

**THESIS PORTFOLIO PROJECT**

**A State of the Art in Machine Learning Recommendation Systems**

(Technical Report)

**An Analysis of Recommendation System's Effect on Society and the Engineers Involvement**

(STS Research Paper)

An Undergraduate Thesis

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Bachelor of Science, School of Engineering

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## **Sociotechnical Synthesis**

(Executive Summary)

### *Modern-Day Recommendation Systems*

“Social media is programmed to monetize depression.” — Abhijit Naskar Himalayan Sonneteer:  
100 Sonnets of Unsubmission

Modern-day recommendation systems have become some of the most important and consistently used algorithms in the world. Every minute, hundreds of thousands of recommendations are made to users all around the world, with the sole purpose of keeping users engaged to a specific platform for as long as possible. Both through negative personal experiences and watching my friends fall victim to these tactics every day, I have become captivated with the idea of understanding how these systems work, and why nothing is being done about them at a societal or governmental level. My technical research has focused on the former, aiming to fully understand the history and future of recommendation systems, whereas my STS portion has focused on the latter, and discovering how the systems affect users and society as a whole.

The technical portion of my thesis has produced a state-of-the-art research paper on recommendation systems. The paper begins with an explanation of the simple models that were used at the dawn of social media and e-commerce, such as naive collaborative filtering models. The paper then explains current research being conducted on recommendation systems such as the cold start problem. My research is concluded with explaining the methods used by the biggest platforms in social media, such as TikTok and Netflix. This research has allowed me to gain a deep understanding of the current landscape of social media addiction, and exactly how efficient these models have become at addicting user bases of social media.

My STS research was geared towards finding the link between recommendation systems, and two key issues that are believed to be caused by these systems, the mental health epidemic and political polarization. My research has found through multiple studies, that no connection can be concretely made between social media and the mental health epidemic in the United States. Additionally, my research found that we in the United States are by no means at unprecedented levels of political polarization, and a large portion of that sentiment stems from social media creating echo chambers that at times emulate political polarization. The paper then shifts and ends with an analysis of why individual engineers, society, and governments have yet to make any significant progress on stopping the development and abuse of recommendation systems.

Recommendation systems and the social media that utilize them are some of the most rapidly growing markets in the world. With exponential growth in the number of users of technology and an ever-increasing market cap, social media platforms will continue to research and develop complex algorithms that will give them a leg up on competitors in captivating users. This means that there are countless actors involved in technical, organizational, and cultural means. This leads to an unstable ecosystem, where any one of the three pillars shifting can lead to a complete change in the entire domain. Considering this allows my research to take a broad view of recommendation systems, and attempt to reflect on all aspects involved and how each should change to better suit the world as a whole.