

# **Thesis Project Portfolio**

## **Analyzing Search and Recommendation Systems**

(Technical Report)

## **The Rise of Content Creators and Online Media Platforms**

(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

**Andrew Wang**

Spring, 2022

Department of Computer Science

## **Table of Contents**

Sociotechnical Synthesis

Analyzing Search and Recommendation Systems

The Rise of Content Creators and Online Media Platforms

Prospectus

## **Sociotechnical Synthesis**

Today, almost everyone in society uses the internet for their entertainment and commerce. The internet has become a vital part of our lives, changing human behavior and causing societal shifts in ways that have not been fully studied. Understanding how online applications impact the way we view ourselves and interact with others will be crucial to building online products and services. Awareness of current trends will play a major role in the future of online legislation and marketing, as well as influencing societal attitudes toward the digital age. This thesis portfolio consists of two projects, including a technical project focused on analyzing search and recommendation algorithms, and a sociotechnical project oriented around the growth of independent content creators and online media platforms. These projects help provide additional insight into how online algorithms directly influence human behavior and how people have altered algorithms to better suit their needs.

The technical research consisted of two loosely related applications focused on studying how users and algorithms interact - a Chrome extension that reranks search results and a website used to study algorithms used for recommendation systems. The Chrome extension was developed to analyze the effectiveness of user-personalized search across popular search engines, such as Google and Bing, by replacing the search results with custom ranked results. Through user testing, we found that there was not a major difference between optimal search results and user-personalized recommendations and that search engines already influenced the ranking of results based on user data. The second project was a web application built to analyze various recommendation algorithms through games. The project included the multi-armed bandit problem, the multi-armed bandit cooperative problem, and BAIR. These games mimicked user behavior toward recommendations on shopping websites and entertainment platforms and could test the effectiveness of suggestion algorithms. These two applications provide a picture of the

inner workings behind the types of suggestions that are filtered and presented to the user on online platforms.

The sociotechnical research focused on investigating the relationship and growth between content creators and online media platforms, such as YouTube and Twitch. The paper analyzes how content creators caused content platforms to change or update their policies and regulations and how these policies and restrictions often affected the types of content created by online influencers. The paper approaches these relationships through actor-network theory and observes the collective action of content creators through the use of social media. Findings showed that the online content landscape was greatly changed when YouTube and Twitch changed their advertising policies and recommendation algorithms to appeal to safe content. Content creators played a major role in the expansion of fair use and the reduction of harassment by convincing their platforms to add more tools to protect creators.

Both technical and sociotechnical research shows that search and recommendation systems have a lot of power in controlling the media that viewers see and changing the livelihoods of content creators. Online platforms have immense influence over popular content and censorship through modifications to algorithms that deliver suggestions to the user. Although the research specifically focused on YouTube and Twitch, these findings have implications that affect social media and commerce platforms as well. The findings demonstrate the power that many companies have over what we see and use daily, and how even small changes to the algorithms that control search and suggestions may impact society as a whole.