Do We All Live in Filter Bubbles on Social Media?

NEGIN HEZARJARIBI

Ethical Considerations in Data Science

Ethical Questions in Current Applications of Data Science

Studies: Bachelor in Applied Artificial Intelligence

IU INTERNATIONAL UNIVERSITY OF APPLIED SCIENCES (IU) | 15 OCTOBER 2025

Table of Contents

Introduction

In the digital era, the way people find and interpret information has changed profoundly.

Today, social media platforms, search engines, and streaming services serve as the main gateways through which individuals communicate, learn, and interact with culture. These environments depend on algorithms that organize and display information based on what they predict users will prefer. Although this personalization improves convenience, it also raises a crucial question: do users really control what they see online, or are their views shaped by algorithmic systems?

Eli Pariser (2011) introduced the term filter bubble to explain how online platforms expose users mainly to information that confirms their existing beliefs, while other perspectives become less visible. Later research, including Bozdag (2013) and Stegmann, Magin, and Stark (2021), emphasizes that personalization is not only a technical matter but also a social and ethical one, affected by both algorithmic design and user behavior. In addition, scholars such as Bloom (2019) and O'Neil (2016) highlight that digital companies operate within economic models that monetize personal data and turn user attention into a commercial resource.

This paper investigates whether people truly live inside filter bubbles on social media. It explores how algorithmic personalization influences individual thinking and social relationships, discusses the ethical challenges it creates, and examines whether these effects are as powerful as often assumed. By combining theoretical perspectives with real examples, the paper aims to present a balanced understanding of how personalization can both enhance and limit human freedom in the digital world.

1. Understanding Filter Bubbles

The idea of a filter bubble was first introduced by Eli Pariser in his book The Filter Bubble: What the Internet Is Hiding from You (2011). Pariser (2011) defined the filter bubble as a condition where search engines and social media platforms employ unseen algorithms to tailor what users view online. As a result, people are primarily exposed to materials that align with their preexisting opinions, whereas alternative perspectives tend to appear less frequently. As a result, two users on the same platform may experience completely different information worlds shaped by algorithmic selection.

Recent studies by Stegmann, Magin, and Stark (2021) suggest that the filter bubble should be viewed as a conceptual metaphor rather than a strict theoretical model. They define it as a semi-closed information environment in which people mainly receive content that strengthens their existing interests and attitudes. This pattern often results from implicit personalization, where algorithms infer user

preferences from behavioral cues, such as clicks, time spent on content, or sharing activity, and prioritize similar items. However, as Stegmann et al. (2021) note, users are rarely fully isolated from opposing information; algorithmic systems remain somewhat open, occasionally allowing diverse content to appear when relevant.

The growth of algorithmic personalization is closely tied to the massive expansion of digital information. With the rise of user-generated content, people are now exposed to far more information than they can effectively process (Bozdag, 2013; Hilbert, 2012). This situation, known as information overload, creates mental strain and decision fatigue as users try to find meaningful insights among endless data. According to Lu (2007), humans naturally filter information based on relevance and experience. From this viewpoint, personalization technologies can be seen as tools that extend this natural ability, helping users focus on information that fits their goals.

Although personalization helps manage cognitive limits, it also introduces potential bias. Bozdag (2013) argues that algorithmic filtering inevitably reflects subjective design choices that influence users' access to information. Similarly, Pariser (2011) warns that when systems optimize for engagement rather than diversity, users may become trapped in narrow informational cycles, conditions that foster the formation of filter bubbles (Stegmann et al., 2021).

Moreover, the development of personalization is deeply connected to the economic structures behind modern digital platforms (Bozdag, 2013; Qazi et al., 2023). Qazi et al. (2023) point out that many social networks rely on advertising-based business models that reward high user engagement. The longer users stay active, the more data can be monetized through targeted ads (Bozdag, 2013; Qazi et al., 2023). Therefore, personalization functions not only as a technical optimization but also as an economic strategy designed to maximize attention and emotional involvement, even at the cost of informational diversity (Pariser, 2011; Bozdag, 2013). As Bozdag (2013) cautions, these incentives can blur the line between personalization and manipulation, as algorithms increasingly favor sensational or polarizing content, reinforcing filter-bubble effects over time (Qazi et al., 2023; O'Neil, 2016).

2. Why Filter Bubbles Matter: Individual and Societal Impacts

The concept of the filter bubble has gained wide attention because it affects both individual perception and collective understanding. In modern digital environments, algorithmic personalization shapes how people search for, interpret, and evaluate information. As a result, the filter bubble has become a key topic in debates about democracy, digital ethics, and media literacy (Pariser, 2011; Stegmann, Magin, & Stark, 2021; Qazi et al., 2023).

2.1 Individual Impacts

On a personal level, filter bubbles can bring both advantages and limitations. Personalized algorithms make it easier for users to find relevant information, reducing the cognitive burden caused by massive data exposure (Lu, 2007; Hilbert, 2012). For example, social media timelines and news applications often highlight content that fits users' previous interests, improving convenience and engagement.

However, this personalization can also restrict access to diverse viewpoints. When algorithms repeatedly show users similar perspectives, individuals may develop confirmation bias, assuming that their opinions are more common or valid than they truly are (Pariser, 2011). Over time, this can narrow critical reflection and increase overconfidence in one's beliefs. Bozdag (2013) cautions that algorithmic filtering may lower the diversity of accessible information and influence personal judgments about political or social matters.

Recent findings also show that recommender systems can strengthen informational homogeneity, creating echo chambers and intensifying ideological bias (Qazi et al., 2023).

2.2 Societal Impacts

On a collective scale, filter bubbles may intensify polarization and fragment social cohesion. When people are predominantly exposed to content that confirms their existing beliefs, sustaining a shared base for democratic dialogue and mutual comprehension becomes increasingly difficult (Stegmann et al., 2021). During elections or social movements, algorithms may further amplify group identity by prioritizing emotionally charged or partisan content (Bozdag, 2013; Shahidi, Hassani, & Haddady, 2025).

A clear example was seen during the 2016 U.S. presidential election, where social media platforms tended to promote emotionally intense and polarized content, deepening political divides among users (Allcott & Gentzkow, 2017). A similar dynamic appeared during the COVID-19 pandemic, when algorithms on Twitter and YouTube boosted viral misinformation and formed echo chambers of fear, skepticism, or denial (Cinelli et al., 2020).

These examples show that algorithmic curation affects not only individual exposure but also the broader public sphere by shaping collective opinion and reinforcing division (O'Neil, 2016).

Scholars such as Bozdag (2013) and Stegmann et al. (2021) highlight the need to balance information quantity and diversity to sustain healthy public discourse. When digital systems optimize engagement over pluralism, they risk undermining democratic reasoning and reducing informational variety in society (Qazi et al., 2023).

2.3 Positive and Negative Aspects

Although filter bubbles are often seen as harmful, they also provide certain benefits. On the positive side, personalization helps users manage vast digital content and locate useful knowledge more effectively (Lu, 2007; Hilbert, 2012). Recommendation systems in streaming services or online stores, for instance, can increase satisfaction by aligning suggestions with user preferences (Aggarwal, 2016).

On the negative side, excessive personalization can isolate individuals from unfamiliar perspectives, creating self-reinforcing loops where algorithms strengthen pre-existing beliefs (Bozdag, 2013; Qazi et al., 2023). This selective exposure may also heighten susceptibility to misinformation and manipulation, especially when alternative evidence rarely appears (O'Neil, 2016; Cinelli et al., 2020).

Overall, the significance of the filter bubble lies in its dual nature: it simplifies the overwhelming flow of digital information while also limiting diversity and reducing collective reasoning. Understanding both sides of this phenomenon is essential for designing ethical and balanced digital ecosystems that support individual autonomy and social cohesion (Stegmann et al., 2021; Shahidi et al., 2025).

3. Ethical Dimensions of Filter Bubbles

The concept of the filter bubble goes beyond technical design; it also involves ethical questions about how people access knowledge and make decisions in digital spaces (Pariser, 2011). As algorithms increasingly shape what users encounter online, issues of transparency, manipulation, and corporate accountability become central to understanding their broader social effects (Bozdag, 2013; O'Neil, 2016).

3.1 Should Algorithms Decide What We See?

One major ethical concern relates to personal autonomy. When algorithms decide what information is "relevant," they quietly influence users' views of reality, often without their awareness or consent (Bozdag, 2013). This unseen influence can amount to subtle manipulation, where users think they are freely choosing what to read or watch, while their choices are actually guided by profit-driven or technical goals (Aggarwal, 2016).

For example, many news and social media platforms use algorithms that prioritize emotionally engaging or divisive content to attract attention and increase ad revenue. Such patterns reinforce confirmation bias, the natural human tendency to seek information that supports existing beliefs (Hilbert, 2012). Therefore, assigning decision-making power to algorithms raises moral questions about who controls access to information and how much influence these systems should have.

Bloom (2019) goes further, suggesting that algorithmic personalization functions as a form of digital surveillance. According to him, companies do not simply personalize information, they also track and shape users' behaviors for economic and sometimes political purposes. In this way, personalization becomes a mechanism of control that turns users into predictable, data-driven subjects.

3.2 How Much Should Users Know About Algorithmic Systems?

Transparency forms another crucial ethical aspect. Most users are unaware that digital platforms constantly collect and analyze their behavior to filter and recommend content (Stegmann, Magin, & Stark, 2021). This lack of openness prevents people from understanding how their online spaces are designed and weakens their ability to make informed decisions.

Bozdag (2013) argues that systems should provide clear explanations about why certain content appears and which factors influence it. When personalization remains hidden, it violates the ethical idea of informed consent. On the other hand, transparency gives users the chance to question, understand, and critically assess the reliability of online information.

3.3 Do Companies Have a Duty to Guarantee Informational Diversity?

Ethical questions about filter bubbles also concern corporate and social responsibility. Online platforms act as major gatekeepers of information (Bozdag, 2013). When personalization limits diversity, it can lead to polarization and weaken democratic conversation (Allcott & Gentzkow, 2017; Shahidi, Hassani, & Haddady, 2025).

Bozdag (2013) suggests that technology companies have a moral duty to balance personalization with diversity so that users encounter a wide range of perspectives and reliable information. Similarly, Lu (2007) calls for "value-added information," meaning content that combines relevance with balance to prevent informational isolation. Hence, ethical system design should aim not only to satisfy users but also to support fairness, inclusion, and democratic integrity.

O'Neil (2016) adds that many algorithmic systems, though presented as neutral, often reproduce inequality and bias. Her concept of Weapons of Math Destruction shows how data-driven models can prioritize engagement and profits over justice and responsibility. In the context of social media, such systems strengthen filter bubbles, deepen social divides, and reduce mutual understanding.

4. Possible Solutions and Ethical Guidelines

Addressing the ethical challenges of filter bubbles requires both technical innovation and social responsibility. Scholars and policymakers have proposed several strategies that promote fairness, transparency, and accountability in digital media environments (Bozdag, 2013; Stegmann et al., 2021; Qazi et al., 2023).

4.1 Technical Design Principles

A promising solution involves developing user-controllable algorithms that allow individuals to adjust their personalization settings. This approach grants users greater autonomy over their informational environment and mitigates the hidden influence of algorithmic curation (Bozdag, 2013; Lu, 2007).

Another practical measure is the publication of informational diversity reports, which reveal how often users are exposed to differing viewpoints. Such transparency helps platforms remain accountable for ensuring viewpoint diversity and maintaining a balanced flow of information (Stegmann et al., 2021; Qazi et al., 2023).

4.2 Media Literacy and User Education

Education remains fundamental in addressing the risks of filter bubbles. Media literacy programs can teach users to identify algorithmic filtering mechanisms and consciously seek out diverse sources of information. When individuals understand how personalization operates, they become more capable of critically and independently navigating digital spaces (Pariser, 2011; Hilbert, 2012).

In this sense, awareness functions as a form of cognitive empowerment, protecting users from passive consumption and reinforcing informed participation in online environments.

4.3 Ethical and Regulatory Frameworks

The establishment of ethical and legal frameworks is essential for guiding responsible algorithmic design. Initiatives such as the IEEE Code of Ethics and the EU AI Act emphasize transparency, fairness, and accountability as central principles of algorithmic governance (O’Neil, 2016; Qazi et al., 2023).

According to Qazi et al. (2023), embedding these ethical principles directly into platform design ensures that personalization technologies respect human autonomy while fostering democratic and inclusive communication.

This integration of ethics into technical design represents a shift from reactive regulation toward proactive moral responsibility in digital innovation.

5. Do We All Live in a Filter Bubble?

The question of whether everyone lives in a filter bubble does not have a simple yes-or-no answer. While algorithmic personalization affects nearly all digital users, its influence varies depending on individual behavior, platform design, and social context (Stegmann et al., 2021). In other words, the filter bubble is not a universal condition but a dynamic experience shaped by how users interact with technology and how platforms implement personalization mechanisms.

5.1 The Extent of Personalization

Most online environments today use algorithmic curation to organize information, whether through search engines, news feeds, or recommendation systems (Bozdag, 2013; Aggarwal, 2016). This means that, to some degree, almost everyone is exposed to filtered content. However, the strength of these filters differs. Users who actively engage with a wide range of topics and sources are less likely to be trapped in narrow informational environments (Stegmann et al., 2021; Pariser, 2011). In contrast, individuals who rely heavily on a single platform or interact mainly with like-minded communities experience stronger personalization effects and are more prone to informational isolation (Pariser, 2011).

5.2 The Role of User Agency

A growing body of research suggests that filter bubbles are not purely algorithmic phenomena but also behavioral ones. Users contribute to their own bubbles by consistently selecting familiar or emotionally comfortable content (Aggarwal, 2016). This process, known as self-reinforcing personalization, highlights that individual choice plays a key role in shaping the extent of exposure to diverse viewpoints. Thus, while algorithms provide the structure, human behavior often sustains the bubble.

Bozdag (2013) argues that this interdependence between users and systems complicates the assumption that everyone is equally affected. Rather than living inside fixed informational walls, people inhabit semi-permeable bubbles that can expand or contract depending on their awareness and curiosity. Digital literacy and conscious engagement, therefore, can weaken the boundaries of these bubbles.

5.3 Contextual and Platform Differences

The degree to which filter bubbles form also depends on the type of platform and its underlying economic logic. For instance, platforms designed for entertainment or targeted advertising are more likely to promote narrow personalization to maximize engagement (Qazi et al., 2023). In contrast, academic databases or public information portals typically prioritize accuracy and diversity over emotional engagement (Stegmann et al., 2021). Therefore, the experience of living in a filter bubble differs significantly between a social media user, an online shopper, and a researcher.

5.4 A Balanced View

It would be inaccurate to claim that everyone lives inside a filter bubble, but it would also be naïve to deny their widespread influence. Personalization systems have become an integral part of the digital experience, shaping how people access, interpret, and trust information. Yet, the permeability of these bubbles offers hope: through transparency, media literacy, and responsible design, users can maintain awareness and actively resist informational isolation.

Based on my observation of Iranian social media spaces, the filter bubble phenomenon is particularly evident in the country's online political sphere. A recent social network analysis of Persian Twitter (X) during the 2024 Iranian presidential election revealed that ideological factions tend to cluster into echo chambers, with content amplification reinforcing polarization (Shahidi, Hassani, & Haddady, 2025). These findings suggest that algorithmic sorting and network effects operate not only on Western platforms but also within Iran's digital public sphere, shaped by local political divisions and user behaviors.

In this sense, we do not all live in filter bubbles, but we all navigate through them. The challenge is not to eliminate personalization, which remains essential for managing the vast scale of digital information, but to ensure it coexists with openness, diversity, and ethical responsibility (Bozdag, 2013; Pariser, 2011; Stegmann et al., 2021).

As Bloom (2019) and O'Neil (2016) emphasize, the challenge of filter bubbles is not merely informational but structural. Behind personalization systems lie economic and political interests that monitor, predict, and shape user attention. Therefore, overcoming filter bubbles requires not only individual awareness but also a critical understanding of how surveillance-based business models and algorithmic inequalities continue to sustain them.

Conclusion

The concept of the filter bubble helps explain one of the major challenges in digital communication today. Personalization algorithms make it easier for users to find relevant information and reduce information overload, but they also influence what people see and believe. As Pariser (2011) and Bozdag (2013) argue, such systems may limit informational diversity; however, Stegmann, Magin, and Stark (2021) point out that filter bubbles remain partly open, as individual choices and curiosity continue to affect exposure to information.

Beyond the technical perspective, Bloom (2019) and O'Neil (2016) show that personalization operates within broader systems of power and profit, where surveillance and data collection influence what users encounter online. This raises ethical concerns regarding fairness, transparency, and autonomy.

Nonetheless, users are not powerless. Promoting media literacy, ethical algorithm design, and transparency can help mitigate the negative effects of filter bubbles. The goal is not to eliminate personalization, but to ensure it coexists with openness, diversity, and responsibility. Ultimately, while we may not all live entirely within filter bubbles, we navigate through them constantly, and our awareness, curiosity, and critical thinking determine how freely we access and interpret information in the digital world.

References

1. Aggarwal, C. C. (2016). *Recommender systems: The textbook.* Springer.
2. Allcott, H., & Gentzkow, M. (2017). Social media and fake news in the 2016 election. *Journal of Economic Perspectives,31*(2), 211-236.https://doi.org/10.1257/jep.31.2.211
3. Bloom, P. (2019). *Monitored: Business and surveillance in a time of big data*. Pluto Press. https://library.oapen.org/bitstream/handle/20.500.12657/25931/1004150.pdf
4. Bozdag, E. (2013). Bias in algorithmic filtering and personalization. *Ethics and Information Technology, 15*(3), 209–227. https://doi.org/10.1007/s10676-013-9321-6
5. Cinelli, M., Quattrociocchi, W., Galeazzi, A., Valensise, C. M., Brugnoli, E., Schmidt, A. L., Zola, P., Zollo, F., & Scala, A. (2020). The COVID-19 social media infodemic. *Scientific Reports, 10*(1), 16598. https://doi.org/10.1038/s41598-020-73510-5
6. Hilbert, M. (2012). Toward a synthesis of cognitive biases: How noisy information processing can bias human decision making. *Psychological Bulletin, 138*(2), 211–237. https://doi.org/10.1037/a0025940
7. Lu, Y. (2007). The human factor in information retrieval: Personalization and human-computer interaction. *Library & Information Science Research, 29*(3), 349–362. https://doi.org/10.1016/j.lisr.2006.10.007
8. O'Neil, C. (2016). *Weapons of math destruction : How big data increases inequality and threatens democracy*. The Crown Publishing Group.
9. Pariser, E. (2011). *The filter bubble: What the Internet is hiding from you.* Penguin Press.
10. Qazi, M. A., Nadeem, M., Sohail, S. S., Imam, R., Doctor, F., Himeur, Y., Hussain, A., & Amira, A. (2023). *Filter bubbles in recommender systems: Fact or fallacy — A systematic review.* arXiv. https://doi.org/10.48550/arXiv.2307.01221
11. Shahidi, M., Hassani, H., & Haddady, M. (2025). Political polarization mechanics on Persian Twitter (X): A social network analysis of the 2024 Iranian presidential election. *Journal of Cyberspace Studies, 9*(1). https://doi.org/10.22059/jcss.2025.388449.1122
12. Stegmann, D., Magin, M., & Stark, B. (2021). *Filter bubble.* ResearchGate. https://www.researchgate.net/publication/354696108_Filter_Bubble_-_Stegmann_Magin_Stark