

THE FUNCTION OF ARTIFICIAL INTELLIGENCE IN HEALTHCARE: A SYSTEMATIC LITERATURE REVIEW

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ABSTRACT

Artificial intelligence (AI) in the healthcare sector is attracting attention from researchers and healthcare practitioners. Prior study has been limited in examining this problem from a multidisciplinary perspective, including accounting, business and management, decision sciences, and health professionals. The systematic literature study, employing a reliable and reproducible research methodology, allowed the researchers to get 288 peer-reviewed publications from Scopus. The authors utilised qualitative and quantitative metrics to analyse authors, publications, keywords, and collaborative networks among researchers. The study employed the Bibliometrix R software suite. The research indicated that the literature in this field is in its infancy. It underscores the administration of health services, predictive medicine, patient data and diagnostics, and clinical decision-making. The United States, China, and the United Kingdom generated the most volume of studies. Keyword research revealed that AI can aid clinicians in diagnosis, predicting disease spread, and customising treatment approaches. The literature reveals various AI applications in healthcare and a substantial area of study that remains little investigated. AI projects require proficiency and comprehension of data quality for data-intensive analysis and knowledge-based management. Insights can aid academics and healthcare professionals in understanding and addressing future enquiries regarding AI in the healthcare industry.

KEYWORDS: Artificial Intelligence, Healthcare, Patient Data, Clinical Decision-Making, Management

BACKGROUND

Artificial intelligence (AI) refers to computing technologies that replicate processes associated with human intellect, including reasoning, deep learning, adaptation, interaction, and sensory perception [1, 2]. Certain gadgets can perform functions that usually need human interpretation and decision-making [3, 4]. These strategies employ an interdisciplinary approach and are applicable across various domains, including medicine and health. Artificial intelligence has been utilised in medicine since the 1950s, when doctors initially endeavoured to enhance their diagnosis through computer-assisted programs [5, 6]. The interest and advancements in medical

AI applications have increased significantly in recent years, attributed to the greatly improved computational capacity of contemporary computers and the extensive availability of digital data for gathering and utilisation [7]. Artificial intelligence is progressively transforming medical practice. Numerous AI applications exist in medicine, applicable across various medical domains, including clinical, diagnostic, rehabilitative, surgical, and predictive techniques. Another significant domain of medicine in which AI is influencing is clinical decision-making and disease diagnosis. AI systems can assimilate, interpret, and report extensive data across several modalities to identify diseases and inform clinical decisions [3, 8]. AI solutions can manage the extensive data generated in medicine and uncover insights that would otherwise stay obscured inside the wide expanse of medical big data [9–11]. These technologies can also discover novel pharmaceuticals for healthcare management and patient therapy.

The application of AI demonstrates courage, as evidenced by a search in the principal research databases. Nonetheless, [12] assert that the technology may decrease healthcare expenses and redundant procedures by directing the medical field towards critical analysis and therapeutic innovation. According to [8, 9], the AI perspective is intriguing; yet, further research is required to determine the effectiveness and uses of AI in medicine [10].

This article will focus on AI techniques for healthcare from the viewpoints of accounting, business, and management. The authors employed the structured literature review (SLR) methodology for its dependable and reproducible research protocol [11] and identified bibliometric variables as subjects of inquiry. Bibliometric analysis facilitates the identification of the principal quantitative factors within the research domain [12]. This strategy enables the identification of essential details regarding a certain study area, encompassing field authors, publication counts, keywords for variable interaction (policies, properties, and governance), and country data [13]. It also facilitates the implementation of the science mapping technique [14]. Our study utilised the Bibliometrix R program and the Biblioshiny web interface for analysis [14–26].

METHODOLOGY

This study assessed artificial intelligence in healthcare research domains utilising the systematic literature review approach [11]. According to [12], a systematic literature review (SLR) facilitates the examination of the scientific corpus within a research domain, encompassing the scientific rigour, dependability, and replicability of researchers' methodologies. Numerous scientists propose that the methodology facilitates the identification of prominent authors, journals, and keywords by integrating qualitative and quantitative characteristics, thereby merging a systematic literature review with bibliometric analysis [27–30]. Although the SLR is

predominantly utilised in business and management [16, 31], it is also applied in the healthcare sector, adhering to the fundamental principle of its conception [32, 33]. A methodological study of previously published articles indicates that the most commonly employed phases are as follows [28, 31, 34].

Given the aforementioned premises, the authors contend that a systematic literature review (SLR) is the optimal strategy as it integrates scientific validity, replicability of the study process, and the interrelation of numerous inputs. The initial step, as outlined in the methodology paper, is the identification of the research question. The concluding phase of the research involves the article's discussion and conclusion, wherein ramifications and prospective research directions will be delineated. At the research team level, data is examined using the statistical software R-Studio and the Bibliometrix package, facilitating scientific examination of results derived from the multidisciplinary database [35-41].

RESULTS

APPLICATIONS OF ARTIFICIAL INTELLIGENCE IN HEALTHCARE

Artificial intelligence has emerged as a disruptive innovation in the healthcare sector. AI, through its advanced algorithms and many applications, has aided physicians and healthcare professionals in health information systems, geocoding health data, epidemic and syndromic surveillance, predictive modelling and decision support, and medical imaging [2, 9, 10,]. Additionally, the researchers conducted a bibliometric analysis to discover four predominant macro-variables in the subject, which were utilised as authors' keywords. Consequently, the subsequent sub-sections intend to elucidate the discourse surrounding the applications of AI approaches in healthcare. The elements are depicted in Fig. 12.

MANAGEMENT OF HEALTH SERVICES

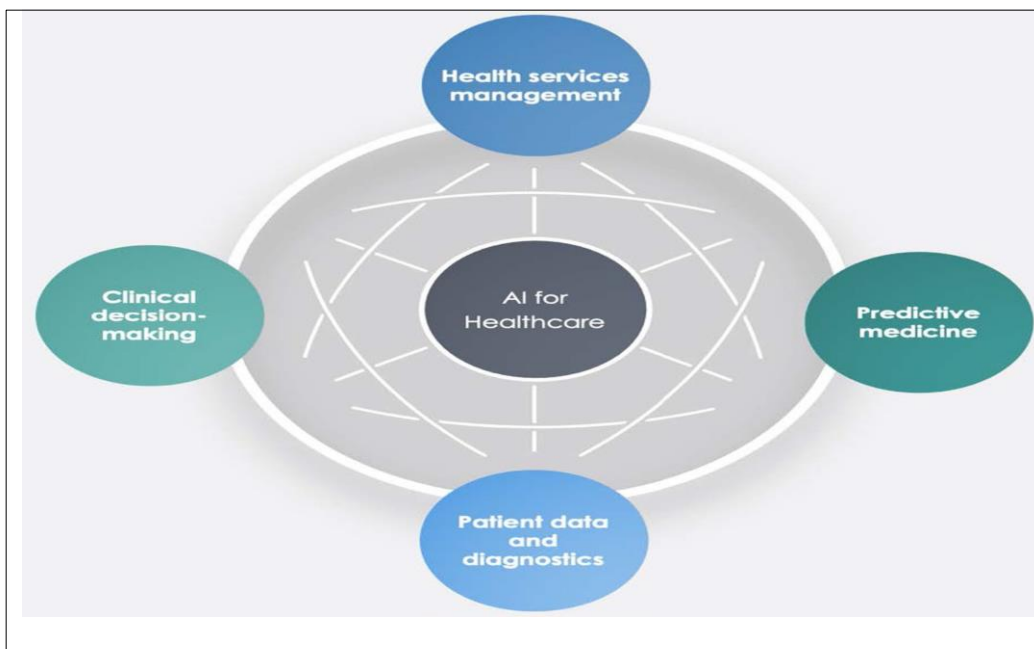
One significant component of AI approaches is their potential to enhance holistic health services management. These applications can assist physicians, nurses, and administrators in their duties. An AI system can furnish healthcare practitioners with continuous, potentially real-time updates on medical information from diverse sources, including journals, textbooks, and clinical practices [2, 10]. The efficacy of these apps has become increasingly vital during the COVID-19 pandemic, as continuous information interchange is essential for effective global management of the crisis [71]. Additional applications entail the coordination of informational tools for patients and the facilitation of suitable inferences for health risk notifications and health outcome forecasting [42]. AI applications enable hospitals and healthcare services to operate more efficiently for several reasons:

- Clinicians may obtain data instantaneously as required.

- Nurses can enhance patient safety while administering medication.
- Patients can remain informed and engaged in their care by engaging with their medical teams during hospital stays.

CLINICAL DECISION MAKING

A primary focus of keyword analysis is that AI applications may assist physicians and medical researchers in the clinical decision-making process. [43] assert that AI can assist physicians in enhancing clinical decision-making or potentially supplant human judgement in some healthcare domains. [44] assert that algorithms can enhance clinical decision-making by expediting processes and increasing the volume of treatment delivered, hence favourably influencing healthcare costs. Consequently, AI technology can assist medical professionals in their tasks and streamline their work.



Ultimately, as [45] observe, algorithmic platforms can offer virtual assistance to aid physicians in comprehending the semantics of language and in resolving business process enquiries like a human would.

PATIENT INFORMATION AND DIAGNOSTIC RESULTS

A complex issue for AI applications is patient data and diagnosis. Artificial intelligence methodologies can assist medical researchers in managing the extensive volume of patient data, sometimes referred to as medical big data. AI systems can oversee data produced by clinical activities, including screening, diagnosis, and treatment allocation. Consequently, healthcare professionals can acquire knowledge regarding analogous topics and the correlations between subject characteristics and outcomes of interest [46]. These technologies can analyse raw data and provide

valuable insights applicable to patient treatments. They can assist physicians in the diagnostic procedure; for instance, conducting a rapid body scan will provide a comprehensive assessment of the patient's condition. Subsequently, AI technology can generate a three-dimensional mapping solution of a patient's anatomy.

Emerging research views are becoming noteworthy in the realm of data. We noted the rise of research focused on patient data management and protection concerning AI applications [47-51]. AI approaches can significantly enhance diagnosis in rehabilitative therapy and surgery. A multitude of robots has been designed to assist and oversee such duties. Rehabilitation robots provide physical support and guidance to a patient's limb during motor therapy [52]. AI possesses significant potential to revolutionise surgical robotics by enabling devices to do semi-automated surgical activities with enhanced efficiency. The ultimate objective of this technology is to automate processes to eliminate human error while ensuring a high degree of accuracy and precision [53]. The COVID-19 period has resulted in enhanced remote patient diagnostics via telemedicine, facilitating remote patient monitoring and equipping physicians and nurses with supportive equipment [54-66].

DISCUSSION

This study intends to do a bibliometric analysis of articles regarding AI in healthcare, concentrating on accounting, business and management, decision sciences, and health profession studies. Employing the SLR methodology of [11], we present a dependable and reproducible research process for subsequent investigations in this domain. Furthermore, we examine the trend of scientific publications on the topic, uncharted information, prospective directions, and ramifications utilising the science mapping workflow.

The four preeminent journals—Journal of Medical Systems, Studies in Health Technology and Informatics, IEEE Journal of Biomedical and Health Informatics, and Decision Support Systems—are ideal venues for publishing research publications on this subject, according to bibliometric characteristics. These publications mostly focus on healthcare, medical information systems, and applications including cloud computing, machine learning, and artificial intelligence. Furthermore, regarding the h-index, Ultimately, co-occurrence of keywords unveils intriguing insights. Researchers have discovered that AI contributes to diagnostic accuracy and aids in health data analysis by comparing thousands of medical records, facilitating automatic learning through clinical alerts, optimising health service management and care locations, and enabling the reconstruction of patient history using this data.

This study identifies five cluster analyses in healthcare applications: health services management, predictive medicine, patient data, diagnostics, and clinical decision-making. These technologies can enhance the optimisation of logistics processes in

healthcare services and facilitate improved resource allocation.

The authors, upon assessing the research findings and the pertinent issues, robustly advocate for AI's involvement in decision assistance. These applications, however, are exemplified by establishing a direct connection between data quality management and the technological proficiency of healthcare workers [67].

THE SIGNIFICANCE OF DATA QUALITY IN THE DECISION-MAKING PROCESS

Numerous writers have examined AI within the healthcare research domain; nevertheless, the authors in this instance concentrate on alternative literature encompassing business and decision-making processes. The examination of the search flow indicates a dual perspective on the literature. Some contributions are rooted in positivist literature and address future applications and implications of technology in health service management, data analysis, and diagnostics. Conversely, certain investigations seek to comprehend the adverse aspects of technology and its effects. [69] asserts that the influence of AI spans multiple sectors; yet, its advancement necessitates measures to safeguard personal data. [70] similarly examine the ethical ramifications of employing AI in healthcare. The authors assert that intelligent robots pose concerns regarding accountability, transparency, and authorisation, particularly in automated interactions with patients. Our analysis does not reveal a significant trend in the literature; thus, we contend that discussing issues such as technological transparency for patients is crucial for the advancement of AI applications.

A significant portion of our findings indicates that, at the application level, AI can enhance medical support for patients (Fig. 11) [71-82]. Nonetheless, we assert that, as [90] highlighted in the Harvard Business Review, the management of expensive back-office issues must also be considered.

WILL MEDICAL TECHNOLOGY DIMINISH THE SKILL SET OF PHYSICIANS?

Additional contemplation pertains to the competencies of physicians. Research indicates that healthcare professionals are increasingly utilising technology for many objectives, including the collection of patient information and diagnostics [71]. This is evidenced by the keywords (Fig. 6) that emphasise technology and the function of decision-making with novel innovative instruments. Furthermore, the discourse broadens with [13], suggesting that the overreliance on technology may impede the development of physicians' skills and the advancement of clinical processes. One of the primary concerns identified in the literature is the potential de-skilling of healthcare personnel resulting from diminished autonomy in patient-related decision-making [83]. Consequently, the issues and discourse identified in Fig. 11 are further elaborated by incorporating the ethical ramifications of technology and the significance of skills.

IMPLICATION

Our analysis possesses numerous theoretical and practical consequences. This work theoretically expands upon the prior findings of [84–90] by examining AI in the context of clinical decision-making and data management quality. This article seeks to facilitate a productive dialogue between healthcare experts and administrative personnel regarding the utilisation of AI to enhance work quality. This study provides a comprehensive understanding of the bibliometric aspects of AI methodologies in healthcare. It can facilitate the progression of scientific study in this domain.

CONCLUSION

In following the methodology outlined by [11], we have built upon the foundational work of prominent scholars, aiming to offer a comprehensive overview of the AI literature in healthcare. This study was conducted using a bibliometric analysis to identify authors, countries of publishing and collaboration, as well as keywords and themes. We identified a rapidly expanding, interdisciplinary study domain that is garnering a growing number of contributors. The research employs a quantitative methodology for analysing bibliometric data and a qualitative methodology for examining repeating keywords, enabling the identification of literary strands that are not exclusively positive. Current limits will impact future research possibilities, particularly in ethics, data governance, and the competences of the healthcare personnel.

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