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Unveiling the dynamics of AI applications: A review of reviews using scientometrics and BERTopic modeling

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ABSTRACT

In a world that has rapidly transformed through the advent of artificial intelligence (AI), our systematic review, guided by the PRISMA protocol, investigates a decade of AI research, revealing insights into its evolution and impact. Our study, examining 3,767 articles, has drawn considerable attention, as evidenced by an impressive 63,577 citations, underscoring the scholarly community's profound engagement. Our study reveals a collaborative landscape with 18,189 contributing authors, reflecting a robust network of researchers advancing AI and machine learning applications. Review categories focus on systematic reviews and bibliometric analyses, indicating an increasing emphasis on comprehensive literature synthesis and quantitative analysis. The findings also suggest an opportunity to explore emerging methodologies such as topic modeling and meta-analysis. We dissect the state of the art presented in these reviews, finding themes throughout the broad scholarly discourse through thematic clustering and BERTopic modeling. Categorization of study articles across fields of research indicates dominance in *Information and Computing Sciences*, followed by *Biomedical and Clinical Sciences*. Subject categories reveal interconnected clusters across various sectors, notably in healthcare, engineering, business intelligence, and computational technologies. Semantic analysis via BERTopic revealed nineteen clusters mapped to themes such as *AI in health innovations, AI for sustainable development, AI and deep learning, AI in education,* and *ethical considerations*. Future research directions are suggested, emphasizing the need for intersectional bias mitigation, holistic health approaches, AI's role in environmental sustainability, and the ethical deployment of generative AI.

Introduction

The adoption of artificial intelligence (AI) within industry, health, education, and government has profound implications for humans at the societal level (Dwivedi et al., 2021). Researchers have developed a substantial body of literature covering a plethora of AI-related themes across numerous applications, providing valuable insights into the impact of AI systems and applications. This rapidly evolving field has led to a significant number of review articles that distill (Goodell et al., 2021), analyze (Pattnaik et al., 2023), and synthesize (Pattnaik et al., 2024) the vast quantum of knowledge produced. These reviews are crucial for understanding the dynamics of AI applications and their transformative potential. The widespread impact of AI in healthcare, education, agriculture, cybersecurity, and government has generated a considerable volume of academic publications, encompassing diverse genres of AI adoption across multiple sectors (Guo et al., 2020; Hinojo-Lucena et al., 2019). Researchers have endeavored to distill key findings through these review articles, resulting in thematic analyses that highlight essential aspects of AI research. These thematic analyses provide a detailed understanding of how AI applications influence various domains; reveal trends, challenges, and opportunities; and shape future research directions. As the field continues to grow, the synthesis of these diverse insights through a meta-review approach becomes increasingly important. By employing scientometrics and advanced topic modeling techniques such as BERTopic, we can unveil the comprehensive dynamics of AI applications, offering a holistic perspective that guides both current understanding and future scholarly efforts (R. Raman et al., 2024).

For instance, extensive research advancements in natural language processing (NLP) systems have been demonstrated by Kreimeyer et al. (2017) and Bannach-Brown et al. (2019), demonstrating the depth of AI applications in language technology. These studies

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highlight how NLP systems have evolved to understand and generate human language with increasing accuracy, enabling applications in areas such as automated translation, sentiment analysis, and conversational agents. Groundbreaking insights into AI applications in medical fields are synthesized by Roy et al. (2019) and Ebrahimighahnavieh et al. (2020), who highlight the potential of AI in neurological research and medical advancements. These reviews reveal how AI technologies can aid in diagnosing neurological disorders, personalizing treatment plans, and improving patient outcomes. Similarly, Liu et al. (2019) and Brinker et al. (2018) analyzed the convergence of AI and healthcare, revealing significant interdisciplinary contributions that span from predictive analytics in patient care to the optimization of hospital operations.

In addition to healthcare, the transformative potential of AI in education was explored by Tahiru (2021) and Xu and Ouyang (2022), who illustrated how AI reshapes learning environments. Their studies discuss the integration of AI in personalized learning systems, intelligent tutoring, and automated grading, which enhance educational experiences and outcomes. The application of AI has also extended to sustainable development, with intensive use of renewable energy and agriculture, as discussed by Mosavi et al. (2018) and Carvalho et al. (2019). These works demonstrate how AI-driven solutions, such as precision farming and energy management systems, contribute to sustainability by optimizing resource use and reducing environmental impact. Conversely, the role of AI in software quality assurance is detailed by Li et al. (2020) and Meiliana et al. (2017), who delve into software defect prediction and the complexities of software development. Their reviews highlight how AI techniques improve software reliability and efficiency by predicting and mitigating potential defects during the development lifecycle.

Furthermore, contributions to intelligent transport systems are underscored by Sirohi et al. (2020) and Noaeen et al. (2022), who emphasize AI's potential to enhance traffic safety. These studies explore how AI technologies, such as autonomous vehicles and smart traffic management systems, reduce accidents and improve traffic flow. Moreover, the modern applicability of AI in urban administration and planning is illustrated by Di Vaio et al. (2020) and Darko et al. (2020), who elucidate its multifaceted impacts on smart cities. Their analyses revealed how AI can optimize urban services, enhance public safety, and improve the quality of life for city inhabitants through intelligent infrastructure and data-driven decision-making.

Moreover, the intersection of AI with blockchain technology was described by Kumar et al. (2023) and Ekramifard et al. (2020), revealing the synergies between these revolutionary technologies. Their studies discuss how AI enhances blockchain capabilities in secure data transactions and decentralized applications, while blockchain provides robust frameworks for AI data integrity and provenance. AI-powered emotional intelligence was explored in "deep learning for emotion analysis" by Bouwmans et al. (2018) and Canedo and Neves (2019). These reviews delve into the nuances of emotion identification and its applications in areas such as mental health monitoring, customer service, and human-computer interaction. Additionally, deep learning applications in recommendations and molecular science are discussed by Portugal et al. (2018), Murad et al. (2018), Martinelli (2022), and Wu et al. (2022). Their findings highlight how deep learning algorithms enhance recommendation systems by personalizing content delivery and accelerating discoveries in molecular science through predictive modeling of molecular interactions.

The role of AI in edge computing and cybersecurity was analyzed by Martins et al. (2020) and Manzoor et al. (2019). These studies show how AI improves the efficiency and security of distributed computing systems by enabling real-time data processing and threat detection at the edge of the network. The ethical dimensions of AI in healthcare are highlighted by Milne-Ives et al. (2020) and Loh et al. (2022), who provide invaluable insights into the moral issues surrounding AI-driven healthcare applications. They discuss concerns such as patient privacy, algorithmic bias, and the need for transparent and accountable AI systems. Furthermore, intelligent diagnostics were examined by Christodoulou et al. (2019) and Fleuren et al. (2020), who explored the synthesis of machine learning models for diagnostic accuracy. Finally, the challenge of mitigating bias in AI decision-making was explored by Sun et al. (2019) and Pagano et al. (2023), who addressed critical issues of fairness and accountability in AI systems by proposing strategies for identifying and reducing biases in AI algorithms.

Despite the extensive coverage of AI applications through individual review articles, there remains a significant opportunity to synthesize these diverse insights into a comprehensive overview. The concept of a "review of reviews" or meta-review has been effectively employed in other disciplines to consolidate findings, identify research gaps, and propose new directions. For example, Schryen and Sperling (2023) conducted a meta-review of operations research, highlighting predominant trends and underexplored areas in 709 reviews published between 2011 and 2020. Their analysis revealed a focus on scoping and selective reviews, emphasizing the importance of systematically organizing and synthesizing existing knowledge. Similarly, Moro et al. (2023) provided an umbrella review of product-service systems, offering a panoramic overview that identified well-researched areas and those still requiring further exploration. In another instance, Sadeghi-Niaraki (2023) analyzed contemporary IoT reviews, pinpointing critical challenges and opportunities within the field. Furthermore, Risso et al. (2023) employed a systematic literature review to extend discussions in 103 review papers on blockchain technology in supply chain management, providing multifaceted insights and identifying future research directions.

The high engagement and success of meta-reviews in various fields underscore the value of this research approach. However, a similar comprehensive study of AI remains largely untapped, presenting an opportunity to synthesize and generate novel findings from the extensive body of AI research. The significant corpus of AI publications and reviews exploring its various applications suggests that synthesizing semantic clusters from collective perspectives on AI could effectively direct future scholarly efforts (Pattnaik et al., 2024). This research aims to fill this existing gap by offering novel insights into AI through thematic clustering of subject categories and employing the BERTopic modeling approach (Grootendorst, 2022). By leveraging these advanced techniques, we can unveil the comprehensive dynamics of AI applications, providing a holistic perspective that enhances current understanding and guides future research and development in this rapidly evolving field. We propose the following research questions:

RQ1: What are the key domains and applications currently being transformed by AI, and how is this transformation characterized?

RQ2: Can the proposed modeling technique develop novel insight into the global transformative impact of AI across diverse domains?

RQ3: What are the potential future directions and innovations?

By addressing these research questions, this study unveils the dynamics of AI applications through a comprehensive review of reviews employing scientometrics and advanced bibliometric modeling. Our investigation reveals the transformative impact of AI across key domains, including healthcare, engineering, environmental sustainability, business, and human-computer interaction. Specifically, AI advancements in healthcare have revolutionized diagnostics and personalized medicine, while its contributions to engineering and environmental applications have promoted sustainability and smart infrastructure. In business, AI enhances decision support systems and operational efficiency, and its influence on digital infrastructure improves human-computer interactions. Additionally, our topic modeling analysis provides novel insights into the broad applicability of AI, highlighting its role in deep learning technologies, education, industry, blockchain, cybersecurity, and ethical considerations. These findings not only answer critical research questions but also identify future directions and innovations, setting a new benchmark for literature reviews in rapidly evolving scientific domains.

In the remaining sections of the study, Section 2 discusses the study methods, detailing the systematic approach and tools used for data collection and analysis. Section 3 highlights the key results, presenting the major findings from our scientometric and topic modeling analyses. In Section 4, we offer a thorough discussion of the results, emphasizing the implications of our findings for both practice and theory and suggesting potential avenues for future research. Finally, in Section 5, we conclude the work by summarizing the study's contributions and reflecting on its significance in advancing the understanding of AI applications.

Methods

The proposed research methods offer a unique contribution to the analysis of artificial intelligence (AI) research by combining the systematic rigor of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) protocol for data collection, the interdisciplinary insight of All Science Journals Classification (AJSC) subject categories for thematic clustering, and the advanced semantic analysis capabilities of BERTopic modeling. As illustrated in Fig. 1, this methodology ensures a comprehensive and bias-minimized dataset, uncovers cross-disciplinary thematic clusters through a structured classification system, and extracts nuanced emerging research themes by leveraging state-of-the-art natural language processing techniques. Together, these elements constitute a novel approach that enhances the depth, accuracy, and relevance of AI research analysis, setting a new benchmark for conducting literature reviews in rapidly evolving scientific domains.

PRISMA

To ensure a systematic and transparent approach in conducting this meta-review, we adhered to the PRISMA guidelines (Moher et al., 2009). The PRISMA protocol provides a structured framework for identifying, selecting, and critically appraising relevant studies, as well as for collecting and analyzing data from these studies. This protocol enhances the rigor and reproducibility of systematic reviews by providing a standardized reporting methodology. Following these guidelines, we systematically collected articles from the Scopus database on 23rd January 2024 (Page et al., 2021; Rama et al., 2023; Raman et al., 2022). Scopus was chosen due to its comprehensive coverage and high-quality indexing of peer-reviewed literature. The study period spans from 2014 to 2023, with the search terms *"((artificial intelligence" OR "AI" OR "machine learning" OR "deep learning" OR "neural network*" OR "supervised learning" OR "unsupervised learning" OR "reinforcement learning" OR "natural language processing" OR "NLP" OR "computer vision" OR "cognitive computing") AND (biblio* OR scientome* OR "literature review" OR "systematic review").* The document types included were articles, conference papers, reviews, and book chapters, leading to a final dataset of 3767 articles for analysis.

Performance analysis

In our scientometric analysis, we used a comprehensive set of metrics to scrutinize the performance, collaboration dynamics, and impact of scholarly publications, as reported in previous reviews (Kokol et al., 2021; Pattnaik et al., 2021, 2023, 2024). The approach undertaken for the design of this research focuses on a range of indicators to fully explore reviews on the applications of AI. The metric total reviews (TRs) showcased our overall research. By distinguishing reviews that are solo-authored (SA) and coauthored (CA), we identify the collaboration patterns that are crucial for knowledge dissemination (Baker et al., 2020). While CA places more emphasis on teamwork, SA reflects individual contributions. The level of collaboration evident in the former reviews is further investigated by analyzing the number of contributing authors (NCA), which captures the range of networks and academic involvement. Furthermore, the average number of authors per coauthored article (AACA), collaboration index (CI), and collaboration coefficient (CC) provide nuanced insights into the shifting intensity and patterns of collaboration over time (Donthu et al., 2021).

In addition to reviewing the number of articles, we analyzed citations to assess the impact of review articles. The number of cited reviews (NCR) indicates the number of review articles frequently referred to, while total citations (TCs) provide an overview of the overall impact. To standardize for variations in publication age, we calculate average citations per cited review (TC/CR), which offers an adjusted impact measure. Conversely, various indices, including the h-index, g-index, and i-index, are utilized to deepen our understanding of citation influence. The h-index focuses on highly cited reviews, representing the number of reviews with at least h citations. The g-index emphasizes productivity by indicating the number of top-cited reviews with at least g2 citations. Simultaneously, the i-indices (i-10, i-100, and i-200) reveal the number of reviews cited at least 10, 100, and 200 times, respectively. Additional metrics such as the number of active years (NAY) reveal the duration of review publications in AI applications. Combining this with productivity per active year (PAY) gives us a better sense of sustained scholarly output over time.

Thematic clustering

The All Science Journals Classification (ASJC) subject categories, a classification system used by Scopus for indexing source titles within a structured hierarchy spanning various disciplines and subdisciplines, serves as the framework for cross-disciplinary thematic analysis (Haddawy et al., 2017; Hassan et al., 2017). We employed VOSviewer, a software application crafted for constructing and visualizing bibliographic networks (van Eck & Waltman, 2010). The basis of our analysis lies in the co-occurrence of ASJC subject categories for each publication. Each node represents a distinct ASJC publication, with lines connecting nodes indicating the frequency of co-occurrence. The color of a node often denotes the cluster or group to which a publication belongs, and each color signifies a different thematic cluster (Goodell et al., 2021; R. Raman et al., 2024). This clustering is grounded in the similarity of co-occurrence patterns, implying frequent discussion together in the literature. The distance between nodes in the visualization is also significant; a shorter distance indicates a stronger or more frequent co-occurrence, suggesting closer relationships or a higher degree of topic relevance.

Topic modeling

Although a number of topic modeling approaches have been utilized within the literature, studies that have developed an empirical analysis of various approaches, such as nonnegative matrix factorization (NMF), To2Vec, and latent Dirichlet allocation (LDA), have identified BERTopic as "being able to generate novel insights using its embedding approach" (Egger & Yu, 2022). At its core, BERTopic is a modeling technique that leverages the powerful contextual embeddings within BERT and the class-based term frequency-inverse document frequency (c-TF-IDF) algorithm to compare the importance of terms within a dense cluster and develop term representation (Sánchez−Franco & Rey−Moreno 2022). Postdata extraction, a thorough preprocessing step involving text-cleaning procedures, NLP techniques, and tokenization, enhanced the quality and uniformity of the dataset. The utilization of sentence embeddings generated using the "all-mpnet-base-v2" model from the Sentence Transformer and dimensionality reduction using uniform manifold approximation and projection (UMAP) further generated the dataset for meaningful topic extraction and visualization (McInnes et al., 2020). The BERTopic

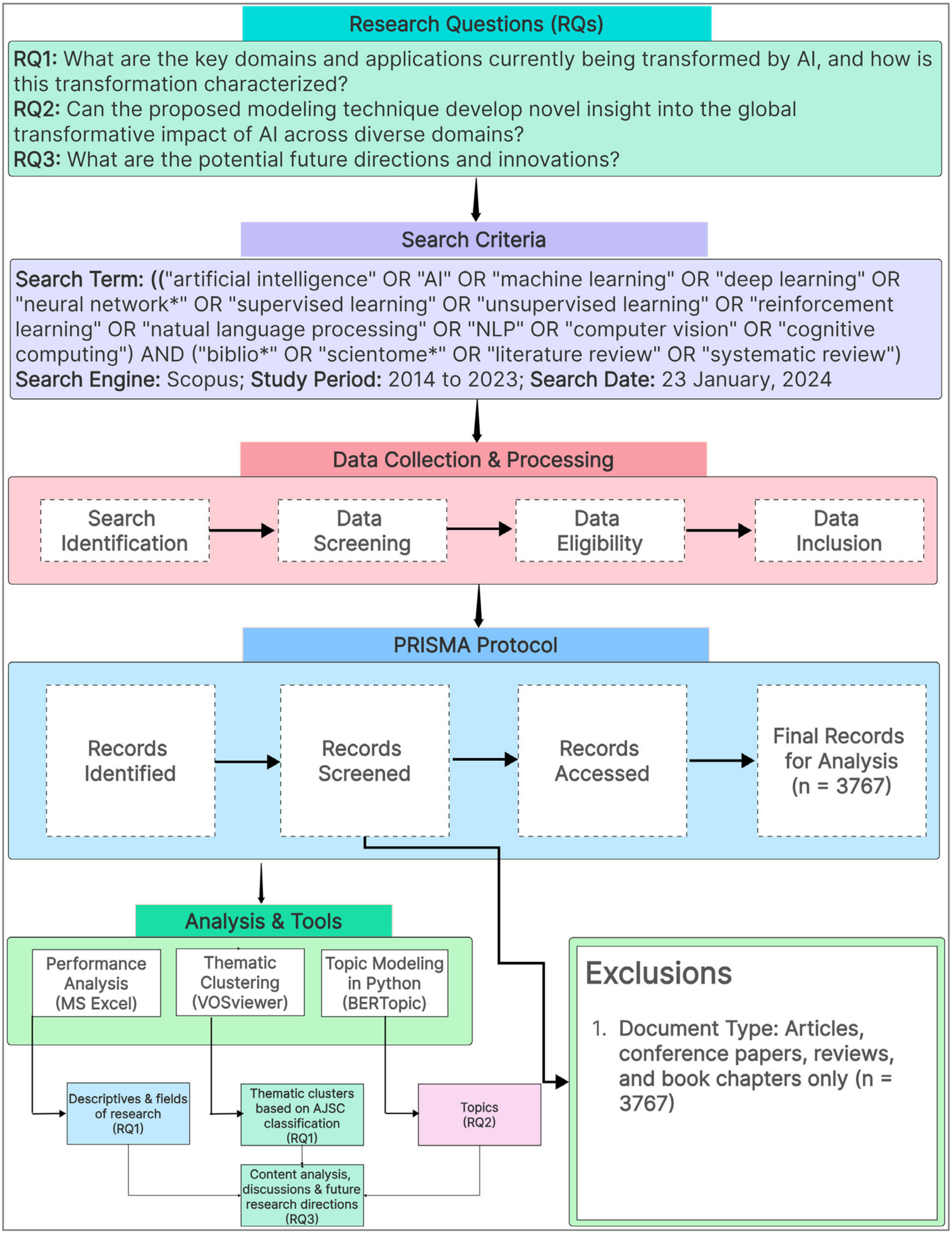

Fig. 1. Research framework.

model was fitted to the preprocessed text content, extracting distinct topics and corresponding probabilities for each article within a topic. The generated topics were scrutinized for coherence, and the distribution of articles across topics was examined, providing insights into the degree of association between articles and identified topics. This comprehensive and advanced approach in our topic modeling analysis ensures the reliability and robustness of our study findings.

Results

Performance analysis

As shown in Table 1, our study thoroughly examined the 3767 reviews that were cited 63,577 times. Such statistics underscore the extensive scholarly engagement and influence within the specialized field of research. The high h-index of 109 and g-index of 176 suggest a substantial impact, emphasizing the significance and relevance of the former reviews.

Moving to the coauthorship insights in Panel B, our study unveils a collaborative landscape with 18,189 contributing authors, reflecting a robust network of researchers engaged in synthesizing state-of-the-art research on AI applications. A collaboration index of 3.83 indicates a considerable degree of teamwork, fostering a rich environment for knowledge exchange created and disseminated through reviews. Additionally, the data illustrate that the average number of authors per coauthored article is 5, emphasizing the collective effort in producing the reviewed content. This collaborative spirit likely contributes to the field's diversity and depth of perspectives. In Panel C, the paper categorizes the types of reviews on AI applications, revealing a predominant focus on systematic reviews and bibliometric analyses, with 2707 and 651 instances, respectively. This signifies a methodological inclination toward the comprehensive synthesis of literature. Moreover, including other review types, such as topic modeling and meta-analysis, showcases the methodological diversity in understanding the dynamics of AI applications. Overall, the inferential summary highlights a multidimensional exploration of the literature, encompassing collaboration patterns, impact metrics, and methodological approaches within the AI domain.

The findings in Table 1 are further extended in Fig. 2, which maps the evolution of the various forms of reviews between 2014 and 2023. The substantial increase in systematic reviews (SLRs) over the years, reaching 1061 in 2023, reinforces our previous finding of a sustained interest in comprehensive literature synthesis. Scientometric reviews also gained prominence, reaching 281, indicating a growing focus on quantitative analysis within the domain.

Building on these insights, we delve more deeply into specific aspects of AI research in the subsequent subsections. We explore the fields of research analysis to identify key areas of focus and emerging trends. This will be followed by an examination of thematic clusters, providing a detailed discussion on the major themes and topics that have shaped the AI research landscape. Additionally, we analyze BERT-enabled topics to uncover nuanced patterns and insights derived from advanced natural language processing techniques. Together, these discussions aim to provide a holistic understanding of the current state and future directions of AI research.

Fields of research analysis

The Scopus database further uses the Australian and New Zealand Standard Classification of Occupations (ANZSCO, 2013) to categorize publications into fields of research (FoRs). Fig. 3 categorizes the study articles under the field of research (FoR). Most notably, information and computing sciences dominate the landscape regarding total reviews and citations, underscoring their pivotal role in the synthesis of AI research. This trend is not surprising given the technical nature of AI. Therefore, biomedical and clinical sciences and health sciences have presented a significant volume of AI reviews, which indicates the growing importance of AI applications in these fields. The high citation counts in these areas suggest that the reviews generated are prolific and impactful, influencing further studies and developments. Although having fewer publications in comparison, other fields, such as engineering, commerce, management, tourism, services, and education, still have a notable presence, reflecting AI technologies' interdisciplinary and wide-reaching impact. Fields such as built environment and design, biological sciences, psychology, mathematical sciences, and human society, while contributing less in number, reveal the diverse application of AI across a broad spectrum of research areas. This diversity in application areas highlights the versatility and broad applicability of AI technologies in various aspects of scientific and technological research.

Table 1
Overview.

Panel A. Descriptive statistics	
Total reviews (TR)	3767
Number of cited reviews (NCR)	2748
Total citations (TC)	63,577
Average citations (TC/TR)	23
h-index	109
g-index	176
i-10	1190
i-100	129
i-250	28
i-500	9
Number of active years (NAY)	10
Productivity per active year (PAY)	377
Panel B. Coauthorship information	
Number of contributing authors (NCA)	18,189
Number of affiliated authors (excludes repetitions) (NAA)	15,677
Authors of single-authored documents (ASA)	121
Authors of coauthored documents (ACA)	15,568
Single-authored documents (SA)	124
Coauthored documents (CA)	3643
Collaboration index (CI)	3.83
Collaboration coefficient (CC)	0.79
Average authors per coauthored article	5
Panel C. Type of review	
Systematic review/systematic literature review (SLR) other than Scientometrics/Bibliometrics	2707
Scientometric/Bibliometric review	651
Other form of review	409
Topic model	48
SLR and topic model	19
Scientometric/Bibliometric and topic model	20
Other form of review and topic model	9
Meta-analysis	4
SLR and meta-analysis	4
Scientometric/Bibliometric and meta-analysis	–
Other form of review and meta-analysis	–

Note: This table presents an overview of the study articles. Citations reported were confined to the search date.

Thematic clusters

The FoRs based on the ANZSRC classification system reveal the distribution of AI across broad academic and research disciplines. In contrast, subject categories based on the ASJC system revealed more granular interconnections via four distinct clusters within AI research (Fig. 4).

Cluster 1 (red): AI in healthcare and life sciences informatics

This cluster is characterized by the integration of AI with healthcare and life sciences to enhance data management, diagnostics, and treatment protocols. Key terms such as "health informatics" and "health information management" suggest the application of AI in organizing and analyzing health data. "Biomedical engineering" and "bioengineering" point to the design of AI-driven medical devices

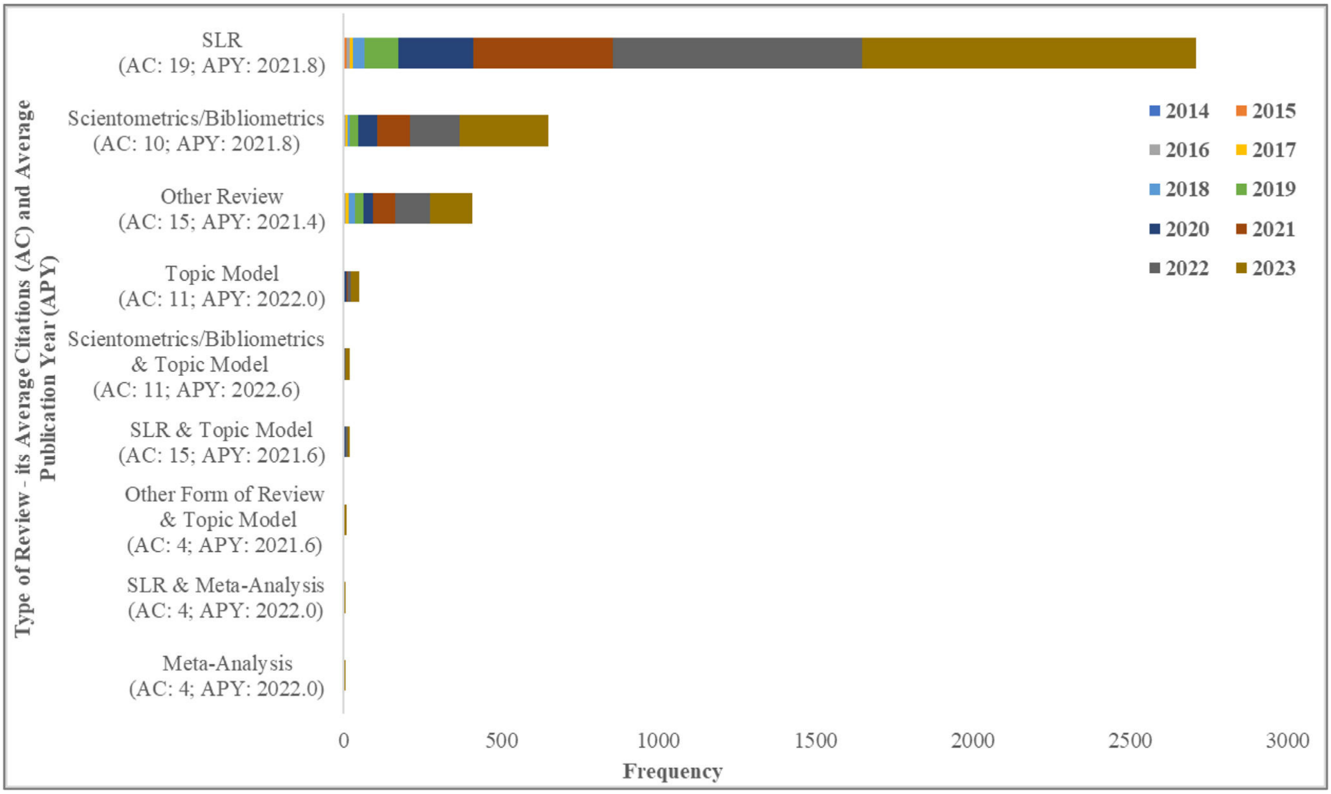

Fig. 2. Temporal evolution of the types of reviews on AI applications.

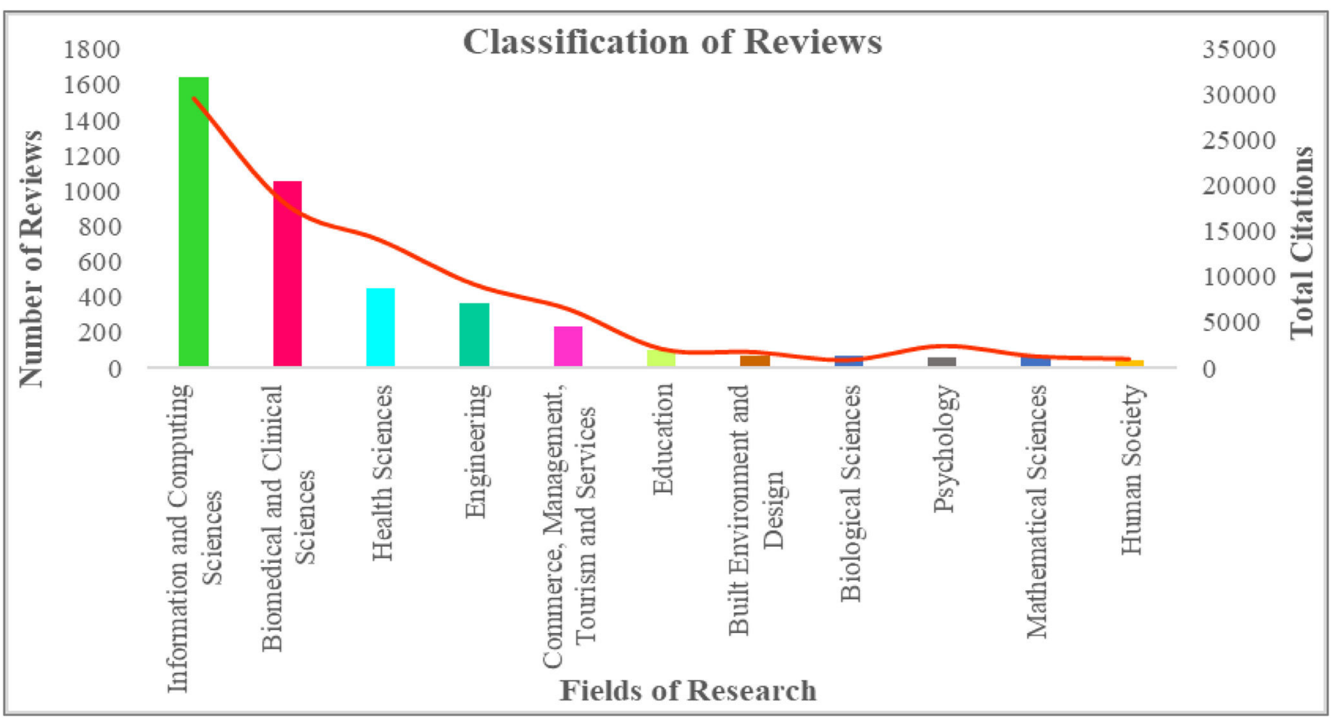

Fig. 3. Classification of AI reviews based on FoRs (ANZSRC 2020 code).

and systems. With “neurology” and “oncology,” there is an implication of AI in specialized medical research and treatment planning, possibly using ML techniques for pattern recognition in disease diagnosis. “Cognitive neuroscience” and “psychiatry and mental health” indicate the exploration of AI in understanding and treating neurological and mental health conditions. This cluster also likely includes the use of AI for genomic sequencing and personalized medicine, as suggested by “molecular biology” and “biochemistry.” Table 2 shows some of the notable works constituting the cluster.

Significant contributions to the field of AI in healthcare were made through a systematic review by Xiaoet al. (2018), who focused on deep learning applications in electronic health record (EHR) data. Their research, conducted between 2010 and 2018, involved a thorough analysis of 98 articles focusing on the use of deep learning in

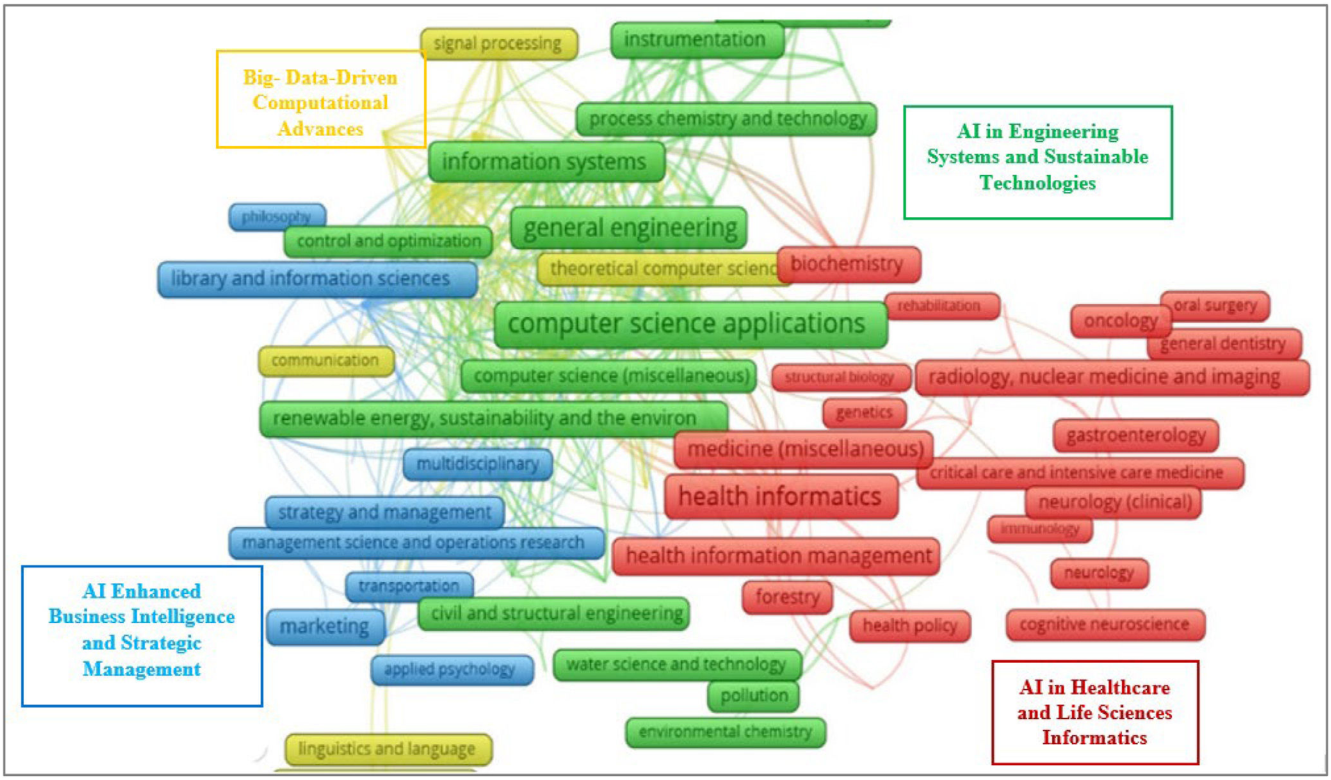

Fig. 4. Clustering of cross-disciplinary subjects of AI research.

Table 2
Highly cited articles representing cluster 1.

Total Citations	Author(s)	Title	Subject Category (ASJC)
380	Xiao et al. (2018)	"Opportunities and challenges in developing deep learning models using electronic health records data: A systematic review"	Health Informatics
257	Contreras and Vehi (2018)	"AI for diabetes management and decision support: Literature review"	Health Informatics
239	Yassin et al. (2018)	"Machine learning techniques for breast cancer computer aided diagnosis using different image modalities: A systematic review"	Computer Science Applications| Software| Health Informatics

healthcare informatics. This study is pivotal for understanding how deep learning architectures can be effectively applied to various types of health data, addressing critical tasks such as disease detection and the prediction of clinical events. The authors noted deep learning's superiority in handling raw data, which aligns with the ongoing shift toward more data-driven approaches in healthcare informatics. However, the paper also delves into the challenges inherent in this field, such as the need for improved data quality and the complexities of model interpretability in a healthcare context. These issues are crucial considering the sensitive nature of health data and the need for reliable and understandable AI systems in medical settings. Moreover, the discussion on the difficulties in integrating deep learning models with existing EHR systems reflects a significant challenge in the broader theme of AI in healthcare informatics.

Contreras and Vehi (2018) explored the integration of AI with modern technologies such as medical devices, mobile computing, and sensors to enhance diabetes management, a critical issue in the cluster theme of AI in healthcare and life sciences informatics. Their comprehensive review, which analyzed 141 articles from 2010 to 2018, focused on using AI to manage diabetes and its complications. This paper highlights the development of AI-driven tools for prediction and prevention in diabetes care, emphasizing how these advancements can improve patient quality of life. Their findings reveal a significant shift toward data-driven methods in diabetes management, underscoring the potential of AI in tailoring treatment to individual needs and in leveraging large datasets for improved management strategies. They also noted the growing research in closed-loop systems and blood glucose (BG) prediction models, reflecting the dynamic evolution of AI applications in this field. They emphasized the importance of continuing research in AI for diabetes management, particularly in enhancing the safety of automated pancreas (AP) systems and open-loop tools. The paper also addresses the ethical considerations of using AI in healthcare, including the risks associated with personal data release and the potential for discrimination.

A systematic review conducted by Yassin et al. (2018) focused on the analysis of computer-aided diagnosis/detection (CAD) systems applicable to breast cancer. Their study, which analyzed 154 selected academic articles, delved into the current state and advancements of CAD systems, especially in their application to breast cancer detection. This paper highlights the increasing reliance on machine learning technologies, such as SVM classifiers, for breast tissue classification and notes the effectiveness of these AI methods in supporting medical experts. This review also discusses the practical challenges and considerations in implementing CAD systems in clinical settings, including issues related to false positives, costs, and the

Table 3
Highly cited articles representing cluster 2.

Total Citations	Author(s)	Title	Subject Category (ASJC)
508	Patrício and Rieder (2018)	"Computer vision and AI in precision agriculture for grain crops: A systematic review"	Agronomy and Crop Science| Forestry| Horticulture| Computer Science Applications
312	Sharma et al. (2020)	"A systematic literature review on machine learning applications for sustainable agriculture supply chain performance"	Computer Science| Management Science and Operations Research| Modeling and Simulation
289	Mosavi et al. (2019)	"State of the art of machine learning models in energy systems, a systematic review"	Energy | Fuel Technology| Renewable Energy, Sustainability and the Environment| | Control and Optimization

necessity for proper training. The authors advocate for the integration of CAD systems into clinical practice, emphasizing that for widespread adoption, CAD systems must be time-efficient, cost-effective, and demonstrably improve physician performance. In the future, the authors recommend the development of standardized public image databases that include diverse modalities and even genetic data to enhance the accuracy and reliability of CAD systems. They also identified deep learning and swarm intelligence as promising areas for future research in CAD system development. This paper concludes by underscoring the importance of incorporating multiple imaging modalities and advanced technologies such as 3D mammography to improve the efficiency and efficacy of CAD systems in breast cancer detection.

Cluster 2 (green): AI in engineering systems and sustainable technologies

AI is seen as a catalyst for innovation across various engineering fields. "Computer science applications" and "information systems" refer to AI's role in optimizing system operations and data processing. The terms "electrical and electronic engineering" and "instrumentation" suggest developing smart sensors and controls that leverage AI for improved efficiency and automation. "Renewable energy, sustainability, and the environment," alongside "energy engineering and power technology," likely involve AI in smart grids, energy consumption prediction, and the optimization of renewable energy sources. The contribution of AI to "safety, risk, reliability and quality" implies the use of predictive analytics and ML for risk assessment and quality control in engineering projects. This cluster may also encompass the development of AI tools for environmental monitoring and sustainable urban planning, as indicated by "geography, planning, and development." Table 3 presents some of the notable works representing the cluster.

A systematic review by Patrício & Rieder (2018) highlighted the intersection of AI in engineering systems and sustainable technology, specifically focusing on the use of computer vision and AI in precision agriculture. Their study, centering on the five most produced grains globally (maize, rice, wheat, soybean, and barley), analyzed 25 papers from the past five years. This review showcased various applications of computer vision in agriculture, such as disease detection, grain quality assessment, and phenotyping. They emphasized the potential of leveraging GPUs and advanced AI techniques such as deep belief networks for enhancing computer vision methods in agriculture. Additionally, the study identified gaps in the development of intelligent devices that integrate computer vision with agricultural machinery and drones. The authors suggested that the expansion of GPUs and AI could benefit the classification of gluten-containing grains such as wheat, oats, and barley.

Similarly, Sharma et al. (2020) conducted a study crucial to the theme of AI in engineering systems and sustainable technology, particularly focusing on the use of ML in agricultural supply chains (ASCs). Their systematic review, which encompassed 93 research papers, explored the diverse applications of ML algorithms across various phases of ASCs. This study emphasized the role of ML in enhancing agricultural sustainability by addressing key challenges such as productivity, water conservation, and soil health. A significant contribution of this work is the development of an ML application framework for sustainable ASCs designed to guide real-time, data-driven decision-making in ASCs. This framework aims to provide actionable insights for researchers, practitioners, and policymakers to manage ASCs effectively, thereby improving agricultural productivity and sustainability. This review underscores the vast potential of ML in ASCs, highlighting its effectiveness in making predictive classifications and improving the overall efficiency of ASC operations. The authors also discussed how ML-driven technologies could enhance farm productivity and profitability through the analysis of data from sensors and drones. Furthermore, they noted that integrating ML data with other technologies such as blockchain could improve supply chain visibility, transparency, and traceability. However, the study also identified areas needing further investigation, such as the comprehensive management of data across ASC phases and the measurable impact of ML on ASC visibility.

Furthermore, Mosavi et al. (2019) investigated the role of ML in engineering systems and sustainable technology, specifically in energy system modeling, design, and prediction. Their paper presents an extensive review and a novel taxonomy of ML models used in energy systems. This study identifies and classifies ML models based on technique, energy type, and application area, providing a comprehensive assessment of their performance and discussing challenges and future research opportunities. A key finding of their research is the remarkable improvement in the accuracy, robustness, precision, and generalization abilities of ML models, especially through hybridization. These hybrid ML models have shown significant effectiveness in renewable energy system applications, such as solar and wind energy, contributing to energy efficiency, governance, and sustainability. The study also highlights the integration of ML with smart sensors, smart grids, and IoT technologies, facilitating the use of big data for informed decision-making and enhancing model efficiency. The paper concludes that novel hybrid ML models outperform conventional models, suggesting a continuing trend toward more advanced hybrid models for sophisticated energy system applications. This emphasis on hybrid models aligns with the increasing need for accurate and efficient renewable energy systems, considering their environmental dependency and the challenges in grid management and power generation forecasting.

Cluster 3 (blue): AI-enhanced business intelligence and strategic management

The focus of this cluster is on the application of AI to improve business intelligence, strategic decision-making, and operational efficiency. "Information systems and management" and "general computer science" suggest using AI for data-driven decision support systems. With "strategy and management" and "industrial and manufacturing engineering," there is an indication of AI for optimizing manufacturing processes and strategic business planning. "Management of technology and innovation" and "management information systems" emphasize AI's role in managing technological advancements and integrating AI into corporate information infrastructures. Keywords such as "decision sciences" and "modeling and simulation" imply the use of AI for predictive modeling and simulation in business scenarios. This cluster also suggests AI applications in finance and economics, as denoted by "economics, econometrics,

Table 4
Highly cited articles representing cluster 3.

Total Citations	Author(s)	Title	Subject Category (ASJC)
210	(Vrontis et al., 2022)	"AI, robotics, advanced technologies and human resource management: a systematic review"	Management of Technology and Innovation| Organizational Behavior and Human Resource Management| Strategy and Management
173	Verma et al. (2021)	"AI in marketing: Systematic review and future research direction"	Management Information Systems| AI| | Library and Information Sciences
171	Collins et al. (2021)	"AI in information systems research: A systematic literature review and research agenda"	Management Information Systems| Marketing| AI| Computer Networks and Communications|

and finance," where AI could be used for market analysis, financial forecasting, and risk management. Table 4 shows the top five cited works evolving out of the cluster.

A comprehensive study by Vrontis et al. (2022) examined the impacts of intelligent automation, including AI and robotics, on human resource management (HRM) at both the organizational and individual levels. Their systematic review, which involved 13,136 studies from top journals in HRM, international business (IB), general management (GM), and information management (IM), resulted in 45 relevant articles that explored the integration of advanced technologies within HRM contexts. The study reveals that intelligent automation technologies represent a novel approach to employee management and can significantly enhance firm performance. These technologies impact various HRM strategies and activities, including job replacement, human-robot/AI collaboration, decision-making, learning opportunities, recruiting, training, and job performance evaluation. The authors also discuss the technological and ethical challenges these innovations present to HRM. Their findings provide a detailed analysis of the current state of the art in this field and propose directions for future research, especially from an international business perspective.

In another extensive study, Verma et al. (2021) conducted an extensive study on the impact of AI) in marketing, employing bibliometric, conceptual, and intellectual network analyses of literature spanning from 1982 to 2020. This study, aiming to consolidate and elucidate AI's contributions and challenges in marketing, reviewed 1580 papers, leading to a comprehensive understanding of the scientific actors in this domain, such as relevant authors and sources. Their research underlines AI's transformative role in marketing, indicating that it is a significant technological disruptor with vast potential across various sectors, including manufacturing, healthcare, and digital marketing. The study also conducted a conceptual network analysis, identifying evolving trends in AI marketing research, from basic understanding to applications in diverse contexts, and finally focused on emerging technologies such as big data and ML. The cocitation analysis provided insights into the intellectual structure of the field, identifying various research clusters that focus on aspects such as the trust factor in organizational performance, market orientation, value cocreation with customers, the benefits of data science, and emerging technologies for consumer insights. The study highlighted future research directions, suggesting the need for deeper consumer insights through the ensembled application of semantic knowledge and ML, as well as the use of hybrid ML techniques for sentiment analysis. They advocate for the incorporation of well-established theories in future optimization models and emphasize the importance of considering linguistic patterns and emotional lexicons for big data sentiment analysis.

Collins et al. (2021) addressed the critical need for a cumulative body of knowledge in the field of AI (AI) within information systems (IS) research. Their systematic literature review, spanning from 2005 to 2020, analyzed 98 primary studies out of 1877 AI-related articles, aiming to provide a structured understanding of AI research in IS. This study makes several significant contributions to the field. First, it identifies the reported business value and contributions of AI in the IS sector. Second, it presents both research and practical implications of AI use, offering insights into the current landscape and applications of AI in IS. Third, this study proposes a research agenda, suggesting directions for future AI research in IS. A key finding from this review is the urgent need for more rigorous academic studies on AI, particularly those focused on its tools and models. The study also emphasizes the importance of detailed definitions of AI in research, even when AI is not the main focus. The authors note a lack of comprehensive reviews and a disparity in how AI is defined within the IS field. This work stands out as one of the few systematic literature reviews (SLRs) on AI in IS, providing a structured analysis of trends and gaps in this domain. It contributes new insights to IS by exploring AI definitions, mapping AI activities, and relating these to business value. The identified gaps in AI research within ISs present a starting point for both researchers and practitioners to advance sociotechnical knowledge surrounding AI.

Cluster 4 (yellow): AI in computational technologies and human-centric systems

This cluster centers on the technological foundations and human interfaces in AI. It covers AI advancements in optimizing data transmission, "computer networks and communications," developing AI-enabled hardware, "hardware and architecture", and software solutions. It also includes "computer vision and pattern recognition," which is essential for interpreting visual data, and "control and systems engineering," along with "signal processing," which is crucial for robotics and automated systems. The cluster further explores AI in digital media "Media technology", enhancing user interaction with AI systems "Human-computer interaction", and foundational AI principles "Theoretical computer science". Additionally, it delves into the mathematical backbone of AI "Computational theory and mathematics", AI's role in graphic design "Computer graphics and computer-aided design", and its critical function in language processing "Communication," "Linguistics and Language". This comprehensive cluster underscores AI's integral role in advancing digital interfaces, infrastructures, and human-computer interactions. Table 5 shows some notable works evolving out of the cluster.

Ling et al. (2015) presented a comprehensive overview of the application of deep learning techniques in speech generation, particularly in the context of statistical parametric speech generation (SPSG). This study compares traditional acoustic models such as hidden Markov models (HMMs) and Gaussian mixture models (GMMs) with more recent deep learning approaches, highlighting their limitations in capturing complex, nonlinear relationships in speech production. This article emphasizes the advantages of deep joint models (such as RBMs and DBNs) and deep conditional models (such as CRBMs and DNNs) over conventional methods. These advanced models have shown better capability in describing the intricate relationship between inputs and outputs in SPSG systems, thereby enhancing the naturalness, similarity, and overall quality of generated speech. The authors reviewed and compared various implementations of deep learning-based acoustic models for SPSG, categorizing them into three classes for systematic analysis. Despite the success of these methods, the study identified ongoing challenges, such as the need for improved modeling and prediction of fundamental frequency (F0) using deep generative models. The authors suggest that

Table 5
Highly cited articles in cluster 4.

Total Citations	Author(s)	Title	Subject Category (ASJC)
191	Ling et al. (2015)	"Deep Learning for Acoustic Modeling in Parametric Speech Generation: A systematic review of existing techniques and future trends"	Signal Processing| Electrical and Electronic Engineering| Applied Mathematics
119	Da'u and Salim (2020)	"Recommendation system based on deep learning methods: a systematic review and new directions"	Language and Linguistics| AI| Linguistics and Language
114	Jain et al. (2021)	"A systematic literature review on machine learning applications for consumer sentiment analysis using online reviews"	Computer Science| Theoretical Computer Science

specially designed deep model structures might be necessary for effective F0 modeling, considering their distinct physiological production mechanisms compared to those of spectral features. Furthermore, the article highlights the lack of focus on modeling temporal dependencies among acoustic feature sequences in current deep learning approaches.

By conducting an SLR, Da'u & Salim (2020) explored the advancements and challenges in deep learning-based recommender systems (RSs). This study is significant because it represents the first SLR focusing specifically on deep learning applications in RSs, a crucial tool for addressing information overload in sectors such as e-commerce and entertainment. The research was guided by the standard SLR guidelines of Kitchemen-ham and involved a meticulous selection and analysis process of relevant publications from 2007 to 2018. This review revealed that autoencoder (AE) models are the most frequently used deep learning architectures in RS, followed by convolutional neural networks (CNNs) and recurrent neural networks (RNNs). The study also revealed that the MovieLens and Amazon review datasets are commonly used for evaluating deep learning-based RS, indicating a focus on the movie and e-commerce domains. Additionally, the review highlighted that precision and root mean squared error are the predominant metrics for assessing the performance of these systems. The authors identified several future research directions for deep learning-based RS, including the integration of additional side information, the development of deeper architectures for improved performance, and the use of a broader range of datasets.

Jain et al. (2021) conducted an SLR to assess the application and effectiveness of ML techniques in consumer sentiment analysis (CSA) within the hospitality and tourism domain. This study is significant for understanding how ML can be leveraged to process and analyze the vast and complex data generated from online reviews, a crucial aspect for service providers in developing consumer-focused strategies. The SLR analyzed 68 research papers focusing on sentiment classification, predictive recommendation decisions, and fake review detection in hospitality and tourism. A key contribution of this study is the development of an ML-CSA framework, which offers comprehensive guidelines for researchers, from topic selection to publication. This framework covers various aspects, such as basic knowledge of CSA, data selection and preprocessing, feature selection, applied ML techniques, and current research objectives. This study calls for empirical testing and validation of the proposed ML-CSA framework.

Thus, the thematic clusters, as outlined, provide a comprehensive overview of AI integration into various academic and research disciplines based on the ANZSRC and ASJC classification systems. These clusters reveal distinct focal areas, such as AI in healthcare and life sciences informatics, engineering systems and sustainable technologies, business intelligence and strategic management, and computational technologies and human-centric systems. Each cluster underscores the diverse applications of AI, from enhancing medical diagnostics and treatment protocols to optimizing engineering processes, improving business decision-making, and advancing human-computer interactions.

Building on these thematic insights, the subsequent section delves into a detailed discussion on BERT-enabled topics. This advanced natural language processing technique allows the extraction of nuanced patterns and insights from the AI research literature. By analyzing the latent topics and their relative proportions, we aim to provide a deeper understanding of the key areas driving AI research. In our subsequent discussions, we provide a holistic view of the current state and future directions of AI research.

Discussion

The topical content, associations among topics, relative significance of respective topics, and thematic analysis are presented in this section. From the extracted latent topics and their relative proportions, we see that "Intelligent diagnostics" dominates the list of topics, representing approximately 18 % of the study articles, followed by topics such as "AI in cancer diagnostics" and "AI in energy and agriculture", constituting approximately 16 % and 10 %, respectively (see Fig. 5). Each of the individual topics, the allocated themes, and the literature references are presented in the Appendix. The themes were created to represent the range of BERTopic outputs and their interrelations.

AI in health innovations

The transformative impact on healthcare from the adoption of AI, incorporating ethical considerations. This theme includes the topics of intelligent diagnostics, wearable technology in rehabilitation, AI in cancer diagnosis, and AI in brain health analysis. The cluster of Intelligent Diagnostics reviews investigates the application of ML in diverse healthcare domains (Christodoulou et al., 2019; Fleuren et al., 2020). By examining clinical prediction models, sepsis detection, COVID-19 diagnosis, depression therapy outcomes, heart disease diagnosis, diabetic retinopathy detection, and blood glucose control in diabetes patients, this review highlights both the potential and challenges of utilizing ML. Despite varied applications, the consensus is that methodological improvements and standardized reporting are crucial for reliable and effective integration of ML in diagnostic and predictive healthcare models.

These reviews collectively highlight the significant role of wearable technology in rehabilitation (Budrionis et al., 2022; McInnes et al., 2020). They explored diverse applications, from estimating biomechanical time series using regression algorithms to aiding blind and visually impaired individuals through smartphone-based computer vision. ML-driven controllers on locomotion assistive devices, commercial wearable sensors for gait monitoring, and the validation of wearable sensors using ML for physical ergonomics are discussed. The combination of AI and extended reality has been explored for applications such as autonomous cars, robotics, medical training, and entertainment. Additionally, the reviews delve into the use of AI and wearable sensors for remote rehabilitation, physical ergonomics, and socially assistive robotics, emphasizing the potential for personalized, data-driven interventions and improved patient monitoring.

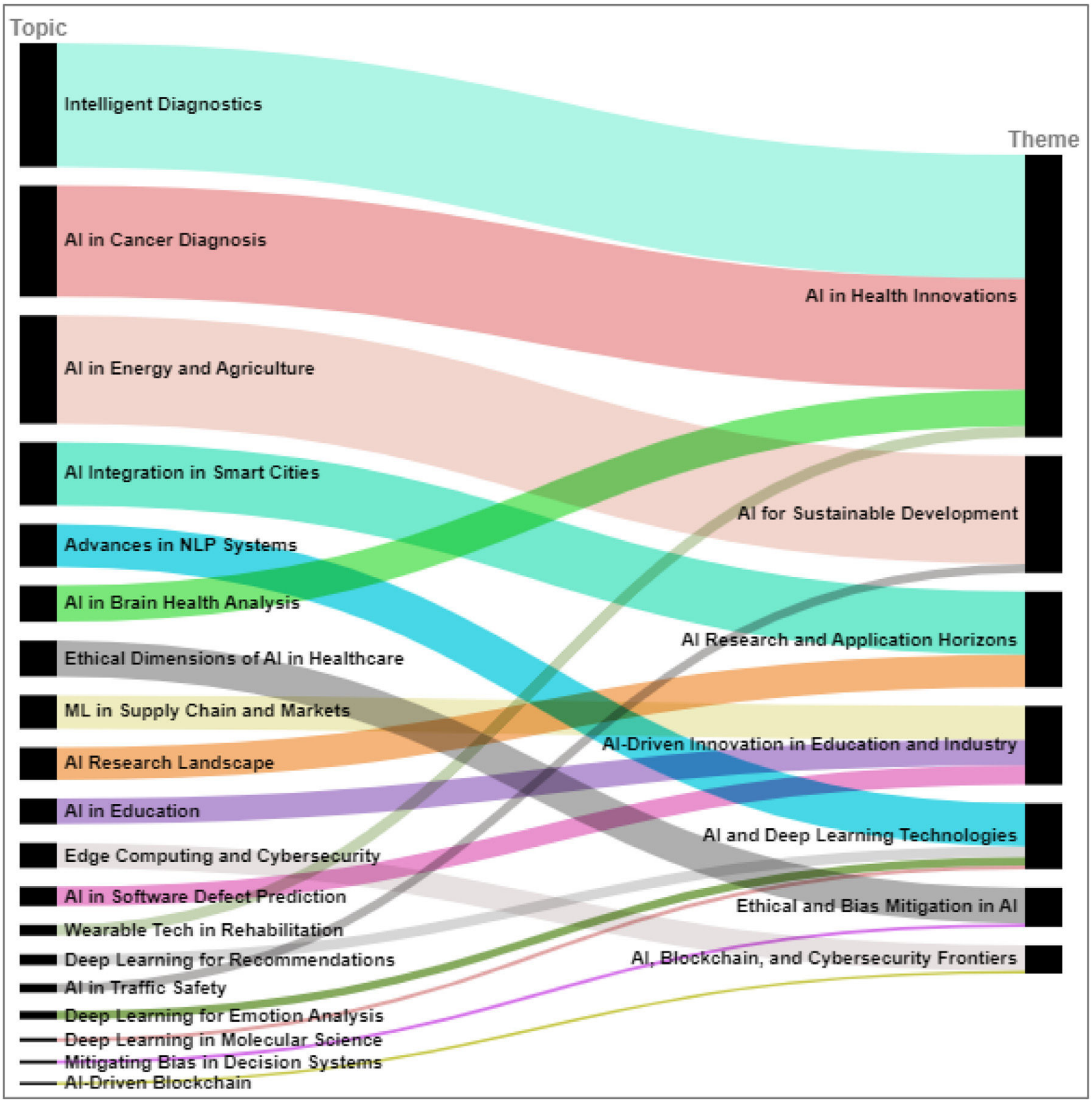

Fig. 5. Summary of the extracted topics and emerging themes.

The subject of "AI in Cancer Diagnosis" collectively affirms the efficacy of AI in medical applications (Brinker et al., 2018; Liu et al., 2019). The diagnostic accuracy of AI is equivalent to that of healthcare professionals, particularly in medical imaging. AI has shown promise across diverse domains, from skin cancer classification to the integration of electronic health records. While acknowledging the potential, the reviews emphasize challenges, such as the need for standardized benchmarks, improved reporting, and addressing biases. These findings underscore the transformative role of AI in cancer diagnosis, urging further research and standardization for robust and reliable applications in healthcare.

The reviews constituting this theme cluster highlight the transformative potential of AI, particularly deep learning and ML, in advancing brain health analysis (Ebrahimighahnavieh et al., 2020; Roy et al., 2019). Covering diverse areas such as electroencephalogram (EEG) interpretation, Alzheimer's disease detection, sleep apnea diagnosis, and autism spectrum disorder research, these reviews highlight the progress made in leveraging AI for comprehensive insights. Despite these achievements, challenges such as reproducibility, dataset availability, and optimization complexities persist within the reviewed studies. The findings underscore the imperative for further research, emphasizing robust feature representation multimodal data integration and addressing challenges to fully harness AI's capabilities in improving diagnostics and understanding of brain-related disorders.

AI for sustainable development

This theme includes topics that discuss AI perspectives on sustainability issues as well as environmental factors related to sustainable energy, agricultural practices, traffic safety, and the design and development of smart cities. Specifically, the topics of AI in energy and agriculture, as well as AI in traffic safety, are included in this theme. Systematic literature reviews offer a comprehensive overview of the current state, challenges, and opportunities in flood prediction, predictive maintenance, crop yield prediction, energy systems, plant species identification, civil structural health monitoring, geotechnical engineering, industrial maintenance, and prognostics of rolling element bearings (Carvalho et al., 2019; Mosavi et al., 2018). By highlighting the effectiveness of ML models and emphasizing hybrid approaches, these reviews contribute to advancing and optimizing processes, systems, and decision-making in various domains, fostering informed innovation and sustainable practices. AI plays a significant role in revolutionizing various aspects of traffic safety and transportation systems (Noaeen et al., 2022; Sirohi et al., 2020). Topics include the application of convolutional neural networks (CNNs) in intelligent transportation systems (ITS), the use of reinforcement learning (RL) for traffic signal control and autonomous vehicles, the impact of AI on autonomous vehicle safety, motion planning for mobile robots with a focus on deep reinforcement learning, and the application of ML in surface transportation systems. These reviews provide insights into the advancements, challenges, and future directions in leveraging AI to enhance safety, efficiency, and decision-making in traffic-related domains.

AI and deep learning technologies

This theme encompasses the many advancements in AI and deep learning and emerging applications in molecular science. The topics within this theme include deep learning for emotion analysis, deep learning for recommendations, deep learning in molecular science, and advances in NLP systems. Researchers employ deep learning across diverse fields (Bouwmans et al., 2018; Canedo & Neves, 2019). In video processing, convolutional neural networks (CNNs) excel in background subtraction, outperforming traditional methods. Facial expression recognition faces challenges in uncontrolled settings, and methods such as face detection and deep learning have been explored. Deep learning transforms single-object visual tracking, while human activity recognition (HAR) faces challenges and opportunities in spatiotemporal feature extraction. CNNs enhance accuracy in crowd counting for surveillance. Face liveness detection reviews AI techniques to combat spoofing threats. The impact of deep and ML on facial expression has been investigated, and a systematic review revealed advancements, challenges, and future directions in object detection. A comprehensive review of emotion recognition emphasizes the role of CNNs, datasets, applications, and open challenges.

Reviews on recommender systems highlight the extensive use of ML and deep learning techniques (Murad et al., 2018; Portugal et al., 2018). Researchers face challenges in selecting appropriate algorithms, but there is a growing trend in applying these technologies to diverse domains such as e-commerce, online learning, and entertainment. The reviews emphasize the increasing application of reinforcement learning for personalization, the effectiveness of deep learning in recommendation systems, and the exploration of new research opportunities. As these technologies continue to evolve, addressing challenges such as information overload, scalability, and accuracy remains crucial for the future development of recommender systems.

In the realm of molecular science and de novo drug discovery, generative ML models facilitate the efficient exploration of novel molecules, addressing challenges such as library homogeneity and synthesizability. Studies highlight that deep learning is pivotal in single-particle cryo-electron microscopy, enhancing structure determination in macromolecular studies. The application of DL in drug discovery extends to molecular similarity searching, where it proves effective in identifying compounds with similar functionalities. Furthermore, the integration of mechanistic modeling and ML in systems biology represents a hybrid approach for better understanding biological processes at different levels. In protein science, AI applications, including ML, contribute to protein structure prediction, design, and evolution. There are promising trends in the development of deep learning-based methods for identifying molecular similarities and predicting protein functions. In drug discovery against Plasmodium falciparum malaria, ML aids in predicting, classifying, and clustering not only bioactive compounds but also biological data, highlighting their roles in genomics and proteomics.

This review highlights the versatility of NLP from clinical applications and systematic review enhancements to social determinants of health extraction, language classification, and surgical outcome assessment (Bannach-Brown et al., 2019; Kreimeyer et al., 2017). These studies underscore the transformative impact of NLP and ML. They revealed advancements in systematic review processes, healthcare decision-making, and surgical outcome research while indicating the potential for further exploration in areas such as Arabic text classification, cardiology, and efficient information extraction using AI techniques. Collectively, these contributions highlight the evolving landscape and promising future of NLP systems in diverse domains.

AI-driven innovation in education and industry

This theme includes the impact on supply chain optimization, education, and software development from AI, where the efficiency and innovative aspects are discussed. The topics covered are AI in software defect prediction, ML in supply chains and markets, and AI in education. These reviews indicate the growing significance of ML in software quality assurance, defect prediction, and reliability assessment (Li et al., 2020; Meiliana et al., 2017). These studies reveal the effectiveness of various ML techniques, including unsupervised learning, supervised learning, and soft computing, in predicting software defects, faults, bugs, and reliability issues. Despite this progress, challenges such as inconsistent reporting, insufficient detail, and the need for more business-focused research persist. The findings emphasize the importance of comprehensive reporting, continued research, and a practical understanding of business aspects to bridge the gap between academic advancements and industrial applications in software development.

The reviews on ML in supply chains and markets collectively present a comprehensive landscape of applications, challenges, and potentials (Goodell et al., 2021; Toorajipour et al., 2021). They identify prevalent and potential AI techniques in supply chain management and reveal emerging trends in finance, banking, stock market forecasting, and marketing. Insights into logistics, sustainable manufacturing, and ML product innovation are highlighted. This review offers a holistic understanding of the evolving role of ML in optimizing operations, enhancing decision-making, and fostering innovation across diverse sectors, guiding future research directions in these dynamic domains.

Systematic literature reviews on “AI in Education” collectively highlight the transformative impact of AI on the educational landscape (Tahiru, 2021; Xu & Ouyang, 2022). By analyzing opportunities, benefits, and challenges, these reviews delve into diverse aspects. By integrating AI technologies within STEM education to predict student performance using ML, studies have showncase the potential to enhance learning outcomes. The reviews contribute valuable insights by addressing issues such as ethical concerns and the need for standardized evaluation in student performance prediction. Overall, AI’s role in education is dynamic, offering possibilities for improved teaching methods, adaptive learning, and efficient exam management systems.

AI, blockchain, and cybersecurity frontiers

This theme includes the exploration of the intersection of AI with blockchain and cybersecurity, focusing on the enhancement of data integrity, security, and privacy. The topics included are AI-driven blockchain, edge computing and cybersecurity. The integration of AI and blockchain emerged as a pivotal aspect of the Fourth Industrial Revolution, as noted in the former reviews constituting the cluster (Ekramifard et al., 2020; Kumar et al., 2023). This synergy, explored in various studies, transforms industries with potential applications in business, supply chains, healthcare, secure transactions, and finance. This research analyses trends, benefits, and intellectual structure; highlights key clusters such as supply chains, healthcare, secure transactions, finance, accounting, and challenges; and emphasizes the potential of decentralized AI, applications for edge computing, and ethical considerations. Bibliometric analyses across diverse sectors, including education, higher education institutions, and attendance systems, showcase the expanding landscape and implications of AI-driven blockchain technologies.

The reviews within this theme illustrate the critical role of ML in bolstering cybersecurity across diverse domains (Manzoor et al., 2019; Martins et al., 2020). This review covers topics such as adversarial ML in intrusion and malware detection, fake news detection, DL-based intrusion detection systems, botnet detection in software-defined networks, Android malware detection, defensive and offensive cybersecurity, NLP approaches to fake news, ML methods in predicting court decisions, and AI in crime prediction. The findings underscore the significance of adopting advanced ML techniques and shed light on potential challenges, providing valuable insights for researchers and practitioners aiming to fortify digital security measures. The cluster's systematic reviews collectively showcase the effectiveness and challenges of leveraging ML techniques to enhance cybersecurity across various domains.

Ethical and bias mitigation in AI

This theme incorporates the critical elements of AI ethics and AI bias mitigation, particularly in healthcare and decision-making systems. The topics covered are Ethical Dimensions of AI in Healthcare and Mitigating Bias in Decision Systems. This review highlights the ethical dimensions of AI in healthcare through a series of systematic reviews (Loh et al., 2020; Milne-Ives et al., 2020). The reviews cover a spectrum of AI applications, from conversational agents supporting health-related activities to explainable AI (XAI) techniques addressing the black-box nature of AI models. Topics include the effectiveness of AI conversational agents, the application of XAI in healthcare, the role of chatbots in promoting physical activity and weight loss, and the integration of AI-based technologies in nursing. The overarching theme underscores the potential benefits of AI in healthcare while emphasizing the need for transparency, user trust, and ethical considerations in its implementation. The significant advancements in applying AI to healthcare decision-making, medical diagnosis, and other domains have raised concerns about the ethical dimensions, fairness and bias of AI systems (Ferrara 2023). The implementation of ethical guidelines and bias mitigation in the use of AI requires a strategic multifaceted approach.

The reviews collectively emphasize the pervasive issue of bias in AI systems, particularly about gender (Pagano et al., 2023; Sun et al., 2019). They delve into the challenges, consequences, and potential solutions for mitigating biases in various domains, such as natural language processing, ML models, decision-making systems, and AI algorithms. The literature reviews address biases at different levels—societal, technical, and individual—highlighting the need for diverse perspectives, transparency, and responsible AI practices. The strategic implementation of ethical guidelines and bias mitigation policies in AI systems requires a rigorous comprehensive approach. This begins with the establishment of clear ethical standards that outline the principles and practices necessary for responsible AI development and deployment and should cover crucial issues such as data privacy, consent, transparency, accountability, and fairness. Ensuring adherence to these standards through regular audits and compliance checks is vital (Dwivedi et al. 2021; Giovanola & Tiribelli 2023). Future research directions are suggested to enhance fairness, inclusivity, and ethical considerations in developing and deploying AI systems.

AI research and application horizons

This theme covers the current landscape of AI research as well as its practical applications, emphasizing the integration of AI into urban environments and smart city infrastructure. The topics included are AI integration in smart cities and the AI research landscape. This theme underscores the diverse and impactful applications of AI across various sectors (Darko et al., 2020; Di Vaio et al., 2020). AI has emerged as a transformative force from its role in shaping sustainable business models, contributing to smart cities, and influencing human resource management to its applications in marketing, consumer research, and psychology. The reviews also highlight the need for multidisciplinary research, systematic exploration of AI implications, and continued discourse, emphasizing both the opportunities and challenges associated with integrating AI in different domains. Furthermore, the intersection of AI with Industry 4.0, as seen in the context of robotic process automation (RPA), presents a promising avenue for enhancing organizational processes and leveraging the potential of automation.

Implications for practice

In pursuant to our findings, we highlight several significant areas where AI and generative AI applications hold potential for future research and practical implementation. These implications address current gaps and propose directions for comprehensive and equitable advancements across various domains.

First, there is a critical need to address intersectional bias in AI systems. Traditional approaches to bias mitigation have predominantly focused on single-axis biases such as gender or race. However, these methods fail to account for the complexities of intersectional bias, where multiple, overlapping sources of bias intersect. Future research should develop AI models that can identify and mitigate these intersectional biases, ensuring that AI systems are more equitable and fair. By incorporating multiple dimensions of identity and their interactions, such models could significantly reduce discriminatory outcomes and enhance the inclusivity of AI technologies.

In the realm of healthcare, the development of AI systems for holistic health monitoring presents a promising avenue. Future AI systems could transcend the current focus on specific diseases by integrating diverse data sources such as wearable technology, genetic information, alternative medicine practices, lifestyle factors, and electronic health records. This integrative approach would enable a comprehensive view of an individual's health, facilitating personalized and preventive healthcare strategies. Such holistic AI systems could revolutionize healthcare by providing tailored health insights and recommendations, ultimately improving patient outcomes and promoting overall well-being.

Additionally, the role of AI in mental health care is an emerging field with substantial potential. Despite the expanding applications of AI in healthcare, there remains a paucity of research on integrative platforms specifically designed for mental health. Future research should focus on developing AI systems that utilize data from various sources to offer personalized mental health services. These systems could include functionalities for early detection, intervention, and continuous monitoring of mental health conditions such as stress, anxiety, and depression. AI-driven innovations in mental health diagnostics, treatment, and monitoring could transform public health by providing accessible and effective mental health care solutions.

Environmental resilience and sustainability represent another crucial area where AI-driven innovations could have a significant impact. Future research should prioritize the development of comprehensive AI applications for environmental monitoring and management. For instance, AI could enhance predictive analytics for biodiversity monitoring by leveraging satellite imagery and sensor networks to proactively manage ecosystems. Improved climate models powered by AI could offer localized climate change predictions, guiding adaptive strategies for vulnerable communities and ecosystems. Real-time AI systems for detecting environmental hazards such as forest fires and oil spills could be integrated with emergency response mechanisms to mitigate their impacts more effectively. Additionally, AI and blockchain technologies could be utilized for transparent and sustainable natural resource management, engaging communities through AI-enhanced citizen science platforms for environmental monitoring. Moreover, employing deep learning techniques to map and autonomously address plastic pollution could significantly contribute to global conservation efforts.

The generalisability of the transformative potential of AI across geographic regions, cultures, and socioeconomic contexts depends on several factors: technological readiness, cultural adaptability, economic viability, regulatory environments and government policy. In developed nations with robust technology infrastructure, AI can drive innovation and deliver change. Within developing economies, regions are likely to be limited by access to technology and may face barriers to adoption, impacting the effectiveness of AI. AI applications in marketing, consumer research, and psychology must consider local cultural contexts. AI models trained on culturally specific data may not perform well in different cross-cultural contexts. Developed economies can invest heavily in AI technologies, facilitating integration into various sectors. Lower-income regions may struggle to adopt and scale AI solutions due to economic constraints, affecting areas such as human resource management and industry automation (Dwivedi et al. 2021). Supportive regulatory frameworks can accelerate AI adoption, while stringent or unclear regulations may slow it. Ethical considerations around privacy and data protection also influence AI deployment, which varies globally and affects fields such as consumer research. The integration of AI with Industry 4.0 technologies, such as robotic process automation (RPA), varies across regions. Compared with developing regions, advanced economies with established industrial bases are more likely to benefit from these technologies.

Thus, the implications for practice derived from our study emphasize the transformative potential of AI and generative AI across various domains. Addressing intersectional bias, advancing holistic health monitoring, integrating AI in mental health care, and developing AI-driven solutions for environmental resilience and sustainability are pivotal areas for future research. AI solutions have a cultural and socioeconomic context requiring innovative and pragmatic solutions. These efforts will not only advance the state of AI technology but also ensure that its applications are equitable, comprehensive, and beneficial to society at large.

Implications for theory and the role of generative AI

The comprehensive integration of scientometric analysis with BERTopic modeling in this study offers a unique dual approach for examining the artificial intelligence (AI) research landscape. This methodology combines quantitative insights from scientometric analysis, which delineates the structural and dynamic dimensions of AI research, with the qualitative depth provided by BERTopic modeling, pinpointing nuanced thematic trends and identifying specific research gaps. This combined approach yields a thorough comprehension of the current state and potential trajectories of AI research, thereby contributing significantly to theoretical frameworks within the field.

This investigation unveils the extensive reach of AI across various sectors, including healthcare, education, energy, and agriculture, synthesizing pivotal insights to outline a narrative of technological innovation's evolving frontiers. Notably, the integration of AI within healthcare and life sciences is a testament to its ability to refine diagnostics and treatment protocols, as evidenced through thematic clusters and the examination of highly cited literature. Furthermore, the use of the Fields of Research (FoR) classification system unveils a research domain predominantly situated within information and computing sciences, highlighting the foundational role of this field in AI development. The impactful penetration of AI into practical domains is evidenced through its translational impact across biomedical, clinical, health sciences, and intersecting areas such as commerce and management. Lesser represented yet critical fields such as education, psychology, and human society signify the burgeoning recognition of AI's capacity to influence a wider array of sociocultural facets. The generalizability of AI depends on a context-specific approach that considers cultural factors, economic conditions, and regulatory environments. Tailored multidisciplinary research ensures the effective, equitable, and culturally sensitive integration of AI, fostering global innovation and sustainable development.

The introduction of generative AI into this discourse has amplified the scope of AI applications, especially in generating novel content, designing advanced models, and simulating complex systems across these domains. Generative AI, with its ability to create new data, images, texts, and simulations reflecting real-world scenarios, promises to greatly increase research depth (Dwivedi et al., 2023; Ooi et al., 2023). This is especially true in areas where there is a lack of data or a strong need for innovative solutions. This technology's potential to revolutionize sectors such as healthcare through the generation of synthetic patient data for research and education by producing personalized learning materials is particularly noteworthy. However, the application of generative AI also necessitates rigorous theoretical considerations regarding ethics (Raman et al., 2023; R. Raman et al., 2024), bias mitigation, and the integrity of generated content, thus opening new avenues for theoretical exploration and methodological innovation.

Limitations and future research directions

Moving forward, reviews on AI applications could benefit from addressing several potential gaps identified in the data. First, there is an opportunity to investigate the adoption and impact of emerging methodologies, such as topic modeling and meta-analysis, given the rising trend in systematic and quantitative reviews. Additionally, a more detailed temporal analysis could uncover trends and shifts in research foci over time, helping to identify temporal gaps and guide future investigations. Moreover, the high level of collaboration among authors suggests the potential for exploring the interdisciplinary nature of collaboration and understanding how different disciplines contribute to various review types. Investigating the quality assessment of reviews, including methodological rigor, transparency, and impact in different categories, can inform improvements and standardization in research practices.

The evolving landscape of AI, coupled with the exploratory potential of generative AI, calls for a heightened focus on interdisciplinary collaboration and the sharing of knowledge and innovations to address global challenges. Innovations in infrastructure development underscore the potential of predictive analytics to inform robust, ethical frameworks that address technological reliance and data biases. In the context of education, personalized learning experiences through generative AI promise enhanced engagement and accessibility. This necessitates further research on quality control to ensure that these AI-driven educational tools meet high standards. Similarly, energy optimization has emerged as a critical area where AI's predictive maintenance capabilities can lead to sustainable and efficient energy policies and practices.

Furthermore, the urgent need for climate action can be addressed through AI's capabilities in environmental modeling and impact analysis. As AI continues to redefine the boundaries of technology and its applications, the imperative for international cooperation and the exchange of ideas becomes increasingly critical. This global collaboration will be essential in ensuring that AI's influence transcends geographical and disciplinary limits, fostering a future where AI contributes positively to society.

Finally, it is important to acknowledge the limitations of this work. Our reliance on reviews collected from Scopus means that the scope may be constrained by the publications available in this database. Consequently, the findings and insights presented may reflect the coverage and emphasis present in Scopus, potentially limiting the comprehensiveness and diversity of perspectives in the broader landscape of AI research.

Conclusions

In conclusion, this study provides a comprehensive synthesis of AI research by employing systematic review methodologies, thematic clustering, advanced topic modeling techniques, and content analysis. Our investigation revealed the transformative influence of AI across key domains, such as healthcare, engineering, environmental applications, business, and technology, characterized by significant advancements in diagnostics, personalized medicine, sustainability, smart infrastructure, decision support systems, and digital experiences. Specifically, AI in healthcare and life sciences has revolutionized diagnostics and personalized medicine (Cluster 1), while its role in engineering and environmental applications underscores its contributions to sustainability and smart infrastructure (Cluster 2). In business and management, AI enhances decision support systems and operational optimization (Cluster 3), and its influence on digital infrastructure and human-computer interfaces highlights its broad applicability (Cluster 4). Our findings demonstrate AI's paradigm-shifting potential in healthcare, advancing intelligent diagnostics and personalized medicine, and sustainable development, contributing to environmental sustainability and smart city initiatives (RQ2). The exploration of deep learning technologies showcases AI's impact on emotion analysis, molecular science, and natural language processing (NLP) systems. AI-driven innovations extend to education and industry, optimizing supply chains and software development, while integration with blockchain and cybersecurity enhances data security and privacy. Ethical considerations and bias mitigation emphasize the necessity of responsible AI practices. By synthesizing diverse insights and employing advanced modeling techniques, we provide a holistic perspective that guides both current understanding and future scholarly efforts (RQ3). This research not only answers key research questions but also sets a new benchmark for conducting literature reviews in rapidly evolving scientific domains. The integration of scientometrics and BERTopic modeling offers a novel approach to unveiling the dynamics of AI applications, ensuring a deeper, more accurate understanding of the transformative impact of AI across multiple sectors and paving the way for future advancements in this critical field.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

CRediT authorship contribution statement

Raghu Raman: Writing – review & editing, Writing – original draft, Supervision, Methodology, Data curation, Conceptualization. **Debidutta Pattnaik:** Writing – review & editing, Writing – original draft, Methodology, Data curation. **Laurie Hughes:** Writing – review & editing, Writing – original draft. **Prema Nedungadi:** Writing – review & editing, Writing – original draft.

Data availability statement

Data associated with our study is available as supplementary file

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Supplementary materials

Supplementary material associated with this article can be found in the online version at doi:10.1016/j.jik.2024.100517.

Appendix

Topics, keywords and representative type of articles on each topic

Topic	Keyterms and their Probability	Representative Articles	APY
Advances in NLP Systems	natural language (0.33), natural language processing (0.32), processing nlp (0.23), language processing nlp (0.23), text mining (0.19), nlp methods (0.17), nlp systems (0.15), review natural language (0.15), nlp applications (0.15), language processing systematic (0.15)	Kreimeyer et al. (2017); Bannach-Brown et al. (2019); Patra et al. (2021); Wahdan et al. (2020); Khanbhai et al. (2021); Tsou et al. (2020); Mellia et al. (2021); Turchioe et al. (2022); Baviskar et al. (2021); Samant et al. (2022)	2021.4
AI in Brain Health Analysis	alzheimer disease (0.32), autism spectrum (0.24), mild cognitive impairment (0.21), eeg signals (0.19), neuroimaging data (0.17), brain computer (0.16), neurodegenerative disorder (0.16), parkinson disease pd (0.16), alzheimer disease systematic (0.15), epileptic seizure (0.15)	Roy et al. (2019); Ebrahimighahnavieh et al. (2020); Mostafa et al. (2019); de Belen et al. (2020); Grueso & Viejo-Sobera (2021); Loh et al. (2020); Saeidi et al. (2021); Alzahab et al. (2021); Tzimourta et al. (2021); Maitín et al. (2020)	2021.7
AI in Cancer Diagnosis	deep learning (0.20), breast cancer (0.19), medical imaging (0.15), review meta analysis (0.15), prostate cancer (0.14), neural network (0.14), convolutional neural network (0.13), intelligence ai (0.13), chest ray (0.13), cancer detection (0.13)	Liu et al. (2019); Brinker et al. (2018); Huang et al. (2020); Soffer et al. (2020); Kassem et al. (2021); Harris et al. (2019); Abreu et al. (2016); Ghaderzadeh & Asadi (2021); Zhou et al. (2021); Mahmood et al. (2020)	2022.0
AI in Education	ai education (0.24), artificial intelligence education (0.23), intelligence education (0.23), educational data (0.19), education artificial (0.18), education artificial intelligence (0.18), education systematic literature (0.17), educational data mining (0.17), student dropout (0.17), online higher education (0.16)	Tahiru (2021); Xu and Ouyang (2022); Sekeroglu et al. (2021); Okewu et al. (2021); Kaddoura et al. (2022); Salas-Pilco et al. (2022); Baashar et al. (2021); Xu and Ouyang (2022); Issah et al. (2023); Ramírez Luelmo et al. (2021)	2022.1
AI in Energy and Agriculture	deep learning (0.19), computer vision (0.17), systematic literature review (0.16), neural network (0.16), remote sensing (0.16), renewable energy (0.15), neural networks (0.14), crop yield prediction (0.14), food image (0.13), precision agriculture (0.13)	Mosavi et al. (2018); Carvalho et al. (2019); van Klompenburg et al. (2020); Mosavi et al. (2019); Wäldchen & Mäder (2018); Flah et al. (2021); Sony et al. (2021); Moayedi et al. (2020); Leukel et al. (2021); Singh et al. (2021)	2021.9
AI in Software Defect Prediction	defect prediction (0.35), software defect (0.33), software defect prediction (0.32), software testing (0.28), software development (0.28), learning software (0.27), software quality (0.26), machine learning software (0.26), software fault prediction (0.23), code smell (0.22)	Li et al. (2020); Meiliana et al. (2017); Jorayeva et al. (2022); Saharudin et al. (2020); Matloob et al. (2021); Stradowski & Madeyski (2023); Habtemariam et al. (2022); Kaur et al. (2020); Brown et al. (2022); Sathyaraj & Prabu (2016)	2020.8

(*continued*)

(*Continued*)

Topic	Keyterms and their Probability	Representative Articles	APY
AI in Traffic Safety	traffic flow (0.27), traffic congestion (0.25), trajectory prediction (0.23), transportation systems (0.22), safety critical systems (0.22), path planning (0.21), road safety (0.20), traffic flow prediction (0.20), intelligent transport (0.20), public transportation (0.20)	Sirohi et al. (2020); Noaeen et al. (2022); Nascimento et al. (2020); Sun et al. (2021); Al-Masrur Khan et al. (2020); Ali & Mahmood (2018); Deshmukh (2018); Behrooz & Hayeri (2022); Di Felice et al. (2019); Mannan et al. (2023)	2021.7
AI Integration in Smart Cities	literature review (0.22), smart cities (0.21), intelligence ai (0.20), human resource management (0.19), knowledge management (0.17), ai adoption (0.16), research ai (0.15), ai marketing (0.15), adoption artificial intelligence (0.14), ai public (0.14)	Di Vaio et al. (2020); Darko et al. (2020); Vrontis et al. (2022); Yigitcanlar et al. (2020); Sousa et al. (2019); Mustak et al. (2021); Peres et al. (2020); Zuiderwijk et al. (2021); Mariani et al. (2022); Ribeiro et al. (2021)	2022.0
AI Research Landscape	bibliometric analysis (0.29), artificial intelligence bibliometric (0.19), intelligence bibliometric (0.19), intelligence bibliometric analysis (0.17), artificial intelligence research (0.16), intelligence research (0.16), artificial intelligence ai (0.14), research topics (0.14), latent dirichlet allocation (0.14), ai research (0.13)	Guo et al. (2020); Hinojo-Lucena et al. (2019); De Felice & Polimeni (2020); Jha et al. (2017); Shukla et al. (2019); Hwang & Tu (2021); Song & Wang (2020); Shen et al. (2022); Belmonte et al. (2020); Zhang et al. (2022)	2021.4
AI-Driven Blockchain	blockchain technology (0.50), ai blockchain (0.42), intelligence blockchain (0.38), artificial intelligence blockchain (0.38), blockchain artificial intelligence (0.35), blockchain artificial (0.35), ai enabled blockchain (0.27), blockchain machine learning (0.25), intelligence ai blockchain (0.25), ai blockchain technology (0.23)	Kumar et al. (2023); Ekramifard et al. (2020); Karger (2020); Moriello (2019); Vincent et al. (2023); Hajizadeh et al. (2023); Sharma et al. (2023); Chen et al. (2023); de Bem Machado et al. (2023); Abidemi et al. (2023)	2022.3
Deep Learning for Emotion Analysis	face recognition (0.41), expression recognition (0.32), facial expression recognition (0.31), object detection (0.28), face liveness detection (0.28), behavior detection (0.27), face expression (0.25), human emotion recognition (0.25), human activity recognition (0.24), deep learning face (0.23)	Bouwmans et al. (2019); Canedo and Neves (2019); Zhang et al. (2021); Ullah et al. (2021); Chrysler et al. (2021); Hassen et al. (2022); Khairnar et al. (2023); Pangestu et al. (2022); Cîrneanu et al. (2023); Kaur & Singh (2023)	2021.6
Deep Learning for Recommendations	recommender systems (0.62), recommendation systems (0.49), learning recommendation (0.37), based recommendation systems (0.34), learning recommender (0.33), deep learning based (0.32), deep learning recommender (0.32), learning based recommendation (0.29), recommender systems systematic (0.29), recommendation social (0.27)	Portugal et al. (2018); Murad et al. (2019); Den Hengst et al. (2020); Brunialti et al. (2015); Necula & Păvăloaia (2023); Lalitha & Sreeja (2021); Selma et al. (2021); Torkashvand et al. (2023); Krishnamoorthi & Shyam (2023); Li et al. (2023)	2020.7
Deep Learning in Molecular Science	drug discovery (0.41), molecular similarity (0.35), molecular similarity searching (0.32), drug design (0.29), protein function prediction (0.28), systems biology (0.27), deep learning drug (0.26), learning drug (0.26), protein science (0.25), anticancer drug response (0.25)	Martinelli (2022); Wu et al. (2022); Koutroumpa et al. (2023); Villalobos-Alva et al. (2022); Procopio et al. (2023); Nasser et al. (2023); Oguike et al. (2022); Yan et al. (2023); Faiz et al. (2023); Praveena et al. (2023)	2022.0
Edge Computing and Cybersecurity	intrusion detection (0.25), internet things (0.24), internet things iot (0.19), things iot (0.19), edge computing (0.18), iot security (0.18), android malware (0.17), denial service (0.17), ddos attacks (0.15), fake news detection (0.15)	Martins et al. (2020); Manzoor et al. (2019); Lansky et al. (2021); Shinan et al. (2021); Senanayake et al. (2021); Liu et al. (2022); Aiyanyo et al. (2020); Busioc et al. (2020); Rosili et al. (2021); Dakalbab et al. (2022)	2021.7
Ethical Dimensions of AI in Healthcare	explainable artificial intelligence (0.20), ai ethics (0.18), intelligence ai (0.18), ai based (0.17), clinical ai (0.17), systematic review (0.17), ai healthcare (0.16), artificial intelligence healthcare (0.16), intelligence healthcare (0.15), artificial intelligence xai (0.15)	Milne-Ives et al. (2020); Loh et al. (2022); Xu et al. (2021); Choudhury & Asan (2020); Mathews (2019); Islam et al. (2022); Schachner et al. (2020); Wells & Bednarz (2021); Oh et al. (2021); von Gerich et al. (2022)	2022.0
Intelligent Diagnostics	systematic review (0.19), meta analysis (0.18), risk bias (0.15), review meta analysis (0.14), systematic review meta (0.14), machine learning ml (0.13), diabetic retinopathy (0.13), intelligence ai (0.12), machine learning models (0.12), diagnostic accuracy (0.11)	Christodoulou et al. (2019); Fleuren et al. (2020); Albahri et al. (2020); Lee et al. (2018); Tayarani N. (2021); Balki et al. (2019); Ahsan & Siddique (2022); Islam et al. (2020); Syeda et al. (2021); Tejedor et al. (2020)	2021.8
Mitigating Bias in Decision Systems	gender bias (0.71), gender bias ai (0.51), ai based decision (0.43), bias ai based (0.42), bias artificial intelligence (0.40), gender biases (0.38), mitigating gender bias (0.32), gender bias artificial (0.32), gender bias nlp (0.29), gender biases ml (0.29)	Sun et al. (2020); Pagano et al. (2023); Varsha (2023); Shrestha & Das (2022); Nadeem et al. (2022); Reyero Lobo et al. (2023); Hall & Ellis (2023); de Lima et al. (2023); Malheiro et al. (2023); Sengewald & Lackes (2022)	2022.3
ML in Supply Chain and Markets	supply chain (0.40), stock market (0.35), market prediction (0.27), stock market prediction (0.25), supply chain management (0.25), literature review (0.23), fraud detection (0.19), predicting stock (0.17), financial time series (0.17), machine learning ml (0.16)	Toorajipour et al. (2021); Goodell et al. (2021); Leo et al. (2019); Li & Bastos (2020); Ahmed et al. (2022); Miklosik & Evans (2020); Akbari & Do (2021); Jamwal et al. (2022); Arboretti et al. (2022); Younis et al. (2022)	2021.7
Wearable Tech in Rehabilitation	gait analysis (0.33), sign language (0.29), gesture recognition (0.26), fall detection (0.22), wearable sensor (0.20), physical rehabilitation (0.19), vision based (0.18), physical activity (0.18), emg data (0.18), human gait (0.18)	Gurchiek et al. (2019); Budrionis et al. (2022); Labarrière et al. (2020); Jourdan et al. (2021); Reiners et al. (2021); Bassyouni & Elhajj (2021); Mennella et al. (2023); Donisi et al. (2022); De Oliveira et al. (2023); Lundgren et al. (2022)	2021.6

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