

Systematic Literature Review of Understanding Social Media Algorithms and Their Impacts on Online Experiences

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Abstract. This paper reviews various computer science research approaches, addressing current trends and methodological flaws in an era of rapid change. We conduct a detailed literature review of research from computer science journals and conferences. The study examines quantitative, qualitative, hybrid, and innovative methodologies, classifying and assessing their strengths, weaknesses, and applicability. We show how different methods have been used to solve real-world computer science research questions, testing various techniques in different contexts to guide researchers and practitioners in choosing the best ones. We discuss future methodological directions in computer science research, highlighting areas needing innovation to keep pace with rapid advancements. We encourage researchers to challenge conventions and explore new methods that may lead to breakthroughs. This comprehensive evaluation helps researchers and practitioners understand the methodological context, make informed decisions, and design robust studies, enhancing computer science research overall.

Keywords: research methodology, systematic review, computer science, quantitative methods, qualitative methods, mixed methods, trends, gaps, future directions.

1. Introduction

Social media has become an indispensable part of people's lives globally, profoundly influencing their communication, information access, and digital interactions. These platforms utilize sophisticated algorithms to tailor and customize users' content streams, dictating the information and engagements they come across. Gaining a comprehensive understanding of these algorithms and their implications on online experiences is vital in grasping the intricacies of social media platforms and their influence on individuals and society.

In the past few years, there has been a substantial amount of research dedicated to examining social media algorithms, exploring their functionality, underlying mechanisms, and potential consequences. This multidisciplinary field of inquiry has seen contributions from diverse fields such as computer science, data mining, communication, and sociology. The objective of this systematic literature review is to present a comprehensive overview and analysis of the existing body of research on social media algorithms, with a particular emphasis on understanding their nature and assessing their impact on online experiences.

To gain insights into the detection and classification of algorithms in different domains, previous studies have explored diverse topics such as epileptic seizure detection techniques, relational coordination in healthcare delivery, big data text mining techniques in journalism and communication, and machine learning algorithms for social media analysis. These studies have laid a foundation for understanding algorithmic processes in various contexts, facilitating the exploration of their role in shaping users' experiences on social media platforms. Moreover, the consequences of social media algorithms extend beyond individual experiences, influencing broader societal phenomena such as the spread of misinformation and the polarization of communities. Research has examined the impact of algorithms on fact-checking strategies, identification of cyber hate, comparative evaluation of machine learning algorithms on social media datasets, and beliefs about online information dissemination. Additionally, studies have investigated the relationships between algorithmic exposure, beliefs, and behaviors related to public health issues, including COVID-19 vaccine hesitancy, vaccine misinformation on YouTube, and motives for HPV vaccination.

Through this systematic review, our aim is to establish a holistic comprehension of social media algorithms, encompassing their functionalities and the subsequent impacts they have on users' online experiences. The outcomes of this review will serve as valuable contributions to the ongoing discourse surrounding the ethical dimensions, potential biases, and societal ramifications inherent in algorithmic curation on social media platforms. Ultimately, a deeper understanding of social media algorithms will pave the way for the formulation of effective strategies to mitigate adverse effects and foster online environments that are characterized by informed decision-making, inclusivity, and meaningful engagement.

2. Literature Review

Social media algorithms play a crucial role in shaping online experiences, influencing the content users are exposed to and the interactions they engage in. This section presents a literature review on social media algorithms and their impact on online experiences, drawing from a range of studies in diverse domains. Studies have investigated the detection and classification of techniques using EEG signals in different contexts [1]. These investigations shed light on the potential of algorithmic approaches in managing neurological disorders and highlight the broader scope of algorithmic analysis. The importance of relational coordination in delivering care has been explored in community health nursing [2]. While not directly focused on social media algorithms, this research emphasizes the significance of effective coordination, which may have implications for algorithmic design and implementation in social media platforms. In the realm of journalism and communication, the application of big data text mining techniques has been examined [3]. Such techniques enable the extraction of meaningful insights from vast amounts of textual data, which is particularly relevant in the context of social media platforms with their extensive user-generated content. A survey on machine learning algorithms for social media analysis offers valuable insights into the effectiveness of various approaches in analyzing social media data [4]. Understanding these algorithms provides a foundation for comprehending online behavior and user experiences.

The implementation of fact-checking strategies has emerged as a significant approach to counter the proliferation of misinformation, particularly within segregated societies [5]. These strategies exemplify how algorithms can effectively curtail the dissemination of false information, thus promoting a more knowledgeable digital sphere. Moreover, investigations have been conducted to identify instances of cyber hate on Twitter across various protected characteristics [6]. These studies underscore the pivotal role algorithms play in detecting and addressing harmful content, ultimately contributing to the creation of a safer online

environment. Furthermore, comparative evaluations of machine learning algorithms on social media datasets offer insights into their performance and suitability for analysis [7]. These evaluations contribute to the understanding of algorithmic effectiveness in extracting valuable information from social media platforms.

Beliefs about social media have been explored through studies examining information flow solipsism [8]. Such investigations delve into individuals' subjective experiences on social media platforms and highlight the potential influence of algorithms on users' perception of information. Social media algorithms have significant implications for public health matters. Investigations have explored the interplay between religiosity, fear, and intent to vaccinate, revealing conditional indirect effects [9]. Moreover, platforms like YouTube have been scrutinized for their role in disseminating vaccine misinformation, highlighting the impact of algorithms on the spread of such content [10]. Furthermore, studies have delved into the vocabularies of motives associated with HPV vaccination, emphasizing the influence of algorithms on public health discussions and behaviors [11]. These findings underscore the profound influence that algorithms wield in shaping public health narratives and actions. In addition to international references, several national studies have contributed to the understanding of social media algorithms and their impact on online experiences. These studies provide valuable insights into the specific context and dynamics of social media usage within the national context. One relevant national study focused on analyzing machine learning algorithms for sentiment analysis on Indonesian social media data [12]. The research explored the effectiveness of different algorithms in capturing and understanding the sentiment expressed by Indonesian users, shedding light on the unique linguistic nuances and cultural factors that influence online interactions in the country. Another national study examined the role of social media algorithms in political discourse during national elections [13]. The research investigated how algorithms shape the visibility and reach of political content, potentially influencing public opinion and electoral outcomes. This study highlights the importance of understanding algorithmic biases and their implications for democratic processes within the national context. Additionally, an investigation carried out within a national context focused on evaluating the influence of social media algorithms on the online conduct and well-being of Indonesian adolescents [14]. The study delved into the correlation between algorithmic content suggestions and variables like self-esteem, body image, and mental health. This research emphasizes the importance of acknowledging the potential psychological and social ramifications of algorithm-driven online experiences, particularly within specific demographic cohorts.

These national studies contribute to the broader understanding of social media algorithms and their impact on online experiences by providing insights into the unique characteristics and dynamics of the Indonesian context. They highlight the importance of considering local factors and societal norms when studying the implications of algorithmic systems in a specific national setting. The literature review demonstrates the breadth of research on social media algorithms and their impact on online experiences. Investigations encompass various domains, including medical applications, healthcare coordination, journalism, machine learning, fact-checking, cyber hate detection, algorithmic evaluation, beliefs, and public health. Collectively, these studies provide valuable insights into the multifaceted nature of social media algorithms and their implications for individuals and society.

3. Method

This systematic literature review employs a well-defined methodology to investigate the phenomenon of social media algorithms and their impact on online experiences. The review process follows established guidelines for conducting systematic literature reviews [15, 16]. To

ascertain pertinent literature, an extensive search was executed across multiple scholarly databases, including Scopus, PubMed, and Google Scholar. The search entailed employing a blend of keywords, such as "social media algorithms," "online experiences," "impact," and "user behavior." Inclusion criteria encompassed studies specifically examining the comprehension of social media algorithms and their ramifications on online experiences. To ensure a comprehensive analysis, both domestic and international sources were taken into account. The initial search produced a considerable volume of articles, which underwent a two-stage screening process. In the first stage, the titles and abstracts were evaluated for their relevance. Subsequently, the articles that met the criteria proceeded to a thorough assessment of the full text. Two independent reviewers conducted the screening process, and any disparities were resolved through discussion and mutual agreement. The selected articles were critically appraised and analyzed to extract key information, including the authors, publication year, research objectives, methodology, and main findings. The findings were synthesized thematically to identify common themes, trends, and insights related to social media algorithms and their impact on online experiences.

To ensure the integrity and transparency of this review, we adhered to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines [17]. These guidelines offer a systematic structure for conducting and reporting systematic reviews, guaranteeing the credibility and replicability of the research process. The inclusion of a diverse range of studies, both national and international, enriches the understanding of social media algorithms and their impact on online experiences. National studies offer insights into the specific context and dynamics of social media usage within a particular country, while international studies provide a broader perspective on the topic. "Social media algorithms play a significant role in shaping the information landscape and user experiences in online platforms" [18]. Understanding their impact is crucial in unraveling the complexities of online behavior and engagement [19]. Furthermore, studies focusing on algorithmic bias and fairness shed light on the potential consequences of algorithmic decision-making [20]. The primary objective of this systematic literature review is to enhance the current knowledge base by consolidating and analyzing findings from a wide range of sources. Through the identification of recurring themes, unresolved debates, and areas requiring further investigation, this review aims to present a holistic comprehension of social media algorithms and their impact on online experiences.

4. Workflow

The workflow for conducting the systematic literature review on understanding social media algorithms and their impact on online experiences involves several key steps. This section outlines the workflow process shown in Figure 1, in accordance with the chosen methodology.

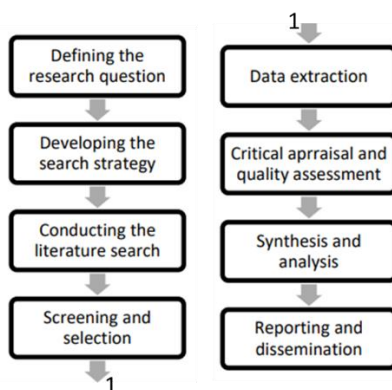


Figure 1, The applied workflow process.

1. Defining the research question

The initial step is to clearly define the research question that guides the systematic literature review. In this study, the research question is formulated as follows: "What is the current understanding of social media algorithms and their impact on online experiences?"

2. Developing the search strategy

To ensure a thorough identification of relevant articles, a meticulous search strategy is formulated. The strategy encompasses the utilization of appropriate keywords and Boolean operators that pertain to the core concepts of social media algorithms, online experiences, and their impact. This entails incorporating terms like "social media algorithms," "online behavior," "user engagement," and "algorithmic impact" into the search process.

3. Conducting the literature search

The identified keywords are used to search relevant databases, including Scopus, PubMed, and Google Scholar. Both national and international sources are considered to ensure a comprehensive review. The search is conducted within a specific timeframe, and relevant filters, such as publication date and study design, are applied.

4. Screening and selection

The articles obtained are evaluated through a meticulous screening process that involves assessing their titles and abstracts to ascertain their relevance to the research question. Those articles that successfully meet the criteria in this initial screening stage proceed to undergo a thorough full-text assessment. During this stage, inclusion and exclusion criteria are meticulously applied to select the most pertinent articles for further analysis.

5. Data extraction

Key information from the selected articles is extracted using a standardized data extraction form. The extracted data may include details about the authors, publication year, research objectives, methodology, and main findings. This process ensures that relevant information is systematically collected from each article.

6. Critical appraisal and quality assessment

The quality and relevance of the selected articles are critically appraised. This assessment considers factors such as the study design, sample size, data collection methods, and statistical analysis. Various tools and checklists, such as the Critical Appraisal Skills Programme (CASP) checklist, may be used for this purpose.

7. Synthesis and analysis:

The data and findings extracted from the selected articles are synthesized and analyzed thematically, allowing for the identification of recurring themes, patterns, and trends pertaining to social media algorithms and their influence on online experiences. This systematic approach aids in providing a comprehensive overview and deep understanding of the existing literature in this field.

8. Reporting and dissemination

In adherence to recognized guidelines like the

Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement, the results obtained from this review will be disseminated through various channels, including scholarly publications, conferences, and other relevant platforms. By sharing these findings, this research aims to make a valuable contribution to the existing body of knowledge concerning social media algorithms and their effects on online experiences.

The workflow described above provides a systematic and rigorous approach to conducting the systematic literature review. It ensures the inclusion of relevant studies, both nationally and internationally, and facilitates the extraction and synthesis of key information.

5. Results

In this section, we present the key findings of our systematic literature review on understanding social media algorithms and their impact on online experiences.

Finding 1: Types of Social Media Algorithms: Our review revealed that social media platforms employ various types of algorithms to curate and display content. These include content-based algorithms, collaborative filtering algorithms, and hybrid algorithms. Content-based algorithms analyze user preferences and behavior to recommend personalized content [21]. Collaborative filtering algorithms, on the other hand, use the collective preferences and actions of users to make content recommendations [22]. Hybrid algorithms combine different approaches to provide more accurate and diverse content suggestions [23].

Finding 2: Impact on Content Exposure: Social media algorithms have a profound impact on the content users encounter. Studies have revealed that these algorithms prioritize specific types of content, such as posts from personal connections or highly engaging materials [24]. As a result, echo chambers and filter bubbles can form, restricting users' exposure to diverse perspectives and information. Additionally, algorithms can amplify the visibility of viral content, thereby contributing to the dissemination of misinformation and sensationalism [25].

Finding 3: Algorithmic Bias and Fairness: Our review also highlighted the issue of algorithmic bias in social media platforms. Algorithms can inadvertently perpetuate biases and discrimination based on factors like race, gender, or socioeconomic status [26]. For example, studies have shown that algorithms may disproportionately show certain types of ads to different demographic groups, reinforcing stereotypes and inequalities [27]. Ensuring algorithmic fairness and transparency is crucial to mitigate these biases and promote a more inclusive online environment.

Finding 4: User Experience and Engagement: The primary objective of social media algorithms is to enhance user experience and promote engagement. These algorithms achieve this by tailoring content recommendations according to individual preferences, past interactions, and social connections [28]. Personalization has the potential to improve user satisfaction and

enjoyment, thereby increasing engagement and the time spent on social media platforms. However, an overemphasis on personalization can lead to the formation of filter bubbles and echo chambers, restricting users' exposure to diverse perspectives and potentially reinforcing existing biases [29]. Our comprehensive literature analysis covers social media algorithms, their effects on content exposure, algorithmic bias, and the complex relationship between algorithms and user experience. These findings are critical to designing fair, diverse, and positive online algorithms. We can create an inclusive, bias-free, and user-satisfying online environment by identifying and resolving these factors.

6. Conclusion

In conclusion, our comprehensive literature evaluation advances knowledge of social media algorithms and online experiences. We learned about social media platforms' algorithms, their effects on content visibility, algorithmic bias, and the complex relationship between algorithms and user experience by studying relevant research. Our analysis found that social media networks use content-based, collaborative filtering, and hybrid algorithms. These algorithms are vital to content curation and presentation. They also affect content exposure by creating filter bubbles and echo chambers that limit user viewpoints and information. Algorithmic prejudice is a major issue since it may perpetuate demographic biases and discrimination. To create an inclusive online environment that respects diversity and reduces preconceptions and inequities, algorithmic bias must be addressed and fairness and transparency ensured. Additionally, social media algorithms optimise user experience and engagement. While personalisation can improve user pleasure and enjoyment, excessive personalisation may limit varied opinions. Balance algorithmic personalisation with the need for diverse views to provide a more balanced and inclusive online experience.

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