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# Sağlıkta Yapay Zekâ Araştırmalarının Bibliyometrik Analizi

## Bibliometric Analysis of Artificial Intelligence Research in the Healthcare

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**Abstract:** Artificial intelligence (AI) has a revolutionary impact on the healthcare sector, offering innovative solutions that can lead to significant transformation. Utilizing capabilities such as machine learning, virtual health assistants, and natural language processing, robotics, and computer vision, AI technologies enable healthcare professionals to analyze extensive medical data rapidly and accurately. Algorithms driven by AI contribute to early disease diagnosis, risk assessment, and the creation of personalized treatment plans, enhancing the delivery of beneficial solutions to patients and providing more cost-effective healthcare services. In addition to clinical applications, AI shapes healthcare management through patient management, resource allocation, and predictive analytics tools. It is known that AI-supported solutions optimize healthcare services by reducing costs and improving the quality of care. The aim of this article is to elucidate the quantitative and qualitative characteristics of AI in healthcare. Methodologically, a comprehensive bibliometric analysis of academic publications related to AI in healthcare was conducted, presenting information on research and knowledge dissemination at the intersection of this critical technology and the healthcare sector's development. Between 1992 and 2023, 1966 studies indexed in Web of Science, contributed by 7460 authors, were examined. The United States emerged as the leading country in terms of the highest number of studies and citations, with IEEE Access being the leading journal. The most prolific author in this field was Yang Zang, while Diana J. Cook was the most cited author, with the article titled "Ambient intelligence: Technologies, applications, and opportunities," authored by Diana J. Cook and colleagues, being the most cited article. The most notable topics in this field were "artificial intelligence," "deep learning," "machine learning," and "COVID-19." The results indicate a significant increase in the use of AI in the healthcare sector in recent years, with this trend expected to continue growing in the coming years. Understanding current trends, major contributors, and evolving aspects of interest provides valuable practical insights for stakeholders aiming to fully leverage the potential of AI in healthcare. Considering that AI is rapidly developing, it can be predicted that its role in health will become more important by contributing to more efficient healthcare systems such as more reliable patient outcomes and increased accessibility. Possible contributions of the obtained results for studies and applications in this field, aspects that need improvement and limitations are discussed in the discussion section.

**Keywords:** Artificial Intelligence, Healthcare, Deep Learning, Machine Learning

**&**

**Öz:** Yapay zekâ (YZ), sağlık sektöründe devrim niteliğinde bir etkiye sahip olup, sektörde önemli bir dönüşüme neden olabilecek yenilikçi çözümler sunmaktadır. YZ teknolojilerinden, makine öğrenmesi, sanal sağlık asistanları, doğal dil işleme, robotik ve bilgisayar görüsü gibi imkânların kullanılması, sağlık profesyonellerine geniş kapsamlı tıbbi verileri hızlı ve doğru bir şekilde analiz etme olanağı tanır. YZ tarafından yönlendirilen algoritmalar, hastalıkların erken teşhisine, risk değerlendirmesine ve kişiselleştirilmiş tedavi planlarının oluşturulmasına katkıda bulunarak hastaya sunulacak faydalı çözümleri artırır ve daha ekonomik sağlık hizmetleri sunar. Klinik uygulamaların yanı sıra, YZ, hasta yönetimi, kaynak tahsisi ve öngörüsel analitik araçlarıyla sağlık yönetimini de şekillendirmektedir. YZ tarafından desteklenen çözümlerle sağlık hizmetlerinin optimize edilmesinin maliyetleri düşürdüğü ve bakım kalitesini artırdığı bilinmektedir. Bu makalenin amacı, sağlıkta yapay zekânın nicel ve nitel özelliklerini ortaya koymaktır. Yöntem olarak, sağlıkta YZ ile ilgili akademik yayınlara yönelik kapsamlı bir bibliyometrik analiz yapılmış ve bu kritik teknoloji ile sağlık sektörünün kesişimindeki araştırma ve bilgi yayma alanındaki gelişimle ilgili bilgi sunulmuştur. 1992-2023 yılları arasında, 7460 yazarın katkıda bulunduğu, Web of Science'ta taranan 1966 çalışma incelenmiştir. Bu alanda en çok çalışma üreten ve atıf alan ülke Amerika Birleşik Devletleri, IEEE Access lider dergi olarak bulunmuştur. En çok yayın yapan yazar Yang Zang, en çok atıf alan yazar Diana J. Cook ve en çok atıf alan makale Diana J. Cook ve arkadaşlarının yazdığı "Ambient intelligence: Technologies, applications, and opportunities" başlıklı çalışma olmuştur. Alanda en dikkat çeken konular "yapay zekâ," "derin öğrenme," "makine öğrenmesi" ve "COVID-19" olmuştur. Sonuçlar, yapay zekânın sağlık sektöründe kullanımının son yıllarda önemli ölçüde arttığını ve bu trendin önümüzdeki yıllarda da artarak devam etmesinin beklendiğini göstermektedir. Mevcut eğilimlere, başlıca katkıda bulunanlara ve ilgi alanlarının gelişen yönlerine dair bilgi sahibi olmak, sağlıkta YZ'nin potansiyelini tam anlamıyla kullanmayı amaçlayan paydaşlar için değerli pratik bilgiler sunmaktadır. YZ'nin hızla geliştiği dikkate alındığında, sağlıktaki rolünün de daha güvenilir hasta sonuçları, artan erişilebilirlik gibi daha verimli sağlık sistemleri sunulmasına katkı sağlayarak daha önemli hale geleceği öngörülebilir. Elde edilen sonuçların bu alanda yapılacak çalışmalar ve uygulamalar için olası katkıları, geliştirilmesi gereken yanları ve sınırlılıkları tartışma bölümünde ele alınmıştır.

**Anahtar Kelimeler:** Yapay Zekâ, Sağlık, Derin Öğrenme, Makine Öğrenmesi

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**İntihal-Plagiarism/Etik-Ethic:** Bu makale, en az iki hakem tarafından incelenmiş ve intihal içermediği, araştırma ve yayın etiğine uyulduğu teyit edilmiştir. / This article has been reviewed by at least two referees and it has been confirmed that it is plagiarism-free and complies with research and publication ethics. https://dergipark.org.tr/tr/pub/sabited/policy



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## Introduction

The field of healthcare is undergoing a remarkable transformation, driven by the relentless march of technological advancement. In recent years, one of the most profound catalysts for change has been the emergence of Artificial Intelligence (AI), a versatile and powerful tool that has found a fertile ground in the healthcare industry (1,2). Machine learning, natural language processing, robotics, virtual health assistants, and computer vision are among the most significant AI technologies. These technologies has opened new frontiers in healthcare, enabling healthcare professionals to tackle the ever-growing complexity and scale of medical data with unprecedented speed and accuracy (3). By harnessing AI-driven algorithms, early disease detection (4,5), precise risk assessment (6,7), and personalized treatment plans (8,9) have become not only conceivable but increasingly achievable, ultimately leading to better patient outcomes and the cost-effective delivery of healthcare services (10,11).

Beyond the clinical realm, AI is now extending its reach into the administrative facets of healthcare. With its sophisticated tools for patient management (12,13), resource allocation (14), and predictive analytics (15,16), AI is reshaping the very foundation of healthcare administration. The outcomes are clear: reduced operational costs and enhanced care quality, making it a win-win proposition for both healthcare providers and the patients they serve.

While the potential benefits of AI in healthcare are vast, realizing its full potential necessitates a thoughtful and responsible approach to its implementation. Addressing concerns such as data privacy, bias mitigation, and the development of appropriate regulatory frameworks is essential in ensuring the ethical and equitable application of AI in this critical domain (17). Bibliometric analyses arise as a potential opportunity. Bibliometric analysis is a powerful quantitative method used to analyze academic literature, scholarly publications, and other forms of written information (18).

Bibliometric analyses serve as robust statistical instruments facilitating both quantitative and qualitative assessments of articles, guiding researchers in their scholarly endeavors (19). These analyses offer the opportunity to investigate the performance of articles and journals, discern research trends, and uncover the specific intellectual framework within the existing literature (19). Essentially, bibliometric analysis permits the evaluation of the literature corpus pertaining to a particular subject (20). Such assessments are crucial for countries and universities to develop evidence-based policies (21). Within the bibliometric analysis process, the performance of research components is the focus of performance analysis, while the interconnections between these components become the subject of scientific mapping (22).

The purpose of this article is to conduct a bibliometric analysis of artificial intelligence applications used in the field of health. Within this scope, the article has two research questions: (i) What are the quantitative characteristics of AI applications in the field of health? (ii) What are the qualitative features of AI applications used in the field of health?

## Materials and Methods

### Research Design

This study adopts a bibliometric research design. In the course of this study, the guide developed by Donthu and his colleagues was employed (18).

### Study Population

The research was conducted using secondary data obtained from the Web of Science (WOS) database. The universe of the study was defined by studies that jointly encompass the topics of AI and healthcare in computer engineering (N=1966). No restrictions were placed on the publication type, and all studies published in the English language were included in the research.

### Data Collection

Data collection for this study involved accessing the Web of Science (WOS) database in April 2023. The data retrieval process was not constrained by time, ensuring a comprehensive representation of the available literature. The search was conducted using a set of English keywords, namely "artificial intelligence and health and computer engineering." This strategy yielded a total of 2529 publications that

fell within the scope of the research. Of these, 563 publications in the Chinese language were subsequently excluded (n=563). The final dataset, comprising 1966 publications (N=1966), was established for analysis.

In the data collection phase, all pertinent data extracted from the Web of Science (WOS) database were initially acquired in BibTeX format, which facilitates structured data handling. Following this, the dataset was seamlessly imported into the Bibliyoshiny program, an extension seamlessly integrated into the R programming environment. Rigorous inclusion criteria were applied to ensure the dataset's relevance to the research objectives, leading to the exclusion of irrelevant publications. Additionally, synonymous keywords were consolidated into meaningful categories (i: artificial intelligence; artificial, intelligence, artificial intelligence (ai), learning (artificial intelligence), ii: deep learning; deep, iii: machine learning, machine). Once the data was refined, the formal analysis process was initiated.

Data Analysis

The data analysis process employed the open-access R program (R 4.2.2.) (23) and the Biblioshiny interface within the Bibliometrix tool (24). The R package and Bibliometrix tool are recommended for conducting comprehensive scientific mapping analyses (25). Throughout the entire data analysis process, "author's keywords" were utilized, and details are presented in four fundamental sections.

*Fundamental Information:* In the process of data analysis, fundamental information about the relevant publications was presented, and the analyses were presented in numerical, percentage, or proportional values.

*Treemap Analysis:* The treemap analysis is a technique that condenses a dataset to its most frequently occurring terms, offering insights into the boundaries of the subject (26). In this analysis, words within the dataset are ranked by their frequency of occurrence (26).

*Trend Topics:* Trend topics reveal the distribution of subject-specific themes over the years. The size of the lines represents the time span during which the respective theme appeared in publications, while the position of the circles indicates the median year, and the size signifies the frequency of keyword usage (26).

*Thematic Mapping:* The thematic mapping analysis provides insights into the conceptual and intellectual framework of the field (27). In the thematic map, each node represents a cluster of terms, with node names representing the words belonging to the cluster and higher-order network connections. The size of the nodes is determined by the number of publications containing the keyword. The position of the node is based on cluster centrality and density (26).

In the interpretation of the analysis, some fundamental concepts are important to understand. Two of these concepts are centrality and density, which are denoted by the intersection of horizontal and vertical lines on a plane, creating four areas named as the "motor themes," "basic themes," "niche themes," and "Emerging or declining themes" (18,19,28).

- Centrality: Centrality is an indicator of a theme's relevance and serves as a measure of its external alignment with other studies. The stronger the centrality, the more significant the theme is considered for the research area.
- Density: Density is an indicator of a theme's development and serves as a measure of its internal coherence. The stronger the density, the more consistent and integrated the theme is within the research domain.
- Motor Themes: Positioned in the top right quadrant, the motor theme is characterized by high centrality and high density. It is considered to represent advanced and vital themes within the research field.
- Basic Themes: Located in the bottom right quadrant, the core theme is characterized by high centrality and low density. It indicates themes that continue to evolve within the research area.
- Niche Themes: Positioned in the top left quadrant, the niche theme is characterized by low centrality and high density. It signifies that the research area contains developed yet isolated themes.

- Emerging or declining themes: Found in the bottom left quadrant, the disappearing or emerging theme is characterized by low centrality and low density. It suggests that the research area includes new or less discussed themes.

**Results**

The 1966 publications included in this study (N=1966) span the years 1992 to 2023, with an average publication age of 4.45 years. These publications have been contributed by 7460 authors, and each publication has an average of 11.45 citations, reflecting their impact on the field (Table 1). The bibliometric analysis highlights the exponential growth of publications related to AI in healthcare over the past three decades (Figure 1). Since the data was collected at April 2023, there is a sharp drop for 2023 in Figure 1 because of incompleteness.

The top 10 most productive countries' publication outputs, along with their total citations, are illustrated in Table 1. The United States of America (20%) is the leading country in terms of the highest number of publications, followed by China (17%) and India (7%). The top 5 productive countries collectively contributed 1060 documents, representing more than half of all publications (54%). In addition to being the most productive contributor, the United States received the highest citation scores, followed by China and the United Kingdom.

The journals with the most publications related to the subject are IEEE Access, Artificial Intelligence in Medicine, IEEE Journal of Biomedical and Health Informatics respectively, as shown in Table 1.

**Table 1.** Numerical values about the relevant publications.

| Parameters | Values |
|---|---|
| **Data (n)** | |
| Number of Sources | 761 |
| Number of Documents | 1966 |
| Time interval of Publications | 1992-2023 |
| The average age of publications | 4.45 |
| Annual growth rate of publications (%) | % 16.41 |
| **Authors (n)** | |
| Number of authors | 7460 |
| **Content of the publications (n)** | |
| The number of keywords used in publications | 5607 |
| Number of references used in publications | 71926 |
| **Publication Type (n)** | |
| Article | 859 |
| Review | 87 |
| Proceedings paper | 990 |
| Book chapter | 13 |
| Editorial material | 17 |
| **The top five countries of the responsible author with the number of publications (n)** | |
| United States of America | 389 |
| China | 339 |
| India | 144 |
| England | 104 |
| Korea | 84 |
| **The top five journals with the number of publications (n)** | |
| IEEE Access | 157 |
| Artificial Intelligence in Medicine | 77 |
| IEEE Journal of Biomedical and Health Informatics | 71 |
| Electronics | 54 |
| Engineering Applications of Artificial Intelligence | 39 |
| **Citations (Mean)** | |
| Average citation per publication | 11.45 |
| **The top five countries of the responsible author with the number of citations (n)** | |
| United States of America | 6118 |
| China | 3896 |
| United Kingdom | 1424 |
| Australia | 1123 |
| India | 1086 |

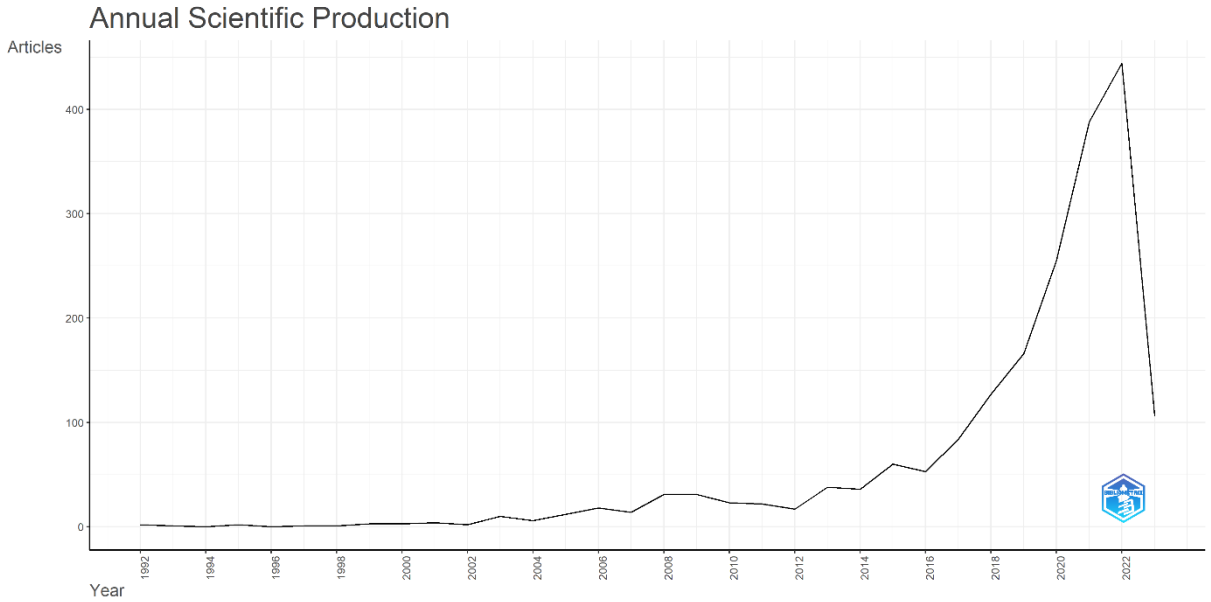


**Figure 1.** The annual scientific production in between 1993-2023.

Among the 7460 authors examined, the majority (4474) contributed just one article each. The top 10 most productive authors with citations are listed in Table 2. Additionally, it is noteworthy that 897 authors received only one citation, while 4555 received multiple citations, underscoring their significant impact in the field. Notably, despite authoring 24 articles, Yang Zhang accrued only 142 citations. In contrast, Diane J. Cook, involved in only 3 publications, one of which was the highest influential paper, accumulated the highest number of citations (n=809). This highlights the non-linear relationship between publication frequency and scholarly impact within this field. Despite Cook's limited number of studies, she received the highest number of citations, indicating the complex dynamics at play in determining scholarly influence.

**Table 2.** Author Impact.

| Author | Publication | Citation |
|---|---|---|
| **ZHANG Y** | 24 | 142 |
| **LIU Y** | 23 | 150 |
| **WANG Y** | 22 | 249 |
| **WANG J** | 20 | 155 |
| **CHEN H** | 19 | 748 |
| **ZHANG J** | 19 | 186 |
| **LIU J** | 18 | 112 |
| **LI X** | 17 | 238 |
| **WANG X** | 16 | 747 |
| **ZHANG X** | 16 | 247 |

Additionally, we conducted an author collaboration network analysis, as depicted in Figure 2, to illustrate the cooperative relationships among the top 50 authors. In the visualization, the size of each node indicates the level of engagement in collaboration by each author, while the edges represent the number of connections between authors. The collaboration network visual reveals five distinct clusters of authors. Authors with more frequent connections, who engage in extensive collaboration, tend to produce more academic work. This is evidenced by the fact that the top ten productive authors are also among the top 50 collaborators. For instance, Y. Zhang emerges as the primary collaborator in one cluster and the most prolific author in our dataset. It was also examined whether there were any discernible patterns in the co-citation relationships among authors. However, due to the large number of authors included in our analysis and the fact that many of their co-citation relationships extended beyond our specific field or community, the analysis yielded results that were not meaningful.

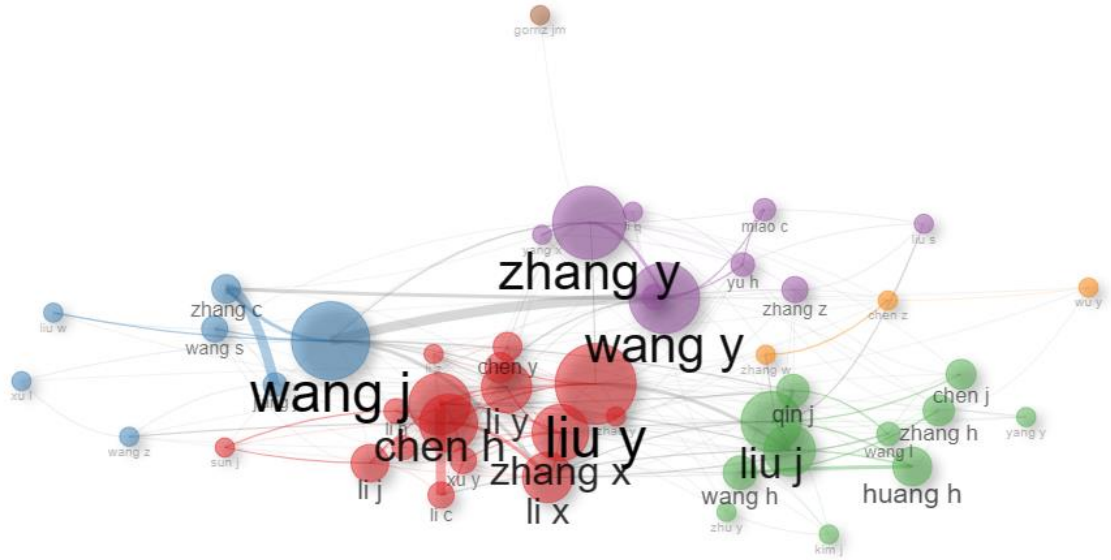


**Figure 2.** Top 50 authors collaboration network.

When examining the treemap in this study, the top 25 keywords were included in the word cloud. The prominent keywords are "artificial intelligence" (n=369, %21), "deep learning" (n=256, %14), and "machine learning" (n=243, %14). These keywords are followed by "COVID-19" (n=131, %7) (Figure 3).

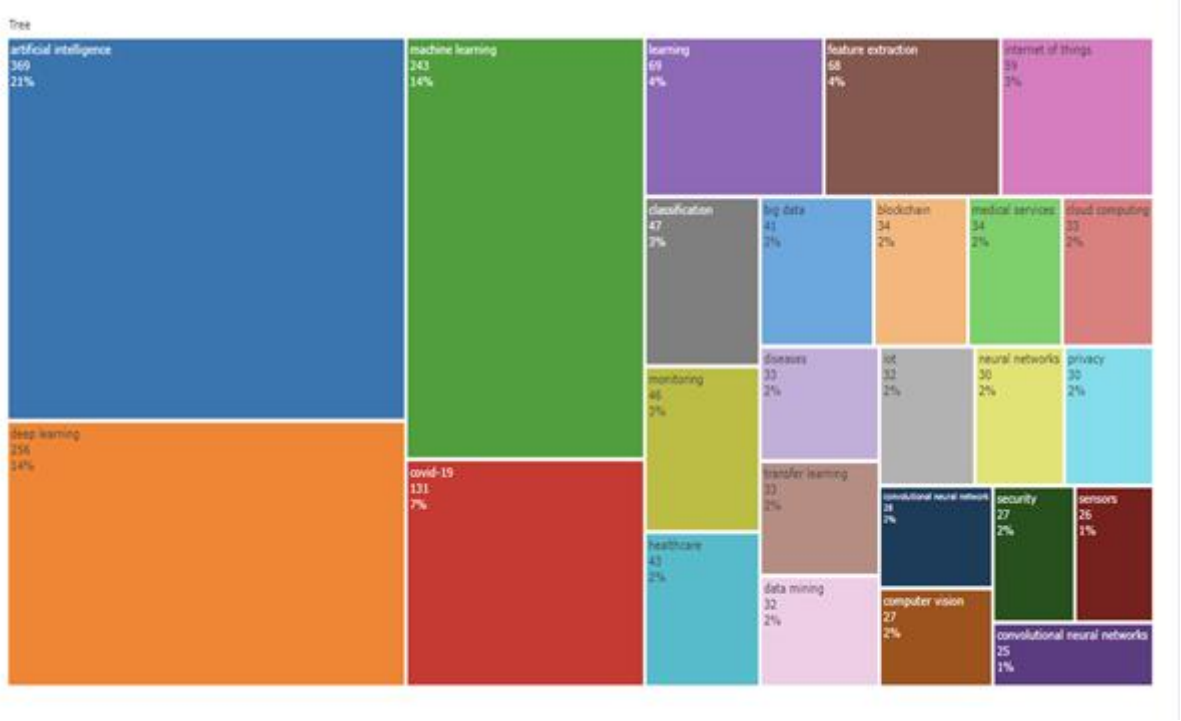


**Figure 3.** Author's keywords treemap.

In the early years of AI research in healthcare, from the early 1990s to the early 2000s, there was a modest yet steady increase in publications. During this period, research primarily focused on foundational concepts and initial applications of AI technologies in healthcare settings. The emphasis was on exploring the potential of AI in assisting clinical decision-making processes and optimizing healthcare delivery. The late 2000s witnessed a significant surge in AI research in healthcare, marked by advancements in machine learning algorithms, natural language processing techniques, and the emergence of deep learning methodologies. This period saw a proliferation of studies exploring the capabilities of AI in disease diagnosis, risk prediction, and personalized treatment strategies. Additionally, the integration of AI-powered tools and platforms into healthcare systems gained momentum, facilitating more efficient patient management and resource allocation. In recent years, from the 2010s to the early 2020s, AI applications in

healthcare have continued to evolve rapidly, driven by the convergence of technological innovation, increasing data availability, and growing interdisciplinary collaborations. Notably, the COVID-19 pandemic has acted as a catalyst for accelerated adoption of AI solutions in healthcare, particularly in areas such as epidemiological modeling, drug discovery, and remote patient monitoring.

For the trend topic analysis in this study, a minimum word frequency of five and a minimum number of words per year of three were considered. Findings from the trend topics analysis over the past five years reveals that "artificial intelligence" has been the most frequent theme, and "feature selection" and "medicine" have been the themes studied for the longest duration. The trend topics in the past year include "deep learning" and "blockchain" (Figure 4).

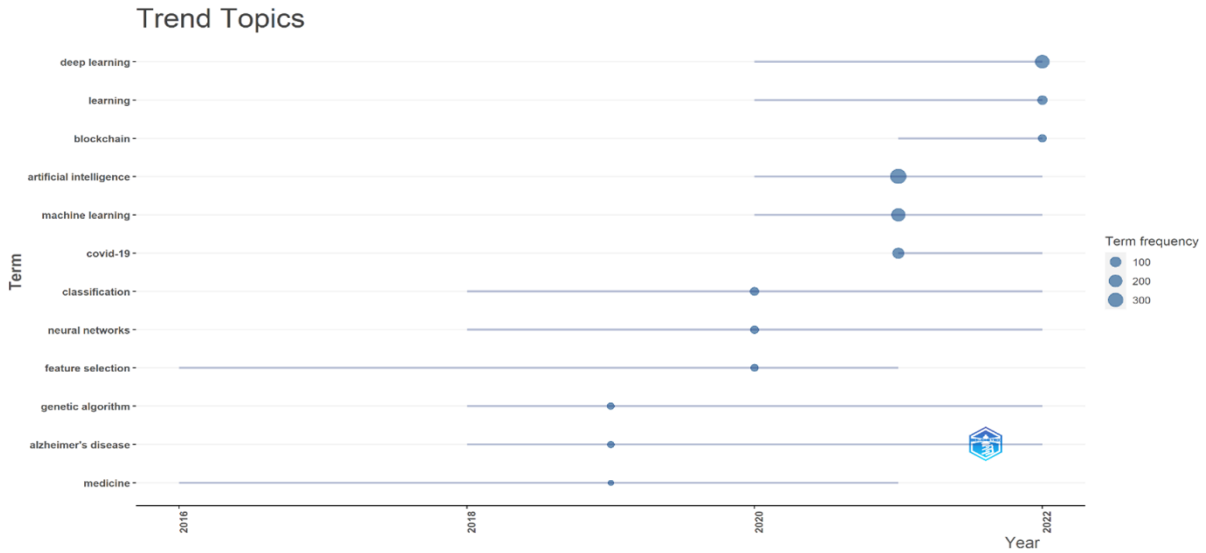


**Figure 4.** Trend topics analysis over the past five years.

In this study, thematic analysis involved the use of 250 keywords and the Walktrap algorithm. A minimum cluster frequency of five and a level number of three were set for each cluster. Based on the thematic map, the field is influenced by two clusters of themes (motor themes). These are the cluster characterized by higher centrality, including "deep learning," "feature extraction," and "classification," and the cluster characterized by higher density, including "internet of things," "healthcare," and "monitoring." The themes that continue to evolve within the field (basic theme) are "artificial intelligence," "machine learning," and "COVID-19." The "rehabilitation" theme has developed but remains somewhat isolated (niche theme). The Emerging or declining themes include "eeg," "brain-computer interface," and "electroencephalography" (Figure 5).

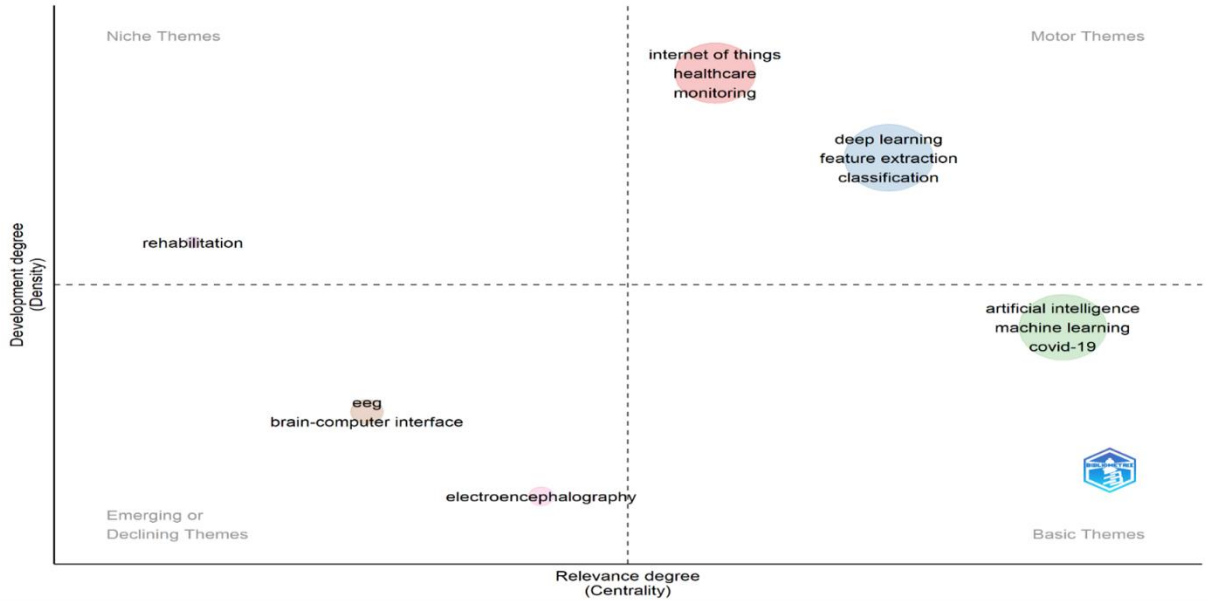


**Figure 5.** Thematic map.

## Discussion

This study evaluated the quantitative and qualitative bibliometrics of Artificial Intelligence studies on healthcare. The results of the quantitative evaluation revealed that artificial intelligence publications in healthcare have a history of 30 years, the number of studies was limited at the beginning but increasing in recent years, the average age was small, the annual growth rate was low and but increasing recently, the most influential country was the USA, and the most influential journal was IEEE Access. Qualitative evaluation results indicated that studies mostly focused on "deep learning" and "machine learning" as AI tools, studies on "COVID-19" shows how fast AI tools integrated healthcare solutions.

The findings presented in this paper underscore the transformative impact of artificial intelligence (AI) on the healthcare sector. The integration of AI technologies, including machine learning, robotics, virtual assistants, natural language processing, predictive analytics and computer vision, has ushered in a new era of possibilities for healthcare professionals (29). The implications of AI in healthcare are profound, with applications ranging from clinical decision support to administrative efficiency enhancements (30).

The steady increase in the number of publications, with an average age of 4.45 years, demonstrates the dynamic nature of research in this domain. This evolution signifies the growing interest and recognition of AI's potential to address complex healthcare challenges (31,32). However, the significant concentration of knowledge production in certain countries highlights the uneven distribution of expertise within this field.

The identification of key themes through treemap analysis provides a snapshot of the most discussed topics in AI in healthcare research. The use of "Artificial Intelligence" as a keyword in this research implies an expected high frequency of occurrence. Despite the numerous tools available within the realm of Artificial Intelligence, the fact that "deep learning" and "machine learning" rank second and third highlights the rapid integration and utilization of these two methods in the field of healthcare. One of the most noteworthy findings here is the relationship between COVID-19 and Artificial Intelligence. The emergence of this new disease in our lives in just the past few years underscores the critical importance of using Artificial Intelligence as a solution tool in the treatment, management, and observation of the effects of COVID-19. The integration of AI in addressing the challenges posed by this recent health crisis demonstrates its potential in contributing to advancements in healthcare practices. This aligns with the broader trend of leveraging AI techniques, particularly deep learning and machine learning, to enhance our understanding and management of complex medical situations. The results of this study suggest a significant role for Artificial Intelligence, particularly in the context of health-related applications, and emphasize the ongoing evolution of its impact on our approach to medical challenges (33).

The trend topics analysis reveals the longevity and consistent relevance of certain themes, such as "feature selection" and "medicine." The identification of emerging themes like "deep learning" and "blockchain" suggests the evolving nature of research priorities. The continuous exploration of these themes underscores the dynamic nature of AI applications in healthcare, adapting to technological advancements and emerging challenges (34).

Thematic mapping offers a deeper understanding of the intellectual structure of AI in healthcare research (35). The presence of motor themes with high centrality and density, such as "deep learning," "feature extraction," and "classification," indicates the core pillars shaping the field. These themes represent established areas with significant impact and internal coherence. The basic themes, including "artificial intelligence," "machine learning," and "COVID-19," continue to evolve, showcasing sustained research interest. The presence of niche themes like "rehabilitation" highlights specialized areas that, while isolated, contribute to the diversity of research endeavors. The identification of Emerging or declining themes like "eeg" and "brain-computer interface" signals potential areas of exploration and innovation.

These findings provide a comprehensive overview of the dynamics and key themes in the field of AI in healthcare, shedding light on the development and trends over time. The insights gained from this analysis contribute to a better understanding of the research landscape in this domain.

While the findings celebrate the advancements in AI in healthcare research, it is crucial to acknowledge the challenges associated with its implementation (36). Ethical considerations, data privacy, and bias

mitigation remain critical concerns. The responsible development and deployment of AI solutions demand interdisciplinary collaboration, involving healthcare professionals, technologists, ethicists, and policymakers. The insights gained from this bibliometric analysis pave the way for future research directions and strategic planning. The identified themes and trends provide a roadmap for researchers, policymakers, and industry stakeholders to align their efforts with the evolving landscape of AI in healthcare. Collaborative initiatives, both nationally and internationally, can further propel the field towards innovative solutions and improved healthcare outcomes (37,38).

**Limitations**

This study is subject to several limitations that warrant consideration. Firstly, the results of the study are constrained by the time frame in which the literature search was conducted. Different time frames for literature searches may yield varying research outcomes. The second limitation pertains to the fact that the literature search was conducted within the "Web of Science Core Collection" database, which means that only studies indexed in WOS were analyzed. Furthermore, the search was limited to journals falling within the "computer engineering" category, representing the third limitation of this study. As a result, relevant studies in other categories may not have been included in the analysis. The final limitation of the study stems from the selection of English keywords, which means that the search only encompassed publications published in English. Different keyword selections in other languages may yield divergent results. These limitations underscore the need for caution when interpreting and generalizing the findings, as they reflect a subset of the available literature. Future research could address these limitations by conducting searches over different time frames, databases, and languages to provide a more comprehensive view of the subject matter. Moreover, future research could also consider multidisciplinary collaboration as a means to enrich the analytical framework and enhance data interpretation. By involving researchers from diverse backgrounds, including computer science, medicine, public health, and ethics, studies can leverage a broader range of expertise and perspectives to gain a more holistic understanding of the complex dynamics shaping AI applications in healthcare.

**Conclusion**

The bibliometric analysis of artificial intelligence literature in healthcare revealed noteworthy qualitative and quantitative findings. Initially, there was a minimal number of publications in the early years of AI, but a substantial exponential growth occurred in recent years. The studies were geographically clustered by countries and journals, signaling a global surge in AI and healthcare-related publications. This underscores the importance of enhanced collaboration among countries and authors to foster continued growth. Additionally, specific subject areas requiring further exploration were identified. Acknowledging and incorporating these results into future research endeavors can be instrumental in positively influencing the advancement of scientific literature in the field.

In conclusion, this exhaustive bibliometric analysis offers a comprehensive perspective on the developing panorama of artificial intelligence in the healthcare sector. The results of this analysis indicate that Artificial Intelligence has been effectively used in various areas of the healthcare sector in recent years. The exponential growth in publications, global collaboration, and the identification of key themes and trends collectively underscore the transformative potential of AI in reshaping healthcare. As researchers continue to explore new frontiers and address emerging challenges, the integration of AI technologies holds the promise of ushering in a new era of healthcare characterized by enhanced patient outcomes, increased accessibility, and more efficient healthcare systems. This analysis serves as a valuable resource for stakeholders navigating the complex intersection of technology and medicine, guiding them in harnessing the full potential of AI for the betterment of healthcare worldwide.

**Ethical Statement:** In the context of this study, since secondary data available through open access were used, no ethical committee approval or institutional permission was obtained. This article has been scanned by iTenticate. No plagiarism detected.
**Authors Contributions:** The corresponding author has carried out all stages of the article on his own.
**Peer Review:** External independent.
**Conflict of Interest:** There is no Conflict of Interest related to study.
**Financial support:** None.
**Other Declarations:** None.

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