Bursting the Bubble: Personalized Recommendation Systems and the Polarization of Politics

Marlee Bryant
The University of Alabama
mabryant4@crimson.ua.edu

ABSTRACT

Filter bubbles, caused by software-implemented recommendations working with biased user input, create an ethical dilemma by discouraging access to differing viewpoints relating to news and politics, leading users' knowledge to be less well-rounded and their perspective to be more polarized. This paper discusses social media's effect on this polarization in the United States, largely due to the software's implementation of personalized recommendation algorithms. Firstly, the gravity of the problem is explained by providing the context of American's preferred news sources, as well as explaining the concepts of filter bubbles and echo chambers on social media and search engines. Then, the cause is examined from both the technological perspective of personalized recommendation systems, and the social perspective of biased user interaction. Next, the effect is quantified through presentation of research related to filter bubbles from popular social media sites. Finally, possible solutions are presented which could be implemented by developers or by users.

1. THE PROBLEM

The intentions of creators of social media platforms was not for it to serve as a primary source for news or political content, and some creators still deny social media's efficacy in these areas [8]. Recent studies by the Pew Research Center prove otherwise, finding that 18% of American's rely on social media as their primary news source [1]. This preference is especially high among young adults, since they more frequently interact with social media, as can be seen in Figure 1 [1]. From this observation, a prediction can be made that social media will likely become even more prevalent as a primary news source in the future, since use of these platforms is constantly increasing, especially for teens and young adults. The presentation of news and politics on social media will greatly affect the opinions and agendas of these younger generations, so it is important to consider whether these platforms are providing accurate and unbiased information to their users.

A shift known as audience fragmentation has occurred more broadly in news media "from mass broadcasting to large audiences toward niche media reaching more narrowly targeted and attentive audiences" [4]. This niche media tends to have more political bias in order to engage and satisfy consumers within its audience, a goal which is shared by social media platforms. When these two entities intersect, it leads to a phenomenon called filter bubbles, a term coined by Eli Pariser [8]. Social media was intended as a way to broaden knowledge and connections and allow for the discussion of diverse topics, but in practice it has produced an opposite effect. Filter bubbles lead users to see "from the universe of available information only a tailored selection that fits their pre-existing attitudes" [2]. In relation to politics, a filter bubble "actively suppresses posts that conflict with a user's political viewpoint," making a well-rounded and unbiased knowledge of current events difficult to achieve. The polarizing effect of filter bubbles is even more intensified when they overlap

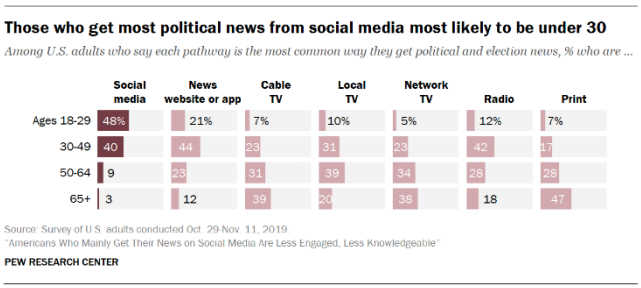

Figure 1. Primary news sources by age group

in interacting individuals, leading to the creation of echo chambers, where users within the same filter bubble share and encourage content which aligns with the group's ideology, encouraging the accentuation and acceleration of these beliefs which appear to be shared universally [3].

The frequency of certain content exposure in news media has a noticeable effect on agenda-setting [4]. Currently, different political groups have highly disparate agendas, which makes it "impossible to come together and engage in collective action because its members disagree on what is important to society" [4]. Filter bubbles lead to the polarization of opinions on shared agendas but can also lead to users having entirely different agendas determined by which content they are being exposed to. This polarization of opinions and agendas contributes to a myriad of political turmoil, such as "legislative deadlock, erratic policies, and decreased trust and engagement in the democratic process" [7]. Echo chambers can also have detrimental effects, as they cause "confusion about causation, and thus encourage speculation, rumors, and mistrust" and lead to "group radicalization and polarization" [3]. All of this amounts to a space where common ground is challenging to find, and yet is fundamental to the democratic process in America's two-party system. Although this fragmentation is somewhat spurred by the individual's confirmation bias and their chosen social interactions, the algorithms behind social media platforms perpetuate this.

2. THE CAUSE

2.1 Technology Bias

The root of the algorithmic creation of filter bubbles is the use of personalized recommendation systems. Social media platforms employ machine learning algorithms which assess and evaluate the content which users interact with and share and suggest content which is similar in order to increase enjoyment and engagement, as well as funding by personalization of advertisements and monetized content. When this is applied to news and political content, it leads to filter bubbles since the input is content which aligns with the users pre-existing political beliefs [2]. The degree of limitation of content is somewhat relative to the user's breadth of interaction, leading to some users becoming "super bubbled" [9]. A user with very limited diversity in interaction will see "posts from outlets that reinforce what they

believe" [9]. This highlights the importance of the input to these algorithms, which in many ways is more of a social and individual issue than technological.

2.2 Social Bias

Everyone inherently tends to be more likely to accept information which aligns with their existing beliefs and to disregard conflicting information, a tendency known as confirmation bias. Additionally, social media users tend to follow and interact most with like-minded friends, referred to as social homophily [2]. Due to these factors, the input which users are providing to social media's recommendation systems is already restricted, so further restriction by the algorithm contributes to an endless cycle of confirmation, which has been identified as an echo chamber. Even incidental news exposure has an effect on agenda-setting, so limiting incidental exposure to differing opinions contributes to the lack of common agendas between political parties [4].

3. THE EFFECT

The presence and consequences of filtering through personalized recommendation systems has been studied on many popular social media platforms, including Facebook, Twitter, and Reddit, as well as on popular search engines like Google and Bing. One study found evidence of filter bubbles on these search engines by asking users to search the same terms and comparing the difference between the content and ordering of their first eight results [6]. They found that both search engines presented different results to each user based on their prior interactions, with Google having a greater filtering effect than Bing.

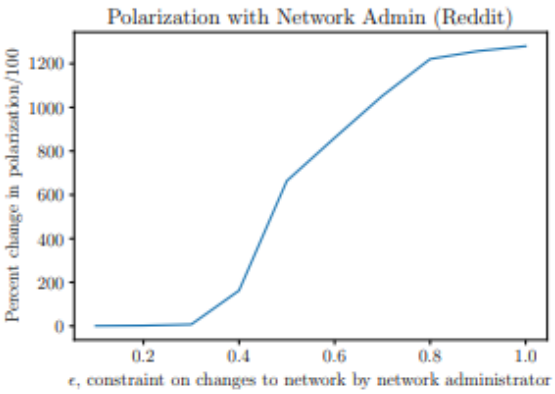

Figure 2. Polarization of Reddit feeds due to filtering

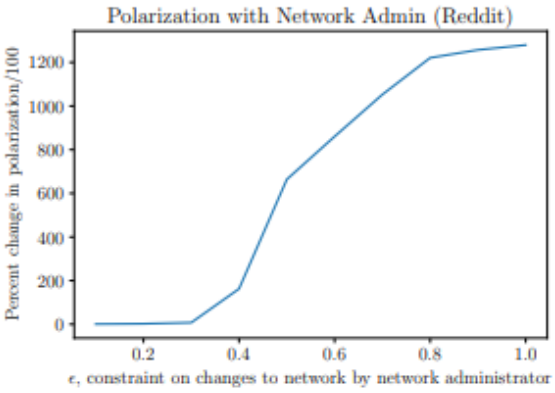

Figure 3. Polarization of Twitter feeds due to filtering

Another study simulated the effects of recommendation system filtering on Reddit and Twitter, and found that even small additions of filtering in user's feeds increased polarization drastically, as can be seen in Figures 2 and 3 [7]. These results reveal how social networks are "very sensitive to influence by filtering," creating a facilitating environment for the formation of filter bubbles [7]. Another study controlled for the individual factor of confirmation bias and noted that, while filter bubbles emerged somewhat without the assistance of algorithmic filters, their addition caused "polarization of society into even more distinct and less interconnected echo chambers" [2]. These findings highlight how social media has turned away from its original intention of enabling diversity of ideas and instead "has reinforced differences between groups and wedged them apart" [7].

4. THE SOLUTION

As this problem is multi-faceted, it will require a comprehensive solution which targets each aspect of its cause. The first issue is on the individual and social level, where users must become aware of their inherent biases and seek out information which contradicts them in order to develop a greater perspective on important issues. This can be difficult to achieve when limited by a filter bubble, especially when many users are not even aware they are in one. Most private software creators are not transparent about their filtering process, so specific information is difficult to attain. To solve this problem more knowledge must be provided about the processes leading to filter bubbles and knowing how to identify them [2]. Additionally, tools have been created to mitigate the effects of filter bubbles on social media and search results. One of such is a browser extension cleverly named Pop, which "aims to bring diverse perspectives by aggregating multiple news sources' coverage of the same event" [5]. When utilizing this tool in combination with Twitter, each news article a user encounters is presented alongside news articles covering the same topic from a variety of sources with differing political leanings. As was noted in a previously discussed study, filter bubbles can present themselves even without technological factors, so individual habit change is necessary to fully mitigate this problem.

Algorithmic changes to recommendation systems are necessary as well, and some developers are already looking into ways to implement these changes by "including filtering algorithms and user interfaces that give users better control and allow more diversity" [3]. Many social media platforms are hesitant to make these changes and instead divert to the related issue over controlling the spread of fake news and inflammatory content. While this is an important endeavor, it is a difficult balance to provide this functionality without crossing the line into censorship, and this alone cannot stop polarization when filter bubbles still exist. The reluctance of many platforms is due to the potential loss in revenue which could result from having less personalized content [7]. The study of Twitter and Reddit found that increasing the amount of disagreeing content by a small fraction of only three to five percent helps mitigate the filter bubble effect and would very minimally affect user engagement [7]. A commitment to change by both developers and users would decrease the polarization caused by audience fragmentation, hopefully leading to more open discourse and, therefore, greater involvement in the democratic system as it is intended.

5. REFERENCES

[1] Amy Mitchell, Mark Jurkowitz, J. Baxter Oliphant AND Elisa Shearer. Americans Who Mainly Get Their News on Social Media Are Less Engaged, Less Knowledgeable. Pew Research Center (2020). https://www.journalism.org/2020/07/30/americans-who-mainly-get-their-news-on-social-media-are-less-engaged-less-knowledgeable/

[2] Daniel Geschke, Jan Lorenz and Peter Holtz. The triple-filter bubble: Using agent-based modelling to test a meta-theoretical framework for the emergence of filter bubbles and echo chambers. British Journal of Social Psychology (2019), 58(1), 129-149. DOI: https://doi-org.libdata.lib.ua.edu/10.1111/bjso.12286

[3] Dominic DiFranzo and Kristine Gloria-Garcia. 2017. Filter bubbles and fake news. XRDS 23, 3 (Spring 2017), 32–35. DOI:https://doi-org.libdata.lib.ua.edu/10.1145/3055153

[4] Jessica T Feezell. Agenda Setting through Social Media: The Importance of Incidental News Exposure and Social Filtering in the Digital Era. Political Research Quarterly. (2018), 71(2), 482-494. DOI: https://doi-org.libdata.lib.ua.edu/10.1177/1065912917744895

[5] Ruchi Ookalkar, Kolli Vishal Reddy, and Eric Gilbert. 2019. Pop: Bursting News Filter Bubbles on Twitter Through Diverse Exposure. In Conference Companion Publication of the 2019 on Computer Supported Cooperative Work and Social Computing (CSCW '19). Association for Computing Machinery, New York, NY, USA, 18–22. DOI:https://doi-org.libdata.lib.ua.edu/10.1145/3311957.3359513

[6] Tawanna R. Dillahunt, Christopher A. Brooks, and Samarth Gulati. 2015. Detecting and Visualizing Filter Bubbles in Google and Bing. In Proceedings of the 33rd Annual ACM Conference Extended Abstracts on Human Factors in Computing Systems (CHI EA '15). Association for Computing Machinery, New York, NY, USA, 1851–1856. DOI:https://doi-org.libdata.lib.ua.edu/10.1145/2702613.2732850

[7] Uthsav Chitra and Christopher Musco. 2020. Analyzing the Impact of Filter Bubbles on Social Network Polarization. In Proceedings of the 13th International Conference on Web Search and Data Mining (WSDM '20). Association for Computing Machinery, New York, NY, USA, 115–123. DOI:https://doi-org.libdata.lib.ua.edu/10.1145/3336191.3371825

[8] Zoe Schiffer. ‘Filter Bubble’ author Eli Pariser on why we need publicly owned social networks. The Verge (2019). https://www.theverge.com/interface/2019/11/12/20959479/eli-pariser-civic-signals-filter-bubble-q-a