

Trends and research on heart detection in using yolo algorithm to realize the 3rd SDG

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Abstract. The purpose of this study is to assess the role, trends, and developments of the YOLO algorithm for healthy heart detection in advancing the 3rd SDGs. The research methodology used involved bibliometric analysis using VOSviewer and Biblioshiny tools. VOSviewer and Biblioshiny were used to examine the distribution of annual documents across countries, institutions, journals, authors, and interrelationships between keywords. The results show that Indonesia is in the 5th position of contributing countries among 10 countries/regions involved in the development of the YOLO algorithm for healthy heart detection. The data used in this research is sourced from the Scopus database in .csv format. In addition to data extraction from the Scopus database, this research also investigates the implementation of the YOLO algorithm for healthy heart detection using data from the Automated Cardiac Diagnosis Challenge (ACDC).

1 Introduction

In the current era, there is a rapid advancement of technology, specifically in areas such as mobile devices, computers, and other smart gadgets that rely on internet connectivity [1]. The widespread adoption of technology can be observed in various device users' usage patterns and human activities, particularly within industries that have incorporated technology into their processes. Therefore, integrating technology into every human endeavor can simplify and streamline human tasks. Progress in technology and healthcare has resulted in significant expansion in virtual appointments, remote health monitoring, mobile healthcare, digital treatments, and the utilization of artificial intelligence and machine learning in healthcare [2]. Technological advancements are vital in creating knowledge, particularly in research trends. One way to see the trend and development of research is by using bibliometrics.

Bibliometrics examines quantifiable data from published sources, which can produce verifiable and consistent results. Bibliometrics explains the relationship between the

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documents analyzed [3, 4]. In bibliometric studies, scholars can use citation analysis to assess systematic significance and utilize it to uncover impactful research principles in a particular field [5]. Publications that receive higher citations are considered to have high research quality and influence in a specific field of expertise [5]. Engaging in bibliometric analysis is essential to gain insight into the evolution of research related to a particular subject [6 - 8]. Examining topics such as using the YOLO algorithm for healthy heart detection is essential.

Research on trend analysis using bibliometrics has been conducted over the past few decades [9]. Based on data from Scopus accessed on July 1, 2024 (www.scopus.com), between 2018-2023, indexed international journals containing the YOLO algorithm for healthy heart detection were 798 documents from all countries. Within the research field, publications serve as crucial sources for learning and writing, particularly internationally indexed. Scopus holds significant importance as a top international index that guides researchers worldwide in disseminating their research findings [10, 11].

Nevertheless, achieving publication in Scopus is challenging as it demands the exploration of novel research themes. Studies indicate that aligning with emerging trends can boost publication rates in recent years [12 - 14], consequently influencing the evolution of research themes. Hence, staying informed about current trends is crucial, especially in the YOLO algorithm for heart health detection.

Given these concerns and the critical need for action, reviewing research topics regarding the YOLO algorithm for healthy heart detection to achieve the 3rd SDG is essential globally to recognize existing research trends. This study's results can provide valuable insights for future researchers. In addition, this study intends to investigate research patterns and offer insights into the future landscape of the YOLO algorithm for heart health detection.

This study outlines the trends and research of the YOLO algorithm for heart health detection to support the 3rd SDG to identify and compare its research, which can help future researchers. (1) Regarding research characteristics and features, where do the locations, document types, sources, and authors of the YOLO algorithm for heart health detection support the 3rd SDG's research? (2) In terms of application, what are the dominant disciplines, and how does the YOLO algorithm for heart health detection contribute to supporting the 3rd SDGs?

2 Methods

This research employs quantitative descriptive techniques through bibliometric analysis [5, 15, 16]. Bibliometric analysis is a statistical approach used to analyze quantitative data from various scientific literature forms, such as essential articles, conference papers, books, book chapters, and other publications. This method identifies and explores novelty and research trends within the literature [15, 17 - 19].

2.1 Resources

Data was collected from the Scopus database, which provides more detailed coverage of the development of the YOLO algorithm for heart health detection than similar databases such as WOS [20].

2.2 Data collection

The five steps of bibliometric analysis include determining search keywords, initial research results, refining search results, compiling preliminary data statistics, and data analysis. In this research, the author chose the keyword "YOLO." In the refinement stage, the author limited

the data based on coverage and year of publication. The period covered is from January 2018 to December 2023. As a result, there were 798 documents relevant to the YOLO algorithm for heart health detection. Each data was downloaded in .csv formats.

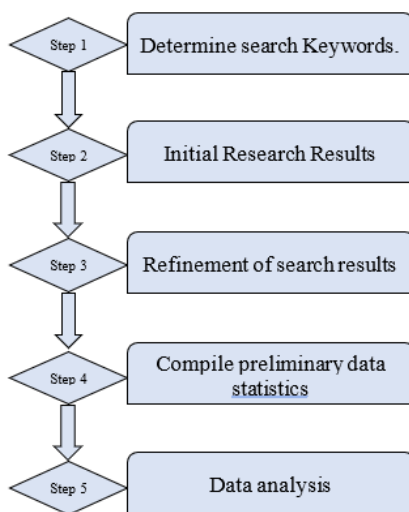


Fig. 1. Step by step of bibliometric analysis.

2.3 Data Analysis

The data was examined using VosViewer & Biblioshiny software to uncover connections among authors, documents, and keywords [21, 22]. Information such as publication year, country, affiliation, language, and more was assessed from the .csv file using Microsoft Excel.

3 Results and discussion

3.1 Publication by year

The metadata results conducted on the Scopus database found that 798 international indexed journal documents (all countries) were published on the topic of the YOLO algorithm for heart health detection from 2019-2023. The number of metadata will be described in detail in Table 1 below.

Table 1. Document details by year

Tahun 2019-2023	Total Document
2019	0
2020	2
2021	54
2022	235
2023	507

Table 1 shows that the number of documents published in the year (2019-2023) International (all countries) significantly increased without any decrease in the last five years. This indicates that publications on the YOLO algorithm for heart health detection can be used to realize 3rd SDGs.

3.2 Top 10 Authors

The metadata results conducted by the Scopus database based on the top authors in internationally indexed journals found that Tian, X. had 5 articles; Song, H. had 4 articles; Liang, J. had 4 articles; Zhu, J. had 3 articles; Xu, W. had 3 articles; Sun, L. had 3 articles; Simkins, G. had 3 articles; Sher Shah, M. had 3 articles; Shen, M. had 3 articles and Sansonetti, G. had 3 articles. In detail, the number of metadata Authors will be described in Figure 2 below.

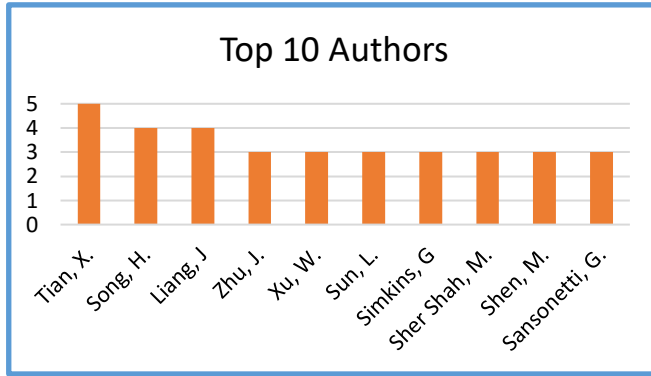


Fig. 2. Top 10 Authors

3.3 Top 10 Affiliation

The metadata results conducted by the Scopus database based on the top affiliation in international indexed journals found that China Agricultural University had 39 articles; Zhejiang University had 23 articles; SRM Institute of Science and Technology had 19 articles; Soochow University had 18 articles; Nanjing Agricultural University had 17 articles; Northeastern University had 17 articles; Macau University of Science and Technology had 16 articles; Xi'an Jiaotong-Liverpool University had 16 articles; Central South University had 15 articles and Notreported had 15 articles. In detail, the amount of metadata Affiliation will be described in Figure 3 below.

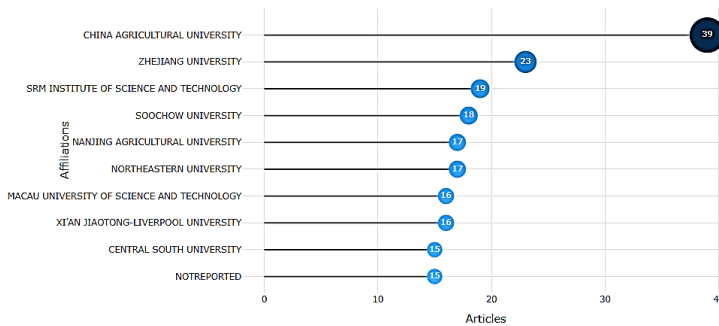


Fig. 3. Top 10 Affiliation

3.4 Top 10 Country/Territory

The metadata results conducted by the Scopus database based on the top Country/Territory in internationally indexed journals found that China had 287 articles; India had 84 articles; Korea had 23 articles; the USA had 16 articles; Indonesia had 13 articles; Saudi Arabia had 10 articles; Pakistan had 9 articles; Japan had 8 articles; Malaysia had 7 articles and Turkey had 7 articles. In detail, the amount of metadata Country/Territory will be described in Figure 4 below.

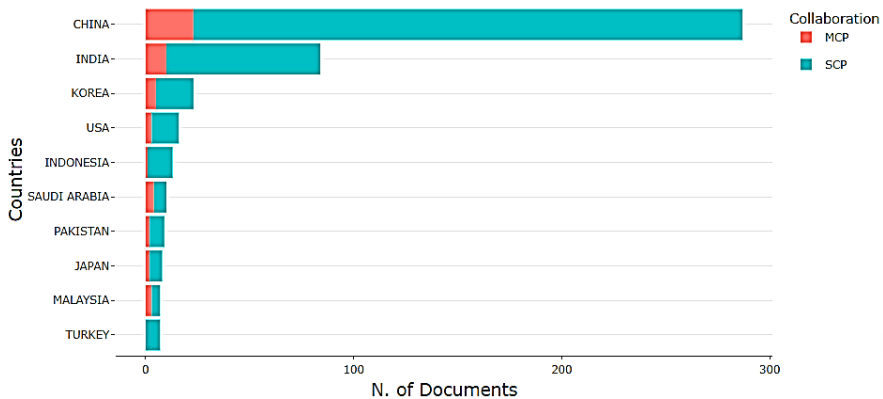


Fig. 4. Top 10 Country/Territory

3.5 Visualization of research trends

The results of visualizing research trends conducted on the Scopus database in internationally indexed journals (all countries) using VOSviewer software in detail will be described in Figure 5 below. The visualization of research trends carried out using Biblioshiny software in detail will be described in Figure 6 below.

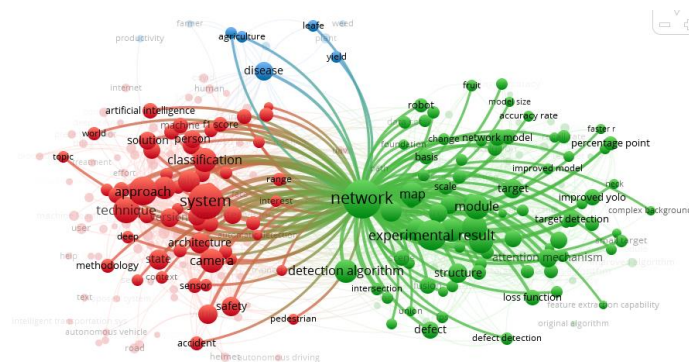


Fig. 5. Visualization of Research Trends using VosViewer

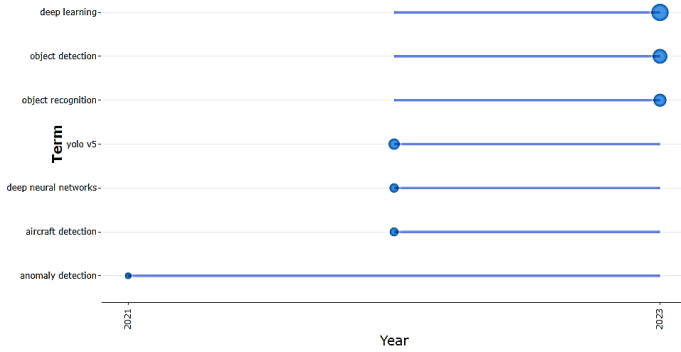


Fig. 6. Visualization of Research Trends using Biblioshiny

3.6 Keywords

The font size of the keywords in Figure 7 indicates the frequency of keywords used in the paper. The keywords in the YOLO algorithm for heart health detection research have similarities, including deep learning, object detection, object recognition, image enhancement, and computer vision. Based on this, the YOLO algorithm for heart health detection research has a strong relationship in various disciplines, especially deep learning, object detection, object recognition, image enhancement, and computer vision.



Fig. 7. Keywords

3.7 The Application of the YOLO algorithm for heart health detection to Realize the 3rd SDG

The implementation of the Yolo Algorithm used is to view data on areas of the heart based on the LV (Left Ventricle), RV (Right Ventricle), and Myocardium areas. The data used is a comparison of normal patient data with patients who have the following abnormalities: (1) Dilated cardiomyopathy (DCM); (2) Hypertrophic cardiomyopathy (HCM); (3) Myocardial infarction (MINF); and (4) Abnormal Right Ventricle (ARV). Figure 8 below is a visualization of heart images before the detection of LV, RV, and Myocardium areas using the Yolo algorithm while Figure 9 is a visualization of heart images after using the Yolo algorithm for detection of these areas.

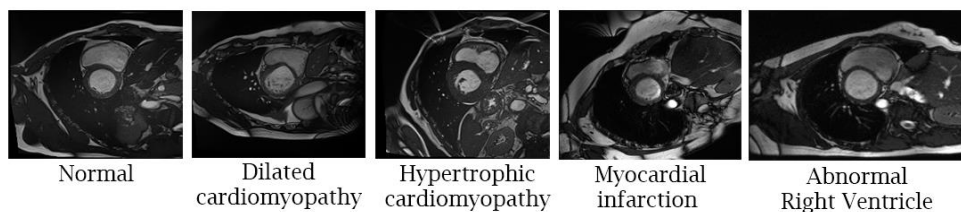


Fig. 8. Visualization of heart images before detection

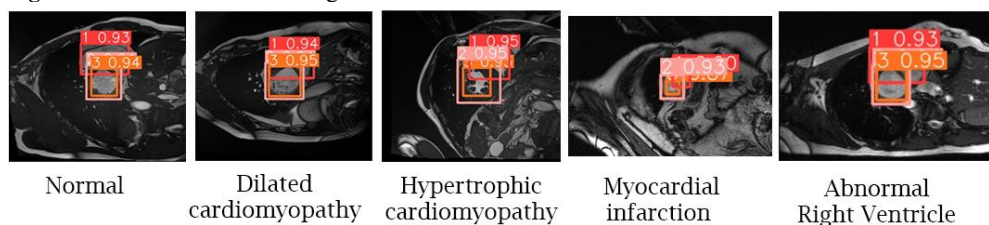


Fig. 9. Visualization of heart images after detection

Based on Figure 9, number 1 indicates the LV area; number 2 indicates the RV area; and number 3 indicates the Myocardium area. For patients who have symptoms of Dilated cardiomyopathy, Hypertrophic Cardiomyopathy, Myocardial infarction, and abnormal Right Ventricle there is a marked difference in both Left Ventricle (LV), Right Ventricle (RV) and Myocardium area from normal size.

4 Conclusion

This research explores the role of the YOLO algorithm for heart health detection in supporting the 3rd SDG, focusing on its trends, applications, and contributions. This study found that the YOLO algorithm for heart health detection has a stable trend in research over the past five years and there is no downward trend from 2019-2023. This research only uses metadata from Scopus. This study found that Trends Visualization both using Biblioshiny and using VosViewer every year always experiences development by looking at the topic every year. This research found that China dominates the countries/regions that develop Yolo for heart health detection. Even so, Indonesia is included in the 5 countries/regions that develop YOLO algorithms for heart health detection so it can be predicted that the research trend will continue to increase every year. Future research needs to focus on other fields, by utilizing one or more keywords, and collaborating with Google Scholar, and Web of Science data, to conduct a comprehensive analysis.

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