating the vast musical landscape. Conversely, the ANT analysis of video game monetization uncovers the power dynamics and ethical considerations surrounding these systems, highlighting the potential for manipulative practices and the importance of player agency. This thesis portfolio contributes to my broader understanding of how technology shapes individual behavior and decision-making. It emphasizes the need for responsible design and implementation of systems that impact users, promoting transparency, ethical considerations, and user empowerment.