

Undergraduate Thesis Prospectus

A Machine-Learning App for Composing Music

(technical research project in Computer Science)

The Controversy over Social Media Recommendation Algorithms

(sociotechnical research project)

by

Conor Monaghan

December 11, 2020

On my honor as a University student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments.

Conor Monaghan

Technical advisor: Aaron S. Bloomfield, Department of Computer Science

STS advisor: Peter Norton, Department of Engineering and Society

General Research Problem

How can software use A.I. and machine-learning algorithms to benefit its users?

Artificial intelligence and machine-learning algorithms are being used for applications with consequences as varied as supplying news to citizens to determining student's grades (BBC, 2020). When the outcomes are this important, software engineers need to understand how their algorithms are going to affect people so they can best benefit society.

A Machine-Learning App for Composing Music

How can artificial intelligence and machine-learning algorithms help new composers with creating music?

The category that this project will fall under is "Propose a new software tool to help some group in some way." The project must incorporate two upper-level C.S. electives; they will be "Foundations of Data Analysis" and a second, yet-undecided course. The technical advisor is Aaron Bloomfield in the C.S. department, and it is a solo capstone project.

My goal for this project is to detail and analyze the feasibility of a new machine-learning app that would assist new composers by suggesting chords and instruments to be used in their partially-completed songs. It would act as a teaching tool for inexperienced composers. There are currently many sites that can identify chords for a song, such as Chordify (2020), but they do not have any methods for continuing a partially-composed chord progression.

Only a theoretical model of the tool will be made, and the finalized project will consist of a detailed proposal and analysis of the tool's use and effects.

The Controversy over Social Media Recommendation Algorithms

Since 2010, how have defenders and critics of social media recommendation algorithms promoted their agendas?

Social media recommendation algorithms have the power to shape people's perception of issues or other people, perhaps negatively. Johnson, et al. (2019) used mathematical analysis to show that "extreme sub-populations will likely be enhanced over time by new social media algorithms designed to reduce division." The algorithms that make social media companies such as Facebook and YouTube profitable are also controversial. To avert restrictive regulation, therefore, these companies must defend them.

Bakshy, et al. (2015) found that on Facebook, the more ideological content is, the likelier it is to be shared, and "the News Feed ranking algorithm sorts these articles," which influences what individuals read. However, the researchers found that Facebook recommends diverse content even to users of relatively extreme views. Still, Johnson, et al.'s models predicted that extreme isolated groups would form even from social media algorithms that try to bring people together (2019). Covington et al.'s (2016) description of YouTube's recommendation algorithm shows that the priority is to increase watch time and other retention data. This increases user time on the site and can amplify extreme content that engages users.

Social media companies promote and defend their algorithms. To manage inaccurate criticism, companies can release information about their algorithms. In a press

release, Facebook (2019) tried to quash rumors about its algorithm that were propagated through “copy-and-paste memes.” Some social media users oppose recommendations, alleging they promote extreme content. For example, in an article titled “YouTube’s Algorithm is Bad for Women,” (2019) Kayleigh Donaldson alleged that top YouTube “search results for Katie Bowman were videos dedicated to ‘proving’ she was a liar.” Some former tech sector insiders have exposed what they regard as biased algorithms. Guillaume Chaslot, a former Google employee, ran a study that identified the most common YouTube recommendations for “Trump” and “Clinton,” finding that in total, 86% favored Trump (Lewis, 2018). Some content creators on social media claim that the recommendation algorithm does not promote their videos (Johnson, 2019).

References

- Bakshy, et al. (2015). Exposure to ideologically diverse news and opinion on Facebook. *Science* (June). 1130-1132. JSTOR.
- BBC. (2020, August). A-levels and GCSEs: How did the exam algorithm work? BBC News. <https://www.bbc.com/news/explainers-53807730>
- Chordify. (2020). Get instant chords for any song. Chordify. <https://chordify.net/>
- Covington et al. (2016). Deep Neural Networks for YouTube Recommendations. *RecSys '16: Proceedings of the 10th ACM Conference on Recommender Systems* (Sep.). 191-198.
- Donaldson, K. (2019, May 4). YouTube's algorithm is bad for women. SYFY. <https://www.syfy.com/syfywire/youtubes-algorithm-is-bad-for-women>
- Facebook. (2019, February 6). No, Your News Feed Is Not Limited to Posts From 26 Friends. Facebook. <https://about.fb.com/news/2019/02/inside-feed-facebook-26-friends-algorithm-myth>
- Johnson, B. (2019, July 5). YouTube Algorithm Changes Are Crushing Creators. YouTube. <https://www.youtube.com/watch?v=h5GeidBHTmM>
- Johnson, et al. (2019). Emergent dynamics of extremes in a population driven by common information sources and new social media algorithms. *Sci Rep* (Aug.). 1-9. Web of Science.
- Lewis, P., McCormick, E. (2018, February 2). How an ex-YouTube insider investigated its secret algorithm. The Guardian. <https://www.theguardian.com/technology/2018/feb/02/youtube-algorithm-election-clinton-trump-guillaume-chaslot>