

The use of artificial intelligence and big data in advertising

O uso de inteligência artificial e big data na publicidade

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ABSTRACT: This work examines the academic research field on the intersection of artificial intelligence (AI) and big data in advertising and explains how scholarly literature has evolved. A bibliometric analysis was performed on 28 articles indexed in Web of Science and Scopus. Co-authorship, citation, keyword co-occurrence and co-citation analyses were used to trace contributors, publications, and emerging themes. Results show that some scholars, like Colin Campbell and Jan Kietzmann, and journals, such as Journal of Advertising and Journal of Consumer Research, are central nodes. Current research seems to focus on AI and machine learning for audience targeting, personalization, and performance measurement. However, there are still some challenges in terms of data privacy and cybersecurity, as well as a shortage of skilled labor. The findings suggest AI-driven advertising research is interdisciplinary and integrates psychology, marketing, and computer science. This research provides a baseline for future studies aimed at developing ethical frameworks and advertising applications.

Keywords: *Artificial intelligence; big data; advertising; bibliometric analysis; machine learning.*

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RESUMO: Este trabalho examina o campo de pesquisa acadêmica na interseção entre inteligência artificial (IA) e big data na publicidade e discute como a literatura científica tem evoluído. Foi realizada uma análise bibliométrica de 28 artigos indexados nas bases Web of Science e Scopus. Análises de coautoria, citações, co-ocorrência de palavras-chave e cocitação foram utilizadas para rastrear colaboradores, publicações e temas emergentes. Os resultados mostram que alguns pesquisadores, como Colin Campbell e Jan Kietzmann, e periódicos, como *Journal of Advertising* e *Journal of Consumer Research*, ocupam posições centrais na rede. As pesquisas atuais parecem concentrar-se no uso de IA e aprendizado de máquina para segmentação de público, personalização e mensuração de desempenho. No entanto, ainda persistem desafios relacionados à privacidade de dados e à cibersegurança, além da escassez de mão de obra qualificada. Os achados sugerem que a pesquisa em publicidade orientada por IA é interdisciplinar, integrando psicologia, marketing e ciência da computação. Este estudo oferece uma base para investigações futuras voltadas ao desenvolvimento de marcos éticos e aplicações na área da publicidade.

Palavras-chave: *inteligência artificial; big data; publicidade; análise bibliométrica; aprendizado de máquina.*

Introduction

The interconnection of artificial intelligence (AI) and big data has reshaped the advertising domain, drastically redefining communication with consumers and the evaluation of campaigns (YU, 2022). While providing novel solutions for audience targeting, content creation, and media planning (KIETZMANN *et al.*, 2018), a systematic understanding of this scientific landscape remains underexplored. This study uses bibliometric analysis in order to map applications of AI and big data in advertising.

Big data analytics frequently encounter challenges regarding heterogeneous, uncertain, and low-quality datasets, where the massive size inherently poses a risk for proper algorithmic scaling (WANG, 2017). Another is related to security and privacy. There may be security and privacy issues such as malicious intent, misuse, systemic vulnerabilities, and cyber-attacks (SMALL, 2014).

In spite of these challenges, AI algorithms make good use of big data to predict consumer behavior with an extraordinary degree of accuracy (KOSINSKI, 2017). AI has changed the way advertising is developed in fundamental aspects such as audience insight, creative design, and channel planning (QIN; JIANG, 2019). Through machine learning and generative AI, real-time data can be evaluated by agencies to generate highly customized, dynamic content automatically (JOVANOVIĆ; CAMPBELL, 2022).

However, the use of deep data insights raises important ethical concerns. The privacy-personalization paradox points to the fact that consumers appreciate individualized messages but are suspicious of obscure data practices (BLEIER; EISENBEISS, 2018). Consequently, countering these risks by way of transparency is crucial to preserve user trust, which is a direct mediator of campaign outcomes (BOERMAN; KRUIKEMEIER; ZUIDERVEEN BORGESIU, 2019).

In order to reveal the intellectual structure and trends in the field, this study aims to answer the following research questions and sub-questions:

1. What are the results of the scientometric analysis of AI and big data in advertising?
 - 1.1. What are the results of the analysis of co-authorship among authors in the field of AI and big data in advertising?
 - 1.2. What are the results of the citation analysis of authors and documents in the field of AI and big data in advertising?
 - 1.3. What are the results of the co-occurrence analysis of author keywords in the field of AI and big data in advertising?
 - 1.4. What are the results of the co-citation analysis in terms of cited authors, cited references, and cited sources within the field of AI and big data in advertising?

Methods

In this research paper, bibliometric analysis is applied in order to systematically review the intellectual structure, development and trends of AI and big data applications in advertising (VAN ECK; WALTMAN, 2010). This quantitative method involves evaluating a large academic publication set in order to determine patterns, contributors and potential gaps to be considered for future research (ARIA; CUCCURULLO, 2017). The analysis is performed using VOSviewer to visualize bibliometric networks in order to determine the structural and intellectual evolution of the field.

The methodology has three main dimensions related to

- (1) Citation Analysis, to quantify the academic impact of authors, articles and journals;
- (2) Co-Authorship Analysis, to visualize cooperative relationships between researchers and institutions; and
- (3) Keyword Co-Occurrence Analysis, to investigate central themes and conceptual structures, based on frequently used terms.

Data collection and screening were carried out using the Web of Science Core Collection and Scopus databases, which are well known as leading international indexes for citation analysis (LI *et al.*, 2018). The search was restricted to academic journals and excluded books and chapters, considering the importance that journal articles play in the dissemination of research findings (PLONSKY; DERRICK, 2016).

The first search strategy was to search for records in the “topic” field in Web of Science (titles, abstracts, author keywords, and Keywords Plus) and the equivalent fields in Scopus (see Table 1). Search terms included “advertising” with “artificial intelligence”, “big data”, “AI”, “deep fake” and “machine learning”, but explicitly excluding the term “market*”. This first stage identified 272 articles from both databases. Subsequent filtering criteria in Web of Science were used based on publication years (2015–2024), document type (articles), specific categories (Education, Computer Science, Communication, and Psychology), specific citation topics (e.g. artificial intelligence & machine learning), and indexing in the Social Sciences Citation Index (SSCI). This process resulted in the identification of 20 relevant articles. Concurrently, the search in Scopus was performed with the same filters (2015–2024, English language, articles, and subject areas such as Computer Science, Business, Decision Sciences, and Psychology), with a final selection excluding non-SSCI indexed journals, resulting in a total of eight relevant articles. Ultimately, after thorough screening in both databases, a total of 28 articles were found and formed the basis for the subsequent bibliometric analysis.

Data Analysis

Using VOSviewer software, data of the screened articles will be analyzed through co-author, citation of authors and documents, co-occurrence of keywords, cited authors, cited references, and cited sources based on the first research question.

Table 1 – Flow of data screening and collection across databases.

Web of Science	Search string	Title & topic: (“Advertis*” AND (“artificial intelligence” OR “big data” OR “AI” OR “deepfake” OR “machine learning”)) NOT “market*”) (n = 83)
	Years	2015–2024 (n = 78)
	Document type	Article (n = 52)
	Web of science categories	Education & Educational Research, and Language and Business, Communication, Computer Science Information Systems, Computer Science Artificial Intelligence, Computer Science Software Engineering, Telecommunications, Business Finance, Engineering Electrical Electronic, Engineering Multidisciplinary, Computer Science Interdisciplinary Applications, Law, Social Sciences Interdisciplinary, Urban Studies, Regional Urban Planning, Economics, Development Studies, Information Science Library Science, Political Science, Health Care Sciences Services, Psychology Multidisciplinary, Psychology Experimental (n = 49)
	Citation topics meso	Communication, Artificial Intelligence & Machine Learning, Knowledge Engineering & Representation, Software Engineering, Social Psychology, Management, Robotics, Security Systems, Remote Research & Education, Computer Vision & Graphics, Law, Human Geography (n = 40)
	Web of science index	Social Sciences Citation Index (SSCI) (n = 20)
	Language	English (n = 20)
	Excluded	-
	Relevant	n = 20

It continues...

Table 1 – Continuation.

Scopus	Search string	Article title: “advertising” and (“artificial intelligence” OR “big data” OR “AI” OR “deepfake” OR “machine learning”) AND NOT “market*” (n = 189)
	Years	2015–2024 (n = 183)
	Subject areas	Computer Science, Business, Management and Accounting, Decision Sciences, Social Sciences, Economics, Econometrics and Finance, Engineering, Mathematics, Energy, Psychology, Environmental Science, Arts and Humanities (n = 174)
	Document type	Article (n = 88)
	language	English (n = 85)
	Keywords	artificial intelligence, big data, advertising, machine learning, advertising, digital advertising, targeted advertising, generative artificial intelligence, generative AI, digital advertising, click-through rates (CTR), ChatGPT, artificial intelligence (AI), advertising education, websites, social network, social media, personalized advertisings, personalized advertising, optimization, online advertising, mobile advertising, large dataset, high-precision, ethical considerations, decision making, AI, big data targeted advertising, big data analytics, big data analytic, big data algorithm, animation, advertising industry, advertising campaigns, advertising systems, advertising strategy, advertising service, advertising practitioners, advertising networks, advertising models, advertising engagement, advertising effects, advertising effectiveness, advertising creativity, advertising campaign, advertising appeal, advertisement model, advertisement duration, advertisement click-through rate, advertisement, accurate advertising, accurate advertising, AI-powered advertising, AI-generated content, AI-generated advertisement, AI influencers, AI in advertising, AI chatbot advertising, AI advertising, AI ads effects. (n = 69)
	Excluded	n = 55 (Non-SSCI journals), n = 6 (articles already existing in Web of Science)
	Relevant	n = 8
Total relevant articles to be reviewed		n = 28

Results

The bibliometric indicators below are derived from only 28 SSCI-indexed journal articles published between 2015 and 2024. Although this tight filter guarantees peer-review quality and topical relevance, it also narrows the empirical base. Consequently, network metrics such as total link strength and centrality should be read as indicative rather than definitive.

Analysis of co-authorship – authors

Analyzing co-authorship using authors as the unit of analysis gives valuable insights into the collaborative structure of the research field. The study of the 28 screened articles provides information on the number of articles to which each author contributed with and the strength of their collaborative connections. The total link strength is a quantitative measure of the number of connections between the authors, which essentially means that the higher the total link strength is, the more closely connected the authors are in their research activities, and the contribution of the authors to the dataset is also closely related. The results of the co-authorship analysis are presented both quantitatively and visually in terms of a network of collaborations and the key contributors in the field (Table 2).

The co-authorship analysis was an evaluation of individual authors of the 28 screened articles, with a minimum of one document and one citation per author being set as inclusion criteria. Findings indicate the following: Colin Campbell, Jan Kietzmann, Kirk Plangger, and Sean Sands each contributed two articles and got 99 citations, totaling a link strength of 7. This implies a high level of network integration and collaborative research. Additionally, three of the authors, Cheryl Aasheim, Adrian Gardiner, and Hairong Li, contributed a single article, with citations ranging from 54 to 60 and link strengths between 1 and 3. Total link strength is used to act as an indicator of connectedness within the dataset. As shown in Figure 1, the visual network shows these structural

Table 2 – Co-authorship: authors frequency.

	Author	Documents	Citations	Total link strength
1	Campbell, Colin	2	99	7
2	Kietzmann, Jan	2	99	7
3	Plangger, Kirk	2	99	7
4	Sands, Sean	2	99	7
5	Aasheim, Cheryl	1	60	3
6	Gardiner, Adrian	1	60	3
7	Rutner, Paige	1	60	3
8	Williams, Susan	1	60	3
9	Li, Hairong	1	54	1
10	Malthouse, Edward	1	54	1

Figure 1 – Co-authorship network of authors.



dynamics and how some of the authors may be central nodes with wide networks, while others have specialized links in research on AI and big data applications in advertising.

With some inclusion thresholds set at a minimum of one document and one citation, the largest connected co-authorship network consists of six items. Wang Lingqi seems to be a central node, and facilitates knowledge exchange between Su Shiliang, He Shenjing, Li Yu, Li Gui, and Hu Lirong in AI and big data advertising research.

Analysis of citation – authors and documents

Citation analysis is used to assess the interrelations among authors and documents of the 28 screened articles. When using authors as the unit of analysis, the assessment is used to map the frequency with which individuals in the dataset cite one another. The total link strength metric is used to calculate the breadth of these citation relationships, and this may be an indication of the collaborative structure of the network. Furthermore, using documents as the unit of analysis identifies the articles that are the most frequently cited by others in the set of documents. In this regard, the total link strength is the measure of the interconnection between the referenced documents, which suggests their contribution to the discourse on the role of AI and big data applications in advertising. The following sections introduce these author-level and document-level citation findings in the form of tables and visualizations, giving an outline of the structural basis for the research.

Setting the thresholds to at least one document and one citation per author for the 28 articles, a connected citation network of 15 authors is obtained (Table 3). Colin Campbell, Jan Kietzmann, Kirk Plangger, and Sean Sands seem to be at the center in terms of contributing two documents and having a link strength of 16 and 99 citations. Taylor Jing Wen and Linwan Wu are also shown to have network connections, with 21 citations and a link strength of 16 respectively. In addition, Anastasia

Table 3 – Citation of authors frequency.

Author	Documents	Citations	Total link strength
Campbell, Colin	2	99	16
Kietzmann, Jan	2	99	16
Plangger, Kirk	2	99	16
Sands, Sean	2	99	16
Wen, Taylor Jing	2	21	16
Wu, Linwan	2	21	16
Adriano, Anastasia	1	14	11
Watts, Jameson	1	14	11
Bates, Kenneth	1	21	11
Dodoo, Naa Amponsah	1	2	10

Adriano, Jameson Watts, Kenneth Bates, and Naa Amponsah Dodoo have between 2 and 21 citations and link strengths ranging from 10 to 11, reflecting the citation dynamics in the subnetwork.

The application of a minimum threshold of one citation per document created a connected network of eight articles (Table 4). Campbell *et al.* (2022) has the highest citations (78) and a link

Table 4 – Citation frequency of documents.

Document	Citations	Links
Campbell (2022)	78	3
Gardiner (2018)	60	0
Malthouse and Li (2017)	54	1
Vakratsas and Wang (2020)	29	4
Wesche and Sonderegger (2021)	23	0
Campbell <i>et al.</i> (2021)	21	5
Wu and Went (2021)	19	3
Shumanov, Cooper and Ewing (2022)	18	0
Watts and Adriano (2021)	14	4
Dong (2024)	10	0

strength of 3. Gardiner *et al.* (2018) and Malthouse and Li (2017) cited 60 and 54 articles, respectively. Vakratsas and Wang (2020) and Wesche and Sonderegger (2021) both show a link strength of 4. Additional documents such as Campbell *et al.* (2021), Wu and Wen (2021), Shumanov, Cooper and Ewing (2022), Watts and Adriano (2021) and Dong *et al.* (2024) provide numbers of citations on the range of 10–21. Overall, these interconnections and different link strengths could depict the citation dynamics and structural connections within the analyzed research landscape.

Applying minimum thresholds of one citation and one document of an author resulted in a connected citation network of 15 authors. Visualization indicates that Colin Campbell, Jan Kietzmann, Kirk Plangger, Sean Sands, Taylor Jing Wen and Linwan Wu are placed at central positions with mutual citations, which could represent a collaborative role. On the other hand, Naa Amponsah Dadoo, Jameson Watts, Anastasia Adriano and Kenneth Bates are on the periphery, having fewer connections to the core. Furthermore, Edward C. Malthouse and Hairong Li are further away from the center, which could represent more focused research, while they still contribute to the overall citation network.

Setting a minimum number of citations per document as one citation per document produced a connected network of eight items. Visualizations suggest Campbell *et al.* (2022) is at a central point in the discussion because it was often referred to by Campbell *et al.* (2021) and Wu and Wen (2021). Vakratsas and Wang (2020) and Watts and Adriano (2021) are located at the center with moderate citations. Although peripheral, Malthouse and Li (2017) is still close to Watts and Adriano (2021). This core cluster is connected to more recent works, such as Coffin (2022) and Wu, Dadoo and Wen (2024). Author-level data indicate that Colin Campbell, Jan Kietzmann, Kirk Plangger and Sean Sands have collaborative networks. Collectively, Campbell *et al.* (2022) and Vakratsas and Wang (2020) could be network centers. Figures 2 and 3 map these co-authorship and document citation patterns, showing the structural dynamics of the AI and big data advertising research.

Figure 2 – Citation network of authors.

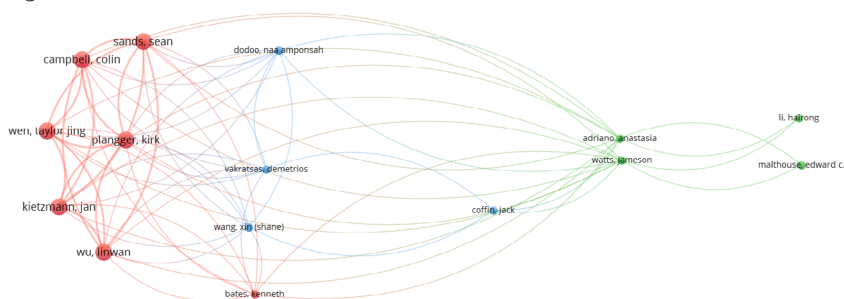
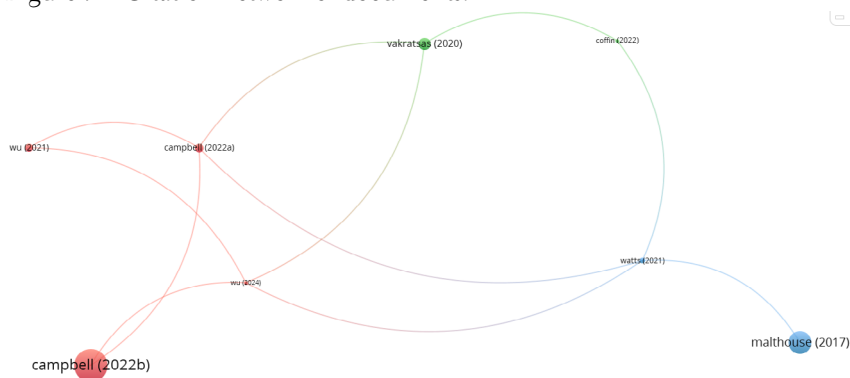


Figure 3 – Citation network of documents.



Analysis of co-occurrence of author keywords

Analysis of the co-occurrence of author keywords offers insights into the themes and conceptual relationships in the research field. This analysis identifies the central ideas that constitute discourse by analyzing the frequency of keyword appearances and when they appear concurrently with other terms in the 28 screened papers. The co-occurrence of keywords not only represents the central themes but also reveals emerging trends and subfields, and the structure of the whole research domain.

In the following sections, the results of the keyword co-occurrence analysis are presented, first in tabular form, and second, as a visualization of the interconnectivity of the key terms. These results allow for a

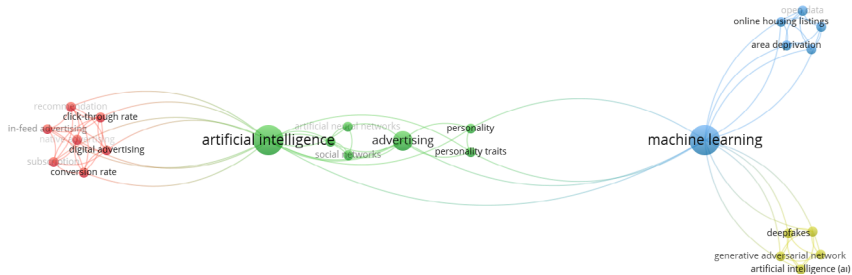
comprehensive view of how keywords cluster around essential themes and create bridges between concepts, enabling the discovery of cross-disciplinary connections.

Applying a minimum occurrence threshold of one, a connected network of 25 items was obtained using keyword analysis. Table 5 shows that “artificial intelligence” and “machine learning” occurred most often (three times each), with total link strengths of 15 and 14, respectively, implying a focus on AI technologies. The term “advertising” was present twice with a link strength of 8, so it may be a bridging concept. Keywords such as “click-through rate”, “conversion rate”, “digital advertising” and “native advertising” each appeared once (link strength 7), indicating an emphasis on performance measures. Furthermore, words like “recommendation”, “in-feed advertising” or “subscription” might refer to specific applications. A visualization of this co-occurrence network showing the structural co-occurrences of these conceptual clusters is given in Figure 4.

Table 5 – Co-occurrence analysis of author keywords.

Keyword	Occurrences	Total link strength
artificial intelligence	3	15
machine learning	3	14
Advertising	2	8
click-through rate	1	7
conversion rate	1	7
digital advertising	1	7
in-feed advertising	1	7
native advertising	1	7
recommendation	1	7
subscription	1	7

Figure 4 – Co-occurrence network of author keywords.



Applying a minimum occurrence threshold of one, the largest connected network consisted of 25 items. Visualizations show that “artificial intelligence” and “machine learning” are placed in the middle of the network and may be the bridges between several clusters. “Artificial intelligence” links to “advertising,” “digital advertising,” “click-through rate,” and “conversion rate,” which could indicate a focus on methodologies and performance measures. Furthermore, the “machine learning” node is linked to “deepfakes,” “generative adversarial networks” and “open data” - suggesting applications in the world of new technologies. Smaller clusters, such as “personality traits” and “social networks,” seem to cover consumer behavior and personalization. In addition, terms such as “subscription” and “in-feed advertising” may be examples of the integration of new formats into larger AI contexts.

Analysis of co-citation – cited authors, cited references, and cited sources

Co-citation analysis of authors, references, and sources is used to study the intellectual structure of the research domain. This method is used to quantify how often these entities are cited together and may be an indicator of their centrality in the scholarly network. Evaluating these patterns helps identify contributors, foundational documents, and frequently cited journals in AI and big data advertising research. Furthermore, this approach could be used to demonstrate the interdisciplinary dynamics of the domain and the sources that support the current research efforts.

The following sections introduce the co-citation results divided into three different units, i.e., cited references, cited authors, and cited sources. Each unit provides a particular view of the dynamics of citation, that is, it frames structural relations and patterns among items in the network by means of quantitative and graphical assessments.

Co-citation analysis is used to evaluate authors, references and sources (Table 6). S. S. Sundar had the most citations (11, link strength [LS] 67) followed by C. Campbell (9, LS 59) and J. Kietzmann (8, LS 58). T. Araujo, H. R. Li and X. B. Qin, 5–6 citations (LS 44-48). As for references, Qin and Jiang (2019, *Journal of Advertising*, 48, p. 338) was cited 6 times (LS 38); 5 and 4 (LS 36 and 30) were cited by Chen (2019) and Vakratsas and Wang (2020), respectively. According to source analysis, *Journal of Advertising* leads with 154 citations (LS 2970), *Journal of Consumer Research* with 30 citations (LS 1412), *Journal of Advertising Research* with 30 citations (LS 1064), *Journal of Marketing Research* with 28 citations (LS 869), and *Marketing Science* with 27 citations (LS 817). These dynamics are illustrated in Figure 5.

Applying a minimum citation threshold of three of each author resulted in a connected network of 44 items. The co-citation network shows that Sundar has the strongest links, being linked with Campbell and Kietzmann. This means that Sundar's work may have a bearing on the basic discourse. Furthermore, the network interconnectedness of C. M. Christensen and Araujo potentially reflects their methodological contributions and thus shows the dynamics of collaboration in this research area.

Setting a minimum number of references (three citations) resulted in a 17-item connected network (Figure 6). Qin and Jiang (2019) and Chen (2019) are in the center of the map, often having a co-citation with Kietzmann, Paschen and Treen (2018) and Vakratsas and Wang (2020). This structural pattern indicates that these references could have a role in informing theoretical and empirical understandings, which potentially demonstrates the integration of new insights with the existing frameworks in the field of advertising research.

Table 6 – Co-citation – cited authors, cited references, and cited sources analysis.

Author	Citations	Total link strength	Cited reference	Citations	Total link strength	Source	Citations	Total link strength
Sundar, SS	11	67	Qin XB, Jiang Z, 2019, j advertising, v48, p338, doi 10.1080/00913...	6	38	J Advertising	154	2,970
Campbell, C	9	59	Chen G, 2019, j advertising, v48, p347, doi 10.1080/00913...	5	36	J Consum Res	30	1,412
Kietzmann, J	8	58	Vakratsas D, Wang X, 2020, j advertising, v50, p39, doi 10.25...	4	30	J Advertising Res	30	1,064
Araujo, T	5	48	Kietzmann J, Paschen J, Treen E, 2018, j advertising res, v58, p263, doi 10...	5	30	J Marketing Res	28	869
Li, HR	5	45	Araujo T, 2020, j advertising, v49, p428, doi 10.1080...	5	29	Market Sci	27	817
Qin, XB	6	44	Deng SS, 2019, j advertising, v48, p356, doi 10.1080...	3	29	J Marketing	26	1,193
Chen, G	5	43	Rodgers S, Nguyen T, 2021, j advertising, v50, p1, doi 10.1080...	3	29	J Bus Res	23	671
Wu, LW	5	43	Watts J, Adriano A, 2021, j advertising res, v50, p26, doi 10.1080...	3	29	J Acad Market Sci	13	451
Eisend, M	5	41	Campbell C, 2021, j advertising, v51, p22, doi 10.1080...	3	27	Harvard Bus Rev	13	311
Rust, RT	5	41	Wu LW, Wen T J, 2021, j advertising res, v61, p133, doi 10.2501...	3	27	Comput Hum Behav	13	224

Figure 5 – Co-citation network of cited authors.

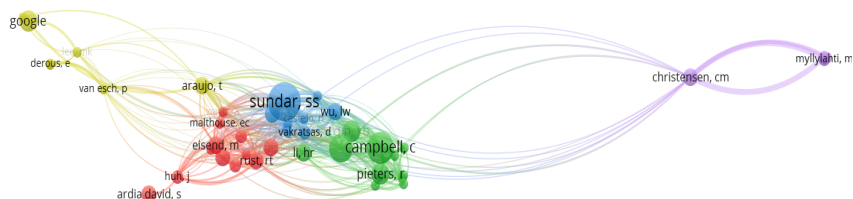
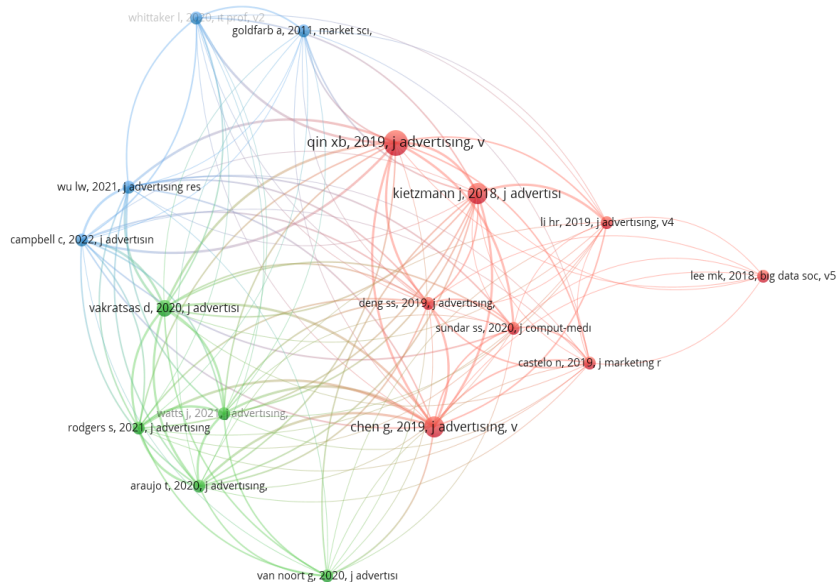
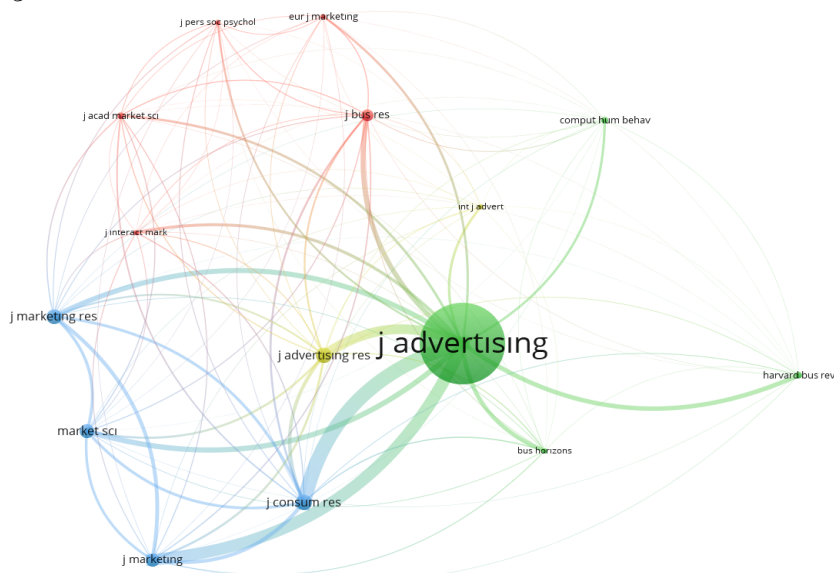


Figure 6 – Co-citation network of cited references.



Applying a minimum threshold of ten citations per source, a connected network of 15 items was obtained (Figure 7). Journal of Advertising has the highest number of citations and link strength. Journal of Consumer Research and Journal of Advertising Research also show signs of structural centrality. Furthermore, there may be complementary insights into consumer behavior from peripheral areas such as the Journal of Marketing Research and Marketing Science, reflecting the interdisciplinary dynamics of AI and big data advertising research.

Figure 7 – Co-citation network of cited sources.



Discussion

Integrating AI and big data into advertising may reshape theoretical methodologies (KIETZMANN; PASCHEN; TREEN, 2018). Bibliometric results suggest that research using AI and big data to optimize targeting, performance monitoring, and reduction of decision-making costs is growing (CAMPBELL *et al.*, 2021; 2022; KIETZMANN; PASCHEN; TREEN, 2018). This study reveals a convergent and collaborative network of researchers (RODGERS; NGUYEN, 2022; YU, 2022). According to the co-authorship data, Campbell, Kietzmann, Plangger and Sands are central nodes, while the moderate link strength implies a collaborative ecosystem (DONG *et al.*, 2024). Foundational documents are Campbell *et al.* (2022) and Malthouse and Li (2017) that inform the discussion of personalization, privacy, and click-through rates, which are in line with previous big data literature (EREVELLES; FUKAWA; SWAYNE, 2016). Research on real-time customization and ethics is built on these frameworks (QIN; JIANG, 2019; RODGERS; NGUYEN, 2022).

Keyword analysis shows “artificial intelligence” and “machine learning” as prime keywords, as well as “conversion rate,” “digital advertising,” “native advertising,” “in-feed advertising” and “recommendation”, all of which could point to an emphasis on optimization and personalized experiences (GARDINER *et al.*, 2018; KOSINSKI, 2017). Co-citation results reveal that Sundar, Campbell, Kietzmann, and foundational studies (CHEN, 2019; QIN; JIANG, 2019) are common in theoretical discussions. The Journal of Advertising (YU, 2022), Journal of Consumer Research, Journal of Marketing Research, and Marketing Science seem to spearhead the discussion of algorithmic governance and privacy (CAMPBELL *et al.*, 2022; QIN; JIANG, 2019; SUNDAR; MARATHE, 2010). Managerially, real-time optimization needs systems of creative automation compliant with data protection regulations — General Data Protection Regulation (GDPR) and California Consumer Privacy Act (CCPA) — in order to secure trust by users (BOERMAN *et al.*, 2019). Furthermore, linking “machine learning” to “deepfakes” and “generative adversarial networks” suggests vulnerabilities of reputational attack that need safeguards for transparency.

Methodologically, because of the SSCI-indexed articles, analyzing 28 articles provides an optimal tradeoff between predatory noise and constraints: small samples may amplify the centrality of some scholars, making it difficult to identify emergent scholars, and sensitive keywords to the outliers. Nevertheless, such a dataset provides a replicable diagnostic baseline. Future research could include Scopus proceedings, emerging sources and preprints, loosening language filters and triangulating data. Addressing the unresolved issues concerning privacy, fairness-aware targeting, cross-cultural responses and skilled labor shortages (SMALL, 2014) may involve sustained interdisciplinary partnerships.

Conclusion

This study provides a scientific analysis of the intersection of AI and big data in advertising. Findings reveal a dynamic scholarly context that

is powered by collaborative networks, with authors such as Campbell, Kietzmann, Plangger and Sands forming the hub of these networks. Thematically, the concept of AI and machine learning seem to be the dominant elements in literature, giving rise to interdisciplinary innovation with concepts such as “conversion rate” and “recommendation.” Furthermore, based on the analyses of citations, the foundational texts (e.g. CAMPBELL *et al.*, 2022; QIN; JIANG, 2019) and major journals framing current debates on personalization, ethics, and real-time optimization are identified.

Despite the benefits reported for the use of AI-powered systems, such as better efficiency and personalization, there are challenges associated with their use, including poor data quality, concerns about data privacy, cybersecurity risks, and labor shortfalls. Consequently, future studies may have to resolve these ethical and methodological dilemmas. Additionally, in order to offer a more comprehensive picture of the nature of research worldwide, future investigations can describe the geographical (country) and institutional (university) distribution of publications in this field.

The study has both practical and theoretical implications. Practically, the findings may help practitioners to point to privacy-compliant, real-time optimization platforms, inform training in industry, and highlight the need for regulation around algorithmic fairness. Theoretically, the study suggests that classical persuasion theories could be coming together as an integrated research agenda around algorithmic governance and that there may be a research gap in AI fairness studies. Ultimately, navigating this evolving landscape may require interdisciplinary partnerships between advertisers, scholars, and policymakers to balance the technological opportunities and ethical risks of AI and big data.

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Data availability statement: the data supporting this study are publicly available.

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