Web Development: A Method for the Remote Collaboration of Bands and Choirs

Analyzing Social Media Algorithms

A Thesis Prospectus
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Introduction

Since the inception of the internet, an enormous amount of social discourse, communication, and collaboration has shifted to take place online. Worldwide, 5.03 billion people use the internet, with 4.7 billion of those people also using social media (Statista). Social media and technologies like it have fundamentally changed discourse through their sheer ubiquity, but this change has not come without its fair share of controversies and problems. One particularly controversial aspect of social media is the dubious impact made by the algorithms that these companies use to determine what an individual sees when they engage with a social media platform. To give a broad summary, companies like Facebook or Twitter derive their profit from keeping users engaged with their platform, as the longer a user stays engaged, the more exposure advertisements receive, which generates them revenue. In order to keep those users engaged, these companies collect data on what their users see and interact with and feed it into algorithms which predict what content would keep them on the website in the future. Then, the user's feed is populated with that content. (Kim 2017) Ultimately, these algorithms define what's shown to users of social media, which means they can have a tremendous amount of social impact. About seven in ten Americans use social media to connect with one another (Pew Research Center 2021), and about half of Americans get news on social media at least sometimes (Walker 2021). Social media algorithms, as the arbiters of what content is shown on these platforms, can thus greatly affect the news, conversations, and views that millions of Americans see every day.

Unfortunately, this highly impactful technology is also highly controversial in its effects on society. Many critics of these algorithms have pointed out that they have an alarming tendency to recommend content that is inflammatory and can lead to political and ideological

extremism (Deibert 2019, Kim 2017, Ribeiro 2020). Others discuss the negative effects that these algorithms have on news media (Peterson-Salahuddin 2020) or how they can be used by authoritarian governments as extremely effective political tools (Bradshaw 2019), among many other issues. With just how pervasive these algorithms are, they can have a tremendous amount of social impact, and so any allegations against them must be examined. To that end, this thesis will examine why the content-recommending algorithms of social media platforms are designed in a way that leads to political or ideological extremism.

First, for my technical topic, I will examine a project that has little to do with social media algorithms on its own, but which will provide an effective contrast to these algorithms. This is a project that I worked on that would allow music groups that couldn't meet in person during the coronavirus pandemic to collaborate remotely using an online website. Again, while this technical project has little to do with social media algorithms on its own, it will provide an effective contrast to these algorithms, as this website is a content-sharing tool like a social media platform but with no such algorithms to affect its social impacts. After this discussion of my technical topic, I will move on to my STS topic, in which I will take a closer look at content-recommending social media algorithms and their impacts. I will perform a more in-depth review on just how social media algorithms have changed communication, the social impacts that that change has had, and why it is that these algorithms are designed in the way that they are. All told, in this thesis I will examine how the political and social structures surrounding social media algorithms have caused them to be designed to promote ideological and political extremism.

Technical Topic

The internet can facilitate communication and collaboration in many ways that can help those in need of it. For the technical topic of my thesis, I'll be describing a group project I helped

build as a project for the class CS 4640: Programming for Web Development, together with my groupmate Brian Christner. This project involved the creation of a website that aimed to help musical groups around the University of Virginia collaborate remotely using the internet. It represents just one way that the internet's ability to facilitate communication and collaboration can be a real force for good in the world, especially when the world is faced with a global pandemic or other issues that curb our face-to-face contact with others. While this project does not feature any content-recommending algorithms of any kind, it can serve as something of a contrasting example of another media-sharing online tool without quite as many controversies as content-recommending social media platforms.

Following the development of the coronavirus pandemic, several bands, choirs, and other music groups at UVA were forced to attempt to collaborate remotely for an extended period, which presented many challenges. According to one student that was a member of the University Singers at the time, without the ability to record and practice music in the same room, musical groups could struggle to keep their musicians in time, as video calling software added too much lag to the process in order to reach desirable musical outcomes. Moreover, asking musicians to record separately and then send their pieces to a composer presented its own problems. Even more issues with timing occurred when musicians couldn't hear each other to line up their parts, and composers experienced severe difficulties with organizing and editing together many disparate musical parts. COMPOSER was a website that my groupmate and I created in response to these challenges. Our goal was to assist musical groups by providing them a way to remotely record, organize, and edit musical projects through the use of an online website. Of course, we were not the first people to make online collaborative tools for these groups, as similar tools have existed for many years and have been heralded for their ability to produce new kinds of music-

making techniques (Barbosa, 2003, Koszolko, 2017). The goal of our website was to make remote musical collaboration as accessible and easy as possible, especially for those with little to no experience using more technical or complicated tools.

We designed the website using a combination of JavaScript, PHP, HTML/CSS, and Python. Ultimately, we were able to produce a website that allowed users to remotely create projects, record music, combine tracks, and lightly edit the composition in order to combat common remote recording problems. Due to its position as a simple and easy-to-use website, it was uniquely situated to aid less technically inclined music groups to collaborate on projects, even when not in the same room. At least one music group at UVA has expressed interest in our project, and it won the "most usable" award among the websites submitted as projects to CS 4640 that year. Notably, the website is still in need of some polish. Future work needed on the project includes expanding its editing and organizational tools, which were effective but very limited at the time of the project's end. Despite this, the project remains a testament to how the internet can facilitate communication and collaboration among people in a healthy and beneficial way.

STS Topic

Of course, while the internet is a powerful tool for communication, not every implementation of that tool is without controversy. For the STS portion of my thesis, I will be examining content recommending social media algorithms, their extremist political outcomes, and the reasons why these algorithms are designed in such a way as to produce these political outcomes. Social media algorithms have long been controversial for their tendency to foster extremism. Deibert (2019) coined three painful truths about these algorithms, which are that they're built around data surveillance and spying, that they're designed to be addictive, and that

their attention-grabbing tendencies "propel authoritarian practices that aim to sow confusion, ignorance, prejudice, and chaos." (Deibert 2019). On the topic of authoritarianism, Bradshaw (2019) found that social media algorithms were manipulated by the world's governments to shape public attitudes, and in some cases were used as a tool to suppress human rights, discredit political opponents, and drown out dissenting viewpoints. News has also been cited as suffering under the algorithm; after surveying journalists and editors, Peterson-Salahuddin (2020) found that journalists often found that when writing, they needed to negotiate between practices that would benefit their chances at having their article be recommended by these algorithms and practices that would fit their concepts of newsworthiness or journalistic autonomy. Perhaps most famously, in extreme cases these algorithms can even lead to radicalization of individuals to dangerous or fringe viewpoints. Ribeiro (2020) aimed to see if this narrative of radicalization pathways held weight on YouTube, and through an examination of over 330,925 videos posted on 349 channels, found this common narrative to be largely true. What's worse, van Eerlen (2017) found that once radicalization has taken hold, that it's profoundly difficult to reverse, with the far better strategy being to simply prevent it in the first place. In response to these various controversies, Imana (2022) proposes an alternative method for the regulation and auditing of social media algorithms for the public's benefit.

Of course, that's not to say that the discussion on these algorithms is always a monolith. Johnson (2019) found that extreme views can come into a society even when everyone has the same information and resources, and found that certain social media algorithms designed to reduce division can actually worsen it. Then there's the discussion of the filter bubble, an idea first popularized by Pariser (2012), which stated that the personalization of social media and search algorithms would leave users in their own "bubbles" where they would never be

challenged by dissenting viewpoints and instead only see their own views parroted back at them. This idea is popular and has been built on by some authors proposing ways to visualize this bubble (Nagulendra 2014) or positing solutions to the problem (Bozdag 2015), but the idea has also been challenged by other authors who cite a lack of evidence in the claim (Bruns 2019, Dahlgren 2021, Haim 2017). Ultimately, the current politics of social media algorithms are highly complex and varied, but it's safe to say that they do encourage a society in which people are driven to ideological and political extremes.

In his 1980 essay *Do Artifacts Have Politics?*, author Langdon Winner discusses the idea that technical objects have inherent political properties, and both embody and encourage certain political ideologies or ideas. Deep into the essay, Winner proposes the idea that some technologies promote certain sociological systems because those technologies are either only able to function in certain sociological systems, or at least benefit immensely from those systems. Winner gives the example of nuclear power plants, citing that the technology of nuclear power all but requires an authoritarian governmental body of some kind to be put in place in order to prevent nuclear disasters (Winner 1980). I would argue that the technology of social media may fall into this category of technical artifacts that are strongly compatible with a certain sociological system, to the detriment of others. More specifically, the technology of social media resonates strongly with a society that holds extreme and divided viewpoints. As mentioned earlier, social media companies make money by getting their users to engage with their product and stay attentive to advertisers for as long as possible (Kim 2017). Ultimately, an algorithm that promotes attention-grabbing content, despite any negative social effects that authors like Deibert (2019) may despise, will make a social media company more money. Under this viewpoint, because of the very nature of social media, its algorithms are all but forced to shape society to be

more ideologically extreme in order for the technology to work financially at all. For the STS portion of my thesis, I will be examining social media algorithms under this framework of Winner's analysis of technologies that require and encourage certain sociological systems. Using this framework, I will ask why content-recommending social media algorithms are designed in a way that leads to political or ideological extremism, and discover if the reason for these issues is that social media cannot function profitably in a society without them.

Research Question and Methods

Research Question: Why are content-recommending social media algorithms designed in a way that leads to political or ideological extremism?

For the STS portion of my thesis, I aim to produce an in-depth literature review of the social politics of social media algorithms, focusing especially on why their content recommending algorithms promote political or ideological extremism. My goal is to analyze to what extent social media requires the negative effects of these algorithms to be functional, and whether social media could be made to exist in a system with fewer negative social consequences. This literature review will include further analysis of how these algorithms result in extremism. It will also review what decisions are made by those higher up in these companies and to what extent these individuals are accepting of their algorithms' less desirable tendencies. The review will also touch on content moderation approaches as one avenue of lessening the negative impacts of these algorithms. Finally, this review will provide some insight into the profit models of social media companies, and whether the technology would be feasible financially with algorithms that have fewer negative effects at the cost of profitability. In order to discuss these subjects, I will review journals and studies, as well as articles, interviews, and other

pieces of media that can give me insight into these topics. Social media algorithms represent a core part of how communication takes places via the internet and in society as a whole in modern times, and this research will serve as a helpful summary and guide to their critical political impact, as well as provide a possible framework for their evolution.

Conclusion

To conclude, it's clear that the political and social structures surrounding social media algorithms have caused them to promote ideological and political extremism. In my thesis, I will examine why it is that these algorithms are designed this way and produce a literature review analyzing why their design produces extreme political outcomes. Additionally, my technical project will provide a contrasting example of a media sharing project without any such algorithms that might be an effective way to help readers think about the many ways that such services can be run.

As a result of this research, I expect to find that these algorithms are designed in the way that they are because it's the most profitable method of running a social media company, but I hope to also find that there are other ways one could run these services without the negative effects that come with their current implementation. The enormous social impact of social media algorithms cannot be overstated, and my hope is that this research will provide a method to reduce the controversial political impact that these algorithms have, or will at least let us better understand those impacts are and why they happen.

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