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Global Insights a Bibliometric Analysis of Artificial Intelligence Applications in Rehabilitation Worldwide

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ABSTRACT

Background: Rehabilitation plays a vital role in helping patients recover functionality after illness or injury. However, challenges remain in providing customized, accessible rehabilitation services. Artificial Intelligence (AI) techniques like machine learning are emerging as promising tools to enhance rehabilitation. This study aimed to conduct a bibliometric analysis to synthesize global growth trends, research foci, and collaborative patterns in AI rehabilitation research.

Methods: A systematic literature search was performed in Scopus and Web of Science databases to retrieve peer-reviewed publications on AI in rehabilitation from 2000-2022. Articles were analysed using Scientopy, VOSviewer and Biblioshiny to extract publication volume, citations, authorship, journals, conceptual themes, and country networks.

Results: The search yielded 315 articles with exponential growth since 2016. Machine learning and deep learning were dominant techniques applied in rehabilitation contexts like stroke. China led research productivity, but contributions came globally including the US, Italy, India and others. Core journals were Institute of Electrical and Electronics Engineers (IEEE). Access and IEEE Transactions in neural engineering and informatics. Citation trends highlighted pioneering AI system studies as most impactful.

Conclusions: This bibliometric analysis provides the first detailed mapping of global AI rehabilitation research, revealing rapid advances primarily in algorithm development rather than clinical translation. Findings can guide future growth through (1) increasing focus on real-world implementation, (2) expanding applications to more health conditions and populations, (3) fostering cross-country and cross-sector collaboration, and (4) promoting commercialization. Sustained international effort is key to realizing AI's potential in enhancing rehabilitation outcomes. This study offers an

evidence base to track evolution and set priorities in this emerging interdisciplinary domain.

Keywords: Artificial intelligence; Bibliometric; Global; Rehabilitation; Machine learning.

INTRODUCTION

Rehabilitation plays an essential role in helping patients regain functionality and improve quality of life after injury, illness, or disability. However, providing comprehensive and individualized rehabilitation services remains challenging due to constraints such as limited accessibility, high costs, and lack of customization [1]. (AI) has emerged as a promising solution to address some of these challenges and enhance rehabilitation outcomes. (AI) has already been successfully incorporated into many healthcare domains, from diagnostic imaging to genomic testing [2]. This has spurred interest in leveraging AI's capabilities of automation, adaptation, and data analytics to make rehabilitation more effective and efficient. Although still an emerging application area, recent research indicates growing use of AI techniques in rehabilitation to develop smart assistive devices, optimize therapy plans, and improve assessments.

One active area of AI research aims to develop robotic solutions that can physically assist patients during therapy [3]. Robotic exoskeletons and prostheses use AI algorithms to intuit patient movements and provide customized support. Such intelligent devices increase the intensity and accessibility of physical rehabilitation. VR and AR are also being combined with AI to create more adaptable and gamified simulations for cognitive and motor rehabilitation [4].

Additionally, AI shows promise for more accurate quantification and analysis of patient condition and progress. Machine learning techniques can automate assessment of gait and movement disorders to support rehabilitation planning and evaluation [5]. AI may thus enhance both the quality and efficiency of rehabilitation services.

However, challenges remain regarding the safety explain ability, and ethics of applying AI algorithms in rehabilitation [6]. More research is needed to develop transparent and fair AI systems that clinicians can trust. This bibliometric study aims to understand the current global landscape of AI applications in rehabilitation through in-depth analysis of research publications. Mapping out active topics, trends, and collaborative networks can provide insights to guide future AI development and implementation for rehabilitation.

MATERIAL AND METHODS

This bibliometric analysis utilized the Scopus and WOS databases to comprehensively review literature on AI applications in rehabilitation [7]. Scopus and WOS were selected because they index millions of publications across healthcare, computer science, engineering, and other pertinent fields, allowing thorough capture of interdisciplinary rehabilitation AI research [8].

Scopus contains over 70 million records sourced from more than 5,000 international peer-reviewed journals, books, and conference proceedings [8]. Scopus offers sophisticated search and filtering options to pinpoint relevant documents through Boolean operators, wildcards, field tags, and more. Citation tracking and detailed export features enable in-depth bibliometric analysis.

Meanwhile, WOS provides access to over 18,000 journals spanning science, social science, arts and humanities *via* several indices, including the Science Citation Index (SCI) expanded and conference proceedings citation index [9]. WOS offers cited reference searching, analysis tools, and data exports valuable for bibliometric reviews.

Together, Scopus and WOS provided comprehensive coverage of AI and rehabilitation literature for identifying publication and citation trends, productive author's institutions, influential publications, and international research networks essential to understand this emerging field. The interdisciplinary focus of these databases enabled gathering insights across computer science, health sciences, engineering, and related areas.

Research strategy

The research strategy was developed based on an extensive review of literature on AI applications in rehabilitation. Separate searches were conducted in WOS and Scopus using a combination of relevant title keywords [10]. For the WOS search, we used ("artificial intelligence" OR "machine learning" OR "deep learning") in the title field AND "rehabilitation*" in the title field. For Scopus, the search query was: (TITLE ("artificial intelligence" OR "machine learning" OR "deep learning") AND TITLE ("rehabilitation*"). These searches focused the results on documents with clear relevance to AI techniques applied specifically in rehabilitation contexts. The research strategy was limited by (1) the study period from 2000 to 2024 and (2) research or review articles as well as conference papers published in peer-reviewed journals. No language restriction was imposed.

Validation and data export

The initial dataset retrieved from Scopus (CSV format) and WOS (text format) were exported and consolidated in Scientopy for validation and bibliometric analysis. After removing 48 non-relevant document types, the pooled corpus contained 497 publications. Of these, 215 (43.3%) were from WOS and 282 (56.7%) were from Scopus. Deduplication identified 182 duplicate entries, with 1 from WOS and 181 from Scopus removed. This resulted in a final dataset of 315 unique publications, with 214 (67.9%) from WOS and 101 (32.1%) from Scopus.

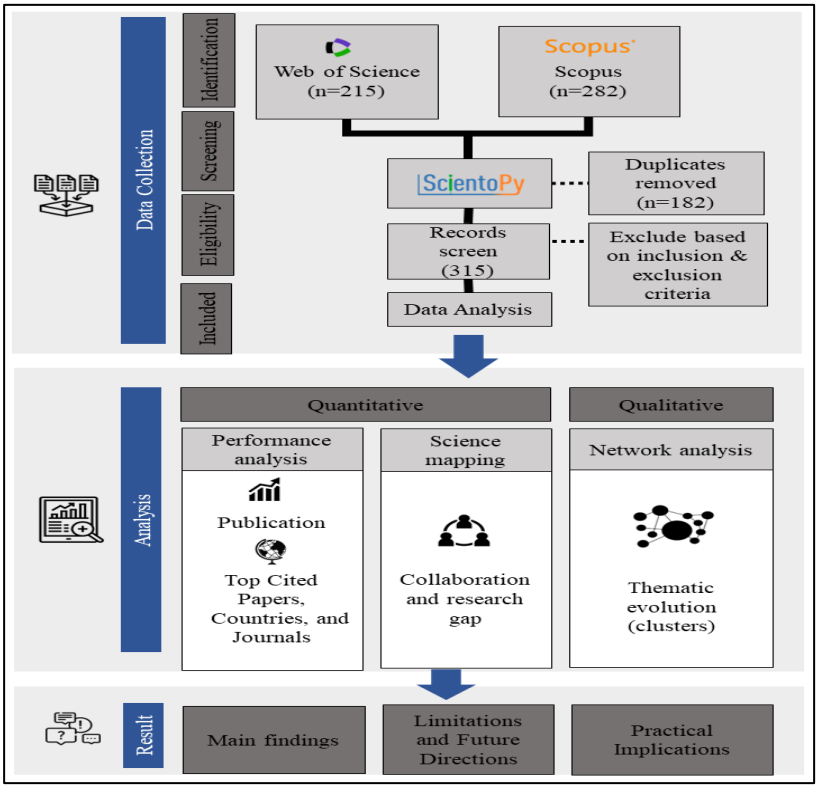
To validate the search strategy, the research productivity of five active authors in AI rehabilitation was checked against their publication counts in the filtered scientopy dataset. A Spearman correlation test found a significant strong agreement ($p<0.001$; $r=0.96$) between the two sets of numbers. This suggests high sensitivity and precision of the search queries in capturing relevant literature. The validated scientopy dataset was then used for all subsequent bibliometric analyses of publication trends, citations, authorship, and research networks.

The validated scientopy dataset was supplemented by exporting metadata to VOSviewer, a freely available computer program for bibliometric mapping [11].

Biblioshiny also used for identifying thematic mapping [12]. VOSviewer was utilized to construct visualization maps depicting collaborative networks and research hotspots [13]. In the resulting maps, node size indicates the frequency of occurrence of items like keywords, authors, or journals. Node color represents clustering of closely related items. The thickness of connecting lines signifies the strength of links between nodes, such as frequent co-authorship relationships.

Additional bibliometric indicators were calculated using the scientopy dataset, including total and mean number of citations received, and the h-index measuring scientific impact based on citation counts. VOSviewer complemented scientopy to provide both qualitative mapping and quantitative citation analyses for a comprehensive perspective on AI rehabilitation research [14].

Figure 1. The study flowchart.



Bibliometric indicators and data presentation

The scientopy and VOSviewer datasets were analyzed to extract relevant bibliometric indicators that characterize the growth and structure of AI rehabilitation research. Trends in annual publication output were visualized using line graphs generated in scientopy. Active countries, institutions, authors, and journals were ranked and presented in tabular format based on productivity metrics. Top-cited articles were compiled in a table (1) indicating total citations received.

Research themes and concepts were mapped through Biblioshiny to identify hot topics as well as declining or niche areas. Biblioshiny provides interactive visualizations of research topics and their connections over time based on text mining of titles, abstracts, and keywords. Co-occurrence analysis of author keywords in VOSviewer provided further insight into connections between research foci. Finally, collaborative networks were illustrated through VOSviewer visualizations of co-authorship and citation relationships. Together, these metrics, rankings, maps, and graphs provide a multidimensional perspective on the bibliometric landscape of (AI) applications in rehabilitation. Both quantitative indicators and qualitative visualizations were included for a comprehensive profile of this emerging interdisciplinary domain.

RESULTS

General characteristics of the retrieved articles

The consolidated corpus for bibliometric analysis contained 315 publications on AI applications in rehabilitation research over the timespan from 1987 to 2024 April. These documents were sourced from 234 different outlets including journals, books, and conference proceedings. Analysis of annual research output showed gradual growth in this field with a 3.01% average annual increase in publications. The average age of documents was 3.34 years

and the mean number of citations per paper was 6.952. In terms of document contents, the dataset contained 919 Author Keywords Plus and 274 Author Keywords reflecting the disciplinary breadth and research foci.

A total of 429 unique authors contributed to the literature, with only 4 single-authored documents. On average, each document had 1.45 co-authors, indicating a high degree of scholarly collaboration. The international collaboration rate was 3.492% based on cross-country co-authorships.

With respect to document types, most publications were journal articles (175), followed by conference papers (67), proceedings papers (44), and reviews (26). Only 4 documents were single-authored works. The collaborative nature and cross-disciplinary appeal of AI and rehabilitation research is evidenced by the diversity of contributing authors and dispersed publication outlets spanned by this analysis.

Table 1. The general characteristics of the retrieved articles.

Description	Results
Main information about data	
Timespan	1987:2024
Sources (journals, books, etc)	234
Documents	315
Annual growth rate %	3.01
Document average age	3.34
Average citations per doc	6.952
Document contents	
Keywords plus (ID)	919
Author's keywords (DE)	274
Authors	429
Authors of single-authored docs	4
Authors collaboration	
Single-authored docs	4
Co-authors per doc	1.45
International co-authorships %	3.492
Document types	
Article	175
Article; book chapter	1
Article; early access	1
Article; proceedings paper	1
Conference paper	67
Proceedings paper	44
Review	26

Evolution and growth of publications

Analysis of publication outputs over time shows that AI rehabilitation research has gone through four growth phases (Figure 2). Only sporadic publications (3 documents) appeared in 2007-2008. This represents the initiating period. Research activity slowly began accelerating between 2013-2015, marked by 6 publications. The field then entered a period of rapid expansion from 2016-2019, with publication counts rising from 13 to 37. The most recent and ongoing phase from 2020-present exhibits exponential growth, with yearly output jumping to 50+ papers.

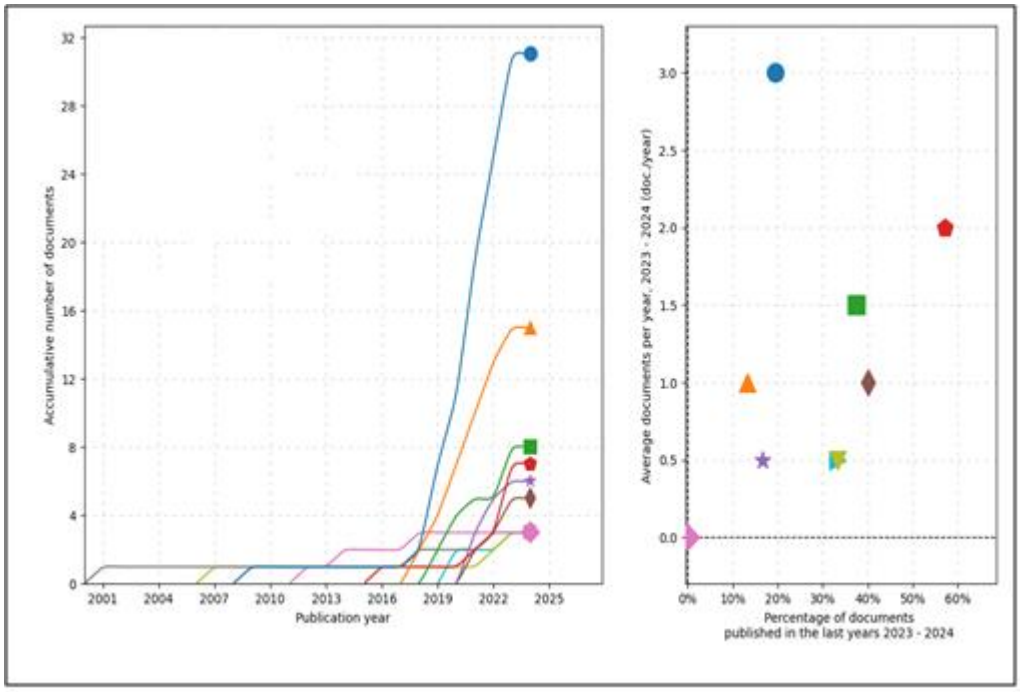
Overall, WOS contained the majority of publications (212) compared to scopus (99). The chronological publication trends highlight that AI-rehabilitation is still an emerging domain, with 89% of papers published from 2016

onwards. The sharp upward trajectory in the last few years reflects increasing attention and productivity in applying AI to enhance rehabilitation assessment, devices, therapies, and access. Further growth is anticipated as more researchers enter this interdisciplinary area.

Top 10 active countries

Presents the top 10 countries with the most publications on AI rehabilitation. China leads with 31 papers, followed distantly by the United States (15), Taiwan (8), Italy (7), India (6), Malaysia (5), Canada (3), Germany (3), Japan (3), and the United Kingdom (3). Notably, China did not have any publications until 2009 but has since rapidly emerged as the dominant country, contributing close to 10% of total output. In contrast, early pioneering work came from Japan and Germany in 2007-2008. The US maintained steady low productivity until recently showing an uptick from 2018-onwards. In general, Asian countries including China, Taiwan, India and Malaysia demonstrate growing research activity in this domain. The geographic distribution indicates AI rehabilitation attracts global interest, albeit with a focus in China reflecting wider national prioritization of AI research and development (Figure 2).

Figure 2. The top 10 countries. **Note:** (●) China; (▲) United States; (■) Taiwan; (⬟) Italy; (★) India; (◆) Malaysia; (⬢) Canada; (●) Germany; (▼) Japan; (▶) United Kingdom



Top 10 most active journals

Presents the top 10 journals with the most publications on AI rehabilitation. IEEE Access published the highest number of papers (11), followed by sensors (8), IEEE transactions on neural systems and rehabilitation Engineering (5), computational and mathematical methods in medicine (4), and frontiers in neuroscience (4). Additional journals with 3 papers each included computers in biology and. Medicine, BMC medical informatics and decision Making, PLOS ONE, computational intelligence and neuroscience, and diagnostics.

The list contains prestigious journals covering medical informatics, biomedical engineering, neuroscience, sensors, and computational methods. Most are published by leading publishers like IEEE, Hindawi, Elsevier, Springer Nature, Frontiers, and MDPI. Impact factors range widely from 2.3 to 9.2. Overall, AI rehabilitation research appears across

diverse journals, indicating its broad relevance. However, IEEE Access and IEEE Transactions emerge as preferred outlets likely due to the engineering and computing aspects of this field.

Citation analysis

The 315 articles in the corpus received a total of 2189 citations, with a mean of 6.95 citations per document and an h-index of 32. Table 3 lists the top 10 most cited articles, published in prestigious journals like IEEE journal of translational engineering in health and medicine, computers in biology and medicine, IEEE transactions on neural systems and rehabilitation engineering, and scientific reports.

The most cited paper (113 citations) presented an IOT-enabled stroke rehabilitation system using smart armbands and machine learning. Other highly influential works focused on deep learning frameworks for assessing exercises, arm movement classification, home-based rehabilitation systems, and mortality prediction after stroke rehabilitation. Overall, pioneering studies on AI and machine learning rehabilitation applications received the most citations, highlighting their significant research impact. The high citation counts indicate the importance ascribed to these studies advancing and demonstrating AI techniques for improved rehabilitation outcomes (Table 2).

Table 2. The top 10 most active journals.

Ranks	Journals	TP	Publisher	Cite score 2022	SJR 2022	SNIP 2022
1	IEEE access	11	IEEE	9	0.926	1.422
2	Sensors	8	Multidisciplinary Digital Publishing Institute (MDPI)	6.8	0.764	1.317
3	IEEE transactions on neural systems and rehabilitation engineering	5	IEEE	8.8	1.26	1.675
4	Computational and mathematical methods in medicine	4	Hindawi	2.3	0.474	0.883
5	Frontiers in neuroscience	4	Frontiers media SA	6.8	1.161	1.221
6	Computers in biology and medicine	3	Elsevier	9.2	1.222	1.783
7	Bmc medical informatics and decision making	3	Springer nature	6.2	0.94	1.384
8	Plos one	3	Public library of science	6	0.885	1.253
9	Computational intelligence and neuroscience	3	Hindawi	3.9	0.863	1.023
10	Diagnostics	3	Multidisciplinary Digital Publishing Institute (MDPI)	3.6	0.67	0.982

Abbreviation: TP: Total Publications

Table 3. The top 10 most cited articles.

Ranks	Title	Year	Source title	Citations	Practical contributions
1	An Iot-enabled stroke rehabilitation system based on smart wearable armband and machine learning [15].	2018	IEEE journal of translational engineering in health and medicine	113	The IOT-enabled stroke rehabilitation system can be used as a training tool for stroke patients. The system can mimic the user's hand gestures in real-time.
2	Deep learning for neuroimaging-based diagnosis and rehabilitation of Autism Spectrum Disorder: A review [16].	2021	Computers in biology and medicine	86	Neuroimaging techniques can aid in the accurate diagnosis of Autism Spectrum Disorder (ASD). Deep learning networks can be used for the automated detection and rehabilitation of ASD.
3	A deep learning framework for assessing physical rehabilitation exercises [17].	2020	IEEE transactions on neural systems and rehabilitation engineering	83	Deep learning models can improve assessment of rehabilitation exercises. The proposed framework provides a versatile and robust approach for evaluation.
4	Rehab-net: deep learning framework for arm movement classification using wearable sensors for stroke rehabilitation [18].	2019	IEEE transactions on biomedical engineering	79	Rehab-Net framework accurately monitors the clinical progress of stroke survivors. Rehab-Net outperforms state-of-the-art learning algorithms in movement classification accuracy.
5	Development and clinical evaluation of a web-based upper limb home rehabilitation system using a smartwatch and machine learning model for chronic Stroke Survivors: Prospective comparative study [19].	2020	Jmir mhealth and uhealth	73	Development of a home-based rehabilitation system using a smartwatch and machine learning. The system can improve functional scores and range of motion in chronic stroke survivors.
6	Predicting post-stroke activities of daily living through a machine learning-based approach on initiating rehabilitation [20].	2018	International journal of medical informatics	66	The proposed ML-based method provides a promising and practical computer-assisted decision making tool for predicting ADL in clinical practice.
7	Machine learning to predict mortality after rehabilitation among patients with severe stroke [21].	2020	Scientific reports	47	Machine learning methods can improve the identification of stroke patients at risk of death. ML algorithms outperformed standard logistic regression for predicting 3-year mortality.
8	Artificial intelligence-based wearable robotic exoskeletons for upper limb rehabilitation: A review [22].	2021	Sensors	41	Development of more reliable systems for upper limb rehabilitation. Improvement of interactions among patients, health professionals, and technology.
9	Using machine learning algorithms to guide rehabilitation planning for home care clients [23].	2007	Bmc medical informatics and decision making	41	Machine learning algorithms achieved superior predictions than the current protocol. Machine learning can be used to refine clinical protocols for comparable performance.
10	Wearable sensors and machine learning in post-stroke rehabilitation assessment: A systematic review [24].	2022	Biomedical signal processing and control	40	A taxonomy that divided the assessment systems into three categories namely activity recognition, movement classification, and clinical assessment emulation.

Visualization of thematic trends

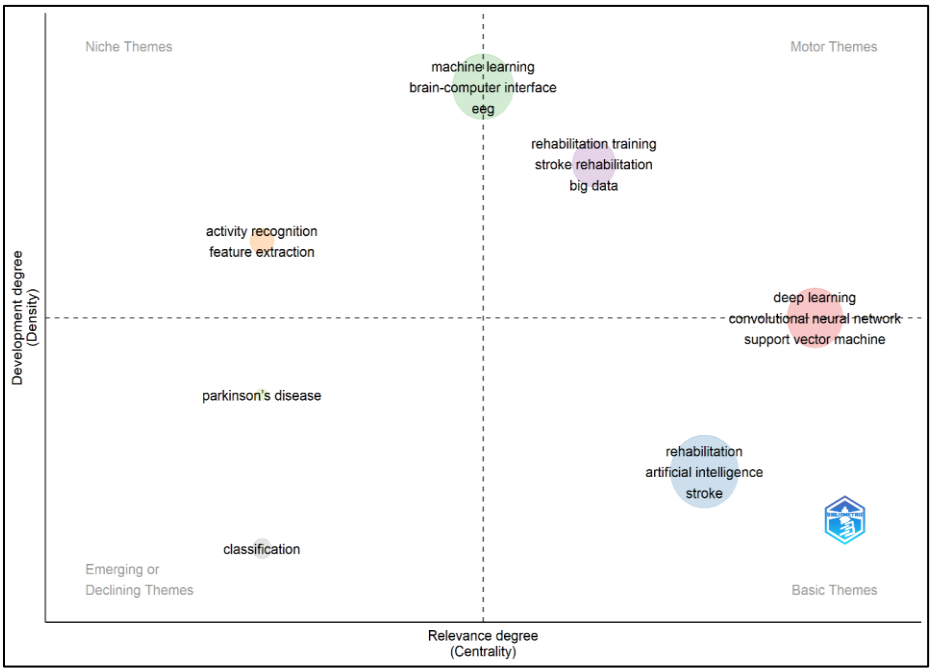
Thematic analysis using Biblioshiny uncovered five clusters of research concepts in AI rehabilitation literature. The largest cluster represents machine learning approaches, while a closely related cluster covers deep learning methods. This reflects the prominence of machine learning and deep learning as active topics, aligning with their uptick in publications after 2016. Two smaller clusters contain works on convolutional neural networks and support vector machines - more specific AI techniques.

The second largest cluster encompasses rehabilitation applications, with virtual reality and stroke rehabilitation as key themes linked to this group. Additionally, a small cluster connects rehabilitation training to machine learning methods, indicating their combined application. The prevalence of machine learning reflects its versatility across assessments, devices, therapies, and other areas within rehabilitation.

Biblioshiny temporal mapping provided further insights into the evolution of topics over time. It reveals that machine learning rapidly emerged as the dominant theme after 2016, overtaking earlier foci like robotics and neural networks.

Deep learning and newer AI applications in computer vision, natural language processing have also gained traction in recent years. However, machine learning has consolidated its position as the most widely used approach. The dynamic thematic visualizations highlight the shifting AI technology landscape as the field continues maturing. They provide greater nuance into trends and trajectories shaping rehabilitation applications (Figure 3).

Figure 3. The thematic map (Source: Biblioshiny).



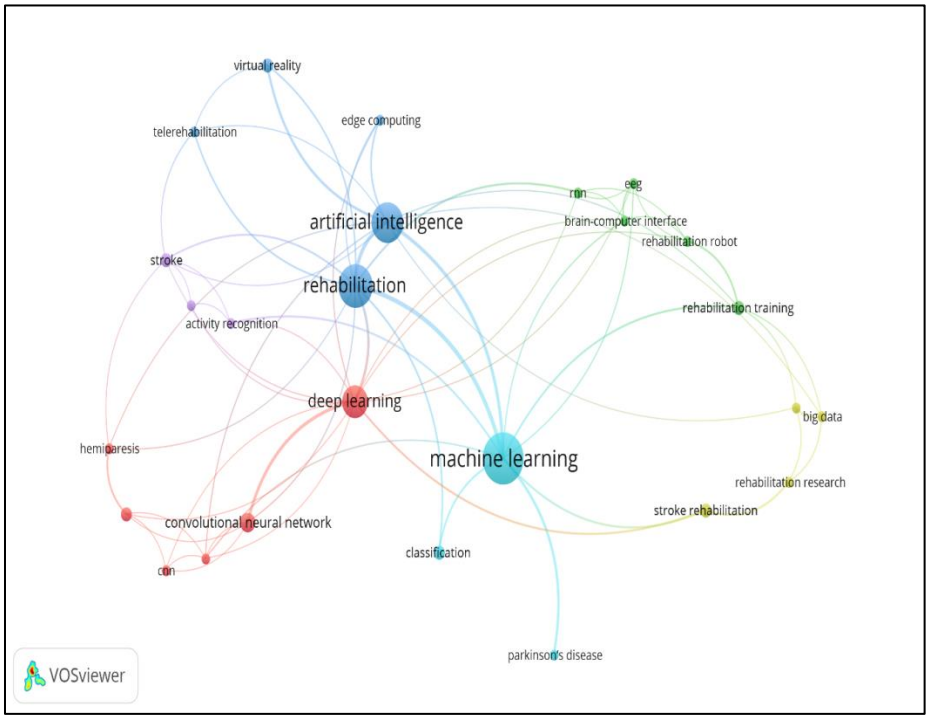
Patterns in author keywords co occurrences

Presents the clustering analysis of author keywords. The co-occurrence analysis of author keywords revealed 7 clusters reflecting the thematic structure of AI rehabilitation research (Figure 4). The largest cluster (Cluster 1) encompassed deep learning, convolutional neural networks, CNN, and related methods. Cluster 2 connected brain-computer interfaces and rehabilitation robots. Cluster 3 grouped artificial intelligence, rehabilitation, and key applications like stroke. Machine learning formed its own cluster (Cluster 6), while Cluster 4 contained big data and

rehabilitation research. Cluster 5 covered activity recognition and feature extraction, and Cluster 7 had classification terms.

The mapping shows deep learning as the predominant technique, while machine learning also occupies a distinct niche. Rehabilitation contexts like stroke and Parkinson's disease are linked to AI methods, with stroke rehabilitation being closely associated to the core rehabilitation cluster. The emerging clusters demonstrate the key AI technologies, health conditions addressed, and analytics tasks within this domain. The keyword grouping patterns provide additional granularity into the topics and relationships driving AI rehabilitation research (Figure 4).

Figure 4. The Network Visualization (Source: VOSviewer).



DISCUSSIONS

This bibliometric analysis revealed key insights into the rapid growth and evolving landscape of AI rehabilitation research over the past two decades. The publication trends uncovered in our study highlight the rising prominence of AI as a tool to transform rehabilitation practices.

The exponential increase in yearly outputs, especially after 2016, can be attributed to greater affordability and accessibility of high-performance computing resources necessary for deep learning algorithms [25]. Advances in sensor technologies, robotics, and VR/AR have also enabled more applications of AI in smart devices and immersive platforms for rehabilitation [26].

Additionally, wider digitalization across healthcare is driving adoption of big data analytics like AI to enhance decision-making and personalization [27]. Our findings reflect how these Technical capabilities and paradigm shifts have spurred AI innovation in rehabilitation.

However, most studies focus on developing novel algorithms rather than implementing AI in clinical settings [28]. More research on integrating AI seamlessly into rehabilitation workflows is essential for real-world adoption. Hybrid systems combining AI with clinician oversight may address barriers around trust and transparency [29]. Studies must also expand beyond technical validation to evaluate AI impact on patient outcomes through longitudinal randomized controlled trials. Our analysis found stroke rehabilitation to be a major focus for AI applications, which

can be attributed to stroke's high incidence rate and significant disability burden globally [30]. But there are opportunities to direct AI towards underserved neurological conditions like traumatic brain injury and spinal cord injury. paediatric and geriatric populations also warrant more tailored AI solutions for rehabilitation.

While China leads publications in this field, international collaborations remain low at just 3.5%. Establishing networks like joint labs and data consortiums can enable cross-country studies on larger diverse datasets [31].

Such global partnerships can spur innovation and expand AI access. Furthermore, greater engagement with industry players and entrepreneurs is imperative to drive commercialization.

Our research maps the AI rehabilitation landscape to guide future growth. Key priorities include moving from algorithm-centered studies to patient-centered design, addressing real-world implementation barriers, directing AI to high-need populations, fostering global collaborations, and accelerating translation and commercialization. Fulfilling this potential will require interdisciplinary, cross-sector partnerships. Our findings provide a roadmap for AI's approach in improving rehabilitation quality, outcomes and access.

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Code availability

Not applicable.

AUTHOR'S CONTRIBUTIONS

Azliyana Azizan initiated the concept, formulated the methodology, conducted data analysis, created graphics, and interpreted the data. Additionally, Azliyana Azizan authored and submitted the manuscript, with the final version being reviewed and approved by the author.

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Availability of data and materials

All data presented in this manuscript are available on Scopus database using the search query listed in the methodology section.

DECLARATIONS

Ethics approval and consent to participate, no approval is needed for this study.

Consent for publication

Not applicable.

COMPETING INTERESTS

The authors declare that they have no competing interests.

REFERENCES

1. Mitchell J, et al. Factors that influence the adoption of rehabilitation technologies: A multi-disciplinary qualitative exploration. J NeuroEngineering Rehabil. 2023;20:1-17.
2. Davenport T, et al. The potential For artificial intelligence In healthcare. Future Healthc J. 2019;6:94–98.
3. Ali O, et al. A systematic literature review of artificial intelligence in the healthcare sector: Benefits, challenges, methodologies, and functionalities. JIK. 2023;81:1-19.
4. Lewis KO, et al. From static web to metaverse: Reinventing medical education in the post-pandemic era. Ann Med. 2024;561:20-23.

5. Fricke C, et al. Evaluation of three machine learning algorithms for the automatic classification of EMG patterns in gait disorders. Front Neurol. 2021;12:1-11.
6. Petersson L, et al. Challenges to implementing artificial intelligence in healthcare: A qualitative interview study with healthcare leaders in Sweden. BMC Health Serv Res. 2022;22;1-16.
7. Azizan A, et al. Bibliometric analysis on geriatric rehabilitation in scopus database (1948-2022). Topics in Geriatric Rehabilitation. 2024;40:60–68.
8. Falagas ME, et al. Comparison of pubmed, scopus, web of science, and google scholar: Strengths and weaknesses. Faseb J. 2008;22:338–342.
9. Kokol P. Discrepancies among scopus and web of science, coverage of funding information in medical journal articles: A follow-up study. J Med Libr Assoc. 2023;111:703–9.
10. Azizan A, et al. Reshaping healthcare: A bibliometric analysis of lessons learned in post-covid-19 health policy. National Public Health Journal. 2023;18:18–24.
11. Azizan A. Exploring the role of social media in mental health research: A bibliometric and content analysis. Journal of Scientometric Research 2024;131:1–8.
12. Aria M, et al. Bibliometrix : A R-tool for comprehensive science mapping analysis. JOI. 2017;11:959–975.
13. van Eck NJ, et al. Software survey: VOSviewer, a computer program for bibliometric mapping. Scientometrics. 2009;84:523–538.
14. Azizan A. Mapping the muscle mass: A birds-eye view of sarcopenia research through bibliometric network analysis. IJDSHS. 2023;7:134–143.
15. Yang G, et al. An iot-enabled stroke rehabilitation system based on smart wearable armband and machine learning. JTEHM. 2018;6:1–10.
16. Khodatars M, et al. Deep learning for neuroimaging-based diagnosis and rehabilitation of Autism Spectrum Disorder: A review. Computers in Biology and Medicine. 2021;139:104-949.
17. Liao Y, et al. A deep learning framework for assessing physical rehabilitation exercises. IEEE Trans Neural Syst Rehabil Eng. 2020;28:468–477.
18. Panwar M, et al. Rehab-net: Deep learning framework for arm movement classification using wearable szensors for stroke rehabilitation. IEEE Trans Biomed Eng. 2019;66:3026–3037.
19. Chae SH, et al. Development and clinical evaluation of a web-based upper limb home rehabilitation system using a smartwatch and machine learning model for chronic stroke survivors: Prospective comparative study. JMIR mHealth and uHealth. 2020;8:172-176.
20. Lin WY, et al. Predicting post-stroke activities of daily living through a machine learning-based approach on initiating rehabilitation. Int J Med Inform. 2018;111:159–164.
21. Scrutinio D, et al. Machine learning to predict mortality after rehabilitation among patients with severe stroke. scientific reports. Sci Rep. 2020;10:201-207.
22. Vélez Guerrero MA, et al. Artificial intelligence-based wearable robotic exoskeletons for upper limb rehabilitation: A review. Sensors. 2021;21:21-46.
23. Zhu M, et al. Using machine learning algorithms to guide rehabilitation planning for home care clients. BMC Medical Informatics and Decision Making. 2007;7:20-30.
24. Boukhennoufa I et al. Wearable sensors and machine learning in post-stroke rehabilitation assessment: A systematic review. Biomed Signal Process Control. 2022;71:103-197.
25. Jiang F, et al. Artificial intelligence in healthcare: Past, present and future. SVN. 2017;2:230–243.

26. Wang C, et al. Artificial intelligence enhanced sensors enabling technologies to next generation healthcare and biomedical platform. Bioelectron Med. 2023;9:17-20.
27. Razzak MI, et al. Big data analytics for preventive medicine. Neural Comput Appl. 2019;32:4417–4451.
28. Lazarus MD, et al. Artificial intelligence and clinical anatomical education: Promises and perils. Anat Sci Educ. 2022;17:249-262.
29. Zhang L, et al. The application of artificial intelligence in glaucoma diagnosis and prediction. Front. Cell Dev. Biol. 2023;11;23-25.
30. Dresser LP, et al. Artificial intelligence and the evaluation and treatment of stroke. Dela J Public Health. 2023;9:82–84.
31. Meng G, et al. Determination of driving forces for China's energy consumption and regional disparities using a hybrid structural decomposition analysis. Energy. 2022;239:122-191.