

# Artificial Intelligence diagnostics as Hospital's flagship service

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**Abstract.** This article presents the results of a bibliometric analysis of artificial intelligence diagnostics studies that made use of the VOSviewer database and Scopus-indexed articles. The paper delves into various aspects from 2010 to 2023. Data was collected by doing searches in the Scopus database using appropriate keywords, such as “information technology” and “artificial intelligence” and “health care”. Subsequently, the collected dataset underwent meticulous analysis and visualization using the VOSviewer software. The most fruitful affiliation or institutional source for artificial intelligence diagnostics is Harvard Medical School. The writers with the most are Abelha, A. and Machado, J. The United States is the nation that produces the greatest amount of scientific articles related to artificial intelligence diagnostics. The most important journal for artificial intelligence diagnostics is International Journal of Medical Informatics. The most common subjects in artificial intelligence diagnostics is medicine. With ninety-five publications, the number of international scholarly publications on artificial intelligence diagnostics reached a peak in 2023. Sixty-nine writers are closely associated with the ownership of two or more documents. There are 388 keywords with strong relationships by selecting with a minimum of 5 occurrences. The findings provide valuable insights into the dynamics and characteristics of artificial intelligence diagnostics research.

## 1 Introduction

In order to meet the needs of aging and varied populations, substantial backlogs in diagnostics, and persistent shortages in the global health and care workforce, modern health systems must integrate artificial intelligence [1]. However, there are still issues with how artificial intelligence technologies are built, how to ensure their performance and safety while in use, and how to evaluate their effects on patients and staff when put into practice. [2] A major issue impeding the effective application of AI technology is the ongoing emphasis on the technology in a vacuum, which is inconsistent with the realities of intricate health and care systems [3]. The failure of this technology-centric approach to support diagnosis and treatment, for instance, might be used to highlight the drawbacks of this approach. [4] The challenge of the last mile refers to the difficulties in converting effective retrospective

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evaluation of artificial intelligence into practical clinical practice. [5] One could argue that the difficulty of the final mile—that is, the realities of intricate clinical systems—must be taken into account early on in the design process of artificial intelligence and, more broadly, digital health technology [6]. Digital health technology design must be grounded on a systems approach [6]. A systems approach takes into account how technology works within the larger clinical system, where interactions with people, other IT systems, the physical environment, and the structure of administrative and clinical processes all play a role in success. [7,8] Artificial Intelligence (AI) has significant potential in the field of medicine to contribute towards the achievement of the five primary goals of healthcare. [9] AI-powered computer systems are capable of executing activities that often necessitate human cognitive abilities, including visual perception, pattern identification, speech recognition, fast data comparisons and projections, language translation, and decision-making among predefined choices [10]. AI-based clinical decision support (AI-CDS) systems utilize artificial intelligence to assist healthcare professionals in making clinical decisions [11]. This includes tasks such as analyzing medical images, making diagnoses, recommending treatment plans, and identifying significant deviations in vital signs. These systems also play a role in shared decision making with patients. Traditional clinical decision support (CDS) relies on encoded human expertise or authoritative clinical guidelines, while AI-CDS use statistical computations or pattern recognition instead of evidence synthesis. [12] Our research aligns with one of the objectives. Assuring healthy lives and enhancing prosperity for all, at all ages, is the aim of fostering inclusive and sustainable industrialization, fostering innovation, and constructing resilient infrastructure (SDGs). There are numerous things that may be done to map research collaborations across nations that can support one another in order to accomplish this goal. Therefore, part of the strategy to accomplish the SDGs is the research we conduct [13].

While AI-CDS has a lengthy past, there has been a significant surge in interest in AI in medicine in recent years [14]. This renewed interest has been driven by advancements in deep learning and the improved computational capabilities available [15]. This has been accompanied by substantial governmental and commercial sector investment in the development and implementation of AI-based technologies. Although there has been a significant increase in commercialization, there is still a lack of concrete proof supporting the promises of enhanced patient outcomes, healthcare efficacy, and efficiency. Furthermore, the assessment of AI-CDS has primarily concentrated on showcasing the effectiveness of systems in controlled laboratory or trial deployment environments, [16] as well as evaluating the instant results achieved. [6] The current approach fails to adequately consider the long-term effects, potential drawbacks, and unexpected outcomes such as loss of skills, potential rise in unneeded referrals or testing, and prejudice against certain groups or conditions [17]. To facilitate evidence-based decision making on the selection and deployment of AI-based systems, it is necessary to examine and expand upon existing frameworks and criteria for assessing the introduction of AI-CDS in routine healthcare use [18]. This should be closely aligned with a greater focus on the significance of evidence-based systems and policy [19].

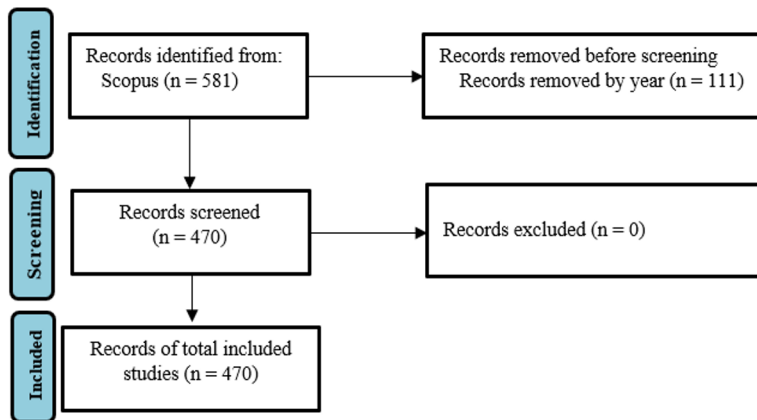
## **2 Material and Methods**

The study's methodology included bibliometric analysis and quantitative descriptive methods. Scientific articles review information technology, artificial intelligence and health care serve as the data source for the research [20]. Scopus was intentionally chosen because of its high quality and well-respected status among academic institutions around the world. Furthermore, Scopus offers aggregate data that demonstrate the impact of a journal or institution on the global scientific publication landscape [21]. This is predicated on the hierarchical structure of citations to and from journal publications and institutional research

papers. [22] Scopus database ([www.scopus.com](http://www.scopus.com)) data on information technology, artificial intelligence and health care from worldwide publications is used in this study. Scopus searches with the terms “information technology” and “artificial intelligence” and “health care” in the title, abstract, and keywords sections of articles published between 2010 and 2023 were used to gather the data. Researchers set out to investigate patterns in research development, core journals, researcher productivity and collaboration, publication growth by institution or affiliation, and the number of publications by nation after retrieving search results from the Scopus database [23]. The information collected in the current research is analyzed using a combination of qualitative and descriptive methodologies [24]. To begin analyzing information using the Scopus database, go to the analyze menu. The researchers obtained data and analyzed statistics in JPEG format as a result of using the menu. There is secondary data accessible in Scopus's CSV format as well. The researchers also utilized Excel and VOSviewer for data processing [25].

### 3 Results and Discussion

Figure 1 shows the total number of 470 documents collected from the Scopus database between 2010 and 2023 that deal with information technology, artificial intelligence and health care.



**Fig. 1.** Publication selection in Scopus

#### 3.1 Number of Scientific Publications on Artificial Intelligence Diagnostics by Affiliation/Institution

Research findings on artificial intelligence diagnostics are published by 10 affiliates/institutions.

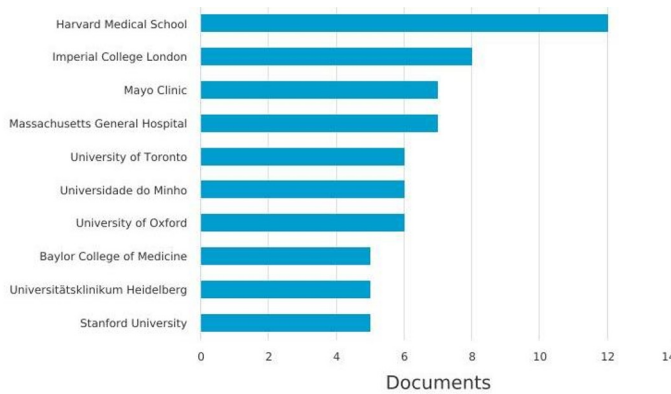
The most active affiliates and institutions in terms of artificial intelligence diagnostics related scientific publications are listed in Table 1 as follows: Harvard Medical School have done 12 publications, Imperial College London have done 8 publications, Mayo Clinic have done 7 publications, Massachusetts General Hospital have done 7 publications, University of Toronto have done 6 publications, Universidade do Minho have done 6 publications, University of Oxford have done 6 publications, Baylor College of Medicine have done 5 publications, Universitätsklinikum Heidelberg have done 5 publications and Stanford

University have done 5 publications. Figure 2 shows the associations and organizations that disseminate productive research findings on artificial intelligence diagnostics.

**Table 1.** Affiliates/Institutions that are Productive in Scientific Publications on Artificial Intelligence Diagnostics

Affiliation/Institution Name	Number of Publications
Harvard Medical School	12
Imperial College London	8
Mayo Clinic	7
Massachusetts General Hospital	7
University of Toronto	6
Universidade do Minho	6
University of Oxford	6
Baylor College of Medicine	5
Universitätsklinikum Heidelberg	5
Stanford University	5

Source: Secondary data processed, 2024



**Fig. 2.** Affiliates/Institutions that are Productive in Publishing Research Results About Artificial Intelligence Diagnostics. Source: Scopus.com (2024).

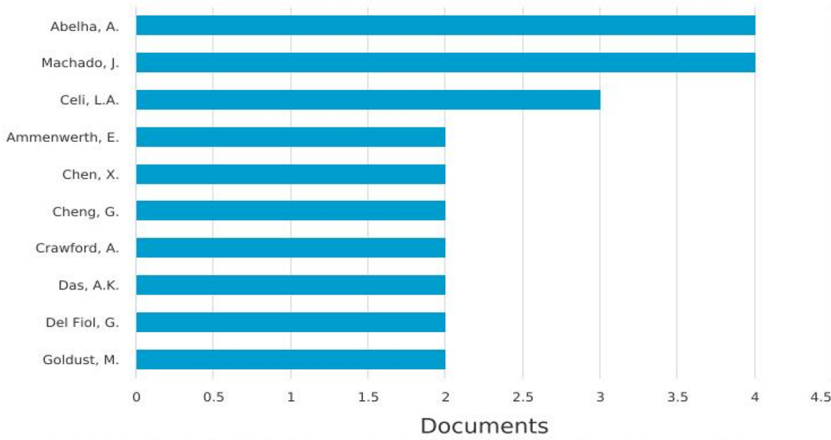
### 3.2 Number of Productive Researchers Conducting Scientific Publications on Artificial Intelligence Diagnostics

There are a total of ten researchers who demonstrate high productivity in disseminating research findings related to artificial intelligence diagnostics.

**Table 2.** Number of Productive Researchers with Scientific Publications on Artificial Intelligence Diagnostics

Researcher Name	Number of Publications
Abelha, A.	4
Machado, J.	4
Celi, L.A.	3
Ammenwerth, E.	2
Chen, X.	2
Cheng, G.	2
Crawford, A.	2
Das, A.K.	2
Del Fiol, G.	2
Goldust, M.	2

Abelha, A. and Machado, J. have done 4 publications each. Celi, L.A. have done 3 publications. Ammenwerth, E., Chen, X., Cheng, G., Crawford, A., Das, A.K., Del Fiol, G. and Goldust, M. have done 2 publications each. The number of productive researchers who have written in scientific publications on artificial intelligence diagnostics is more accurately represented in Figure 3.



**Fig. 3.** Number of Productive Researchers with Scientific Publications on Artificial Intelligence Diagnostics Source: Scopus.com (2024)

### 3.3 Number of Scientific Publications on Artificial Intelligence Diagnostics by Country

Ten nations are particularly active in the publication of research findings pertaining to artificial intelligence diagnostics.

**Table 3.** Countries that are Productive in Scientific Publication on Artificial Intelligence Diagnostics

Country	Number of Publications
United States	138
India	52
United Kingdom	51
China	43
Germany	28
Australia	18
Taiwan	15
Russian	14
Canada	13
France	13

Source: Secondary data processed, 2024

With 138 publications, the United States ranks first, followed by India (52), United Kingdom (51 publications), China (43 publications), Germany (28 publications), Australia (18 publications), Taiwan (15 publications), Russian (14 publications), Canada (13 publications), and France (13 publications) in terms of artificial intelligence diagnostics scientific output. In Figure 4, the nations with the highest number of published artificial intelligence diagnostics research are highlighted.(Supplementary Figure 1).

### 3.4 Core Journal of Scientific Publications on Artificial Intelligence Diagnostics

Table 4 shows the order of the five journals with the highest number of publications, namely

**Table 4.** Scientific Journal Publications on Artificial Intelligence Diagnostics

Journal Name	Number of publications
International Journal Of Medical Informatics	12
Studies In Health Technology And Informatics	12
Journal Of Medical Internet Research	11
International Journal Of Environmental Research And Public Health	10
Lancet	6

Source: Secondary data processed, 2024

There are a total of twelve publications in the International Journal of Medical Informatics, twelve in Studies in Health Technology and Informatics, eleven in Journal of Medical Internet Research, ten in International Journal of Environmental Research and Public Health, and six in Lancet, according to Table 4. Supplementary Figure 2 clearly displays the publications on artificial intelligence diagnostics that have been published in scholarly journals.

### 3.5 Number of Scientific Publications on Artificial Intelligence Diagnostics by Subject

There are ten subjects with the highest order:

**Table 5.** Subjects of Scientific Publications on Artificial Intelligence Diagnostics

Subject	Number of Publications
Medicine	248
Computer Science	149
Engineering	99
Health Professions	52
Social Sciences	32
Biochemistry, Genetics and Molecular Biology	30
Decision Sciences	29
Mathematics	27
Nursing	15
Business, Management and Accounting	14

Source: Secondary data processed, 2024

According to Table 5, the following fields have the most scientific articles published on artificial intelligence diagnostics: Medicine (248), Computer Science (149), Engineering (99), Health Professions (52), Social Sciences (32), Biochemistry, Genetics and Molecular Biology (30), Decision Sciences (29), Mathematics (27), Nursing (15), and Business, Management and Accounting (14). Supplementary Figure 3 provides a more discernible breakdown of the number of scholarly articles on artificial intelligence diagnostics by subject.

### 3.6 The Trend of Scientific Publications on Artificial Intelligence Diagnostics

**Table 6.** The trend of Scientific Publications on Artificial Intelligence Diagnostics

Year of Publication	Number of Publications	Percentage (%)
2010	10	2.13%
2011	9	1.91%
2012	9	1.91%
2013	11	2.34%
2014	18	3.83%
2015	7	1.49%
2016	9	1.91%
2017	12	2.55%
2018	24	5.11%
2019	42	8.94%
2020	55	11.70%
2021	87	18.51%
2022	82	17.45%
2023	95	20.21%
Total	470	100.00%

Source: Secondary data processed, 2024

In 2023, artificial intelligence diagnostics had the most scholarly papers indexed on Scopus, with a total of 95 publications (20.21%). Here is a breakdown of the number of publications organized by year: With 87 publications in 2021, 82 in 2022, 55 in 2020, 42 in 2019, 24 in 2018, 18 in 2014, 12 in 2017, 11 in 2013, 10 in 2010, 9 in 2011, 9 in 2012, 9 in 2016 and 7 in 2015.

### 3.7 Author Collaboration Analysis

Since cooperation in research is greatly desired, agencies and researchers must work together to share ideas, funding, facilities, infrastructure, and chances for the exchange of scientific information and methodologies. [26] This study found 1687 authors, while the authors who had a strong relationship with at least 2 document ownership were 69.

### 3.8 Keyword Analysis

In this study, we analyzed 4334 terms and narrowed them down to 388 with strong relationships by selecting those with a minimum of 5 occurrences. Artificial Intelligence Diagnostics appears most frequently in the author's work. We can see how four clusters were formed from search results using the phrase in the development map of artificial intelligence diagnostics research papers indexed in the Scopus database from 2010 to 2023. There are 112 red keywords in Cluster 1, 85 green keywords in Cluster 2, 74 blue keywords in Cluster 3, 66 yellow keywords in Cluster 4, 38 purple keywords in Cluster 5 and 13 light blue in Cluster 6. You can see the keyword density in VOSviewer's density visualization. There appears to have been a lot of research on the issue, as shown by the increasing keyword density. Conversely, new research can be possible in an area with a low density.

## 4 Conclusion

The findings provide valuable insights into the dynamics and characteristics of artificial intelligence diagnostics research and provide a solid foundation for further research in this domain.

### Acknowledgment

Everyone who helped the writers with the essay's drafting and editing deserves an expression of gratitude from the writers.

### Fundings

No Author(s) received funding.

### Data availability statement

Data will be made available on request.

### Declaration of competing interest

The authors disclose no conflict.

### Author contribution statement

*Riat El Khair* and *Qurratul Aini* conceived and designed the study. *Riat El Khair* and *Qurratul Aini* performed the computational analysis. *Riat El Khair* and *Qurratul Aini* wrote the manuscript. *Riat El Khair* provided the funding. *Riat El Khair* and *Qurratul Aini* revised the manuscript. All authors have read and approved the manuscript and have made significant contributions to this study.

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