African Journal of Biological Sciences

One Decade Research in the Field of Artificial Intelligence for Indonesian Orchid: A Bibliometric Analysis

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Article History
Volume 6, Issue 5, 2024
Received: 22 May 2024
Accepted: 03Jun 2024
doi:*10.48047/AFJBS.6.5.2024.10477-10488*

Abstract

The use of artificial intelligence to solve surfaces in Dendrobium Orchids has been the focus of popular research in the last decade. However, there are no scientific reports that provide a systematic overview of this scientific field. We used bibliometric approaches to identify and analyze academic literature on the use of artificial intelligence in Dendrobium Orchids issues and explore emerging research trends, joint writer networks, institutions, countries, and journals. The results of this analysis also obtained information that the issues of sensitivity and specificity, diagnostic accuracy in computer science have the potential to acquire novelty.

Keywords: Artificial intelligence, Bibliometric analysis, Indonesian Orchids, Dendrobium

1. INTRODUCTION

Digital images are more reliable for disease recognition in comparison to human eyes, many diseases have similar features at times it is difficult for human eyes for identifying them moreover recognition is totally dependent on eyesight of human expert [1]. Orchids [2] (Family: *Orchidaceae*) have been successful for use as blooming potted plants. *Dendrobium* orchid is one such category, with increasing popularity in the international floricultural scene. While historically a cut flower commodity, dendrobiums are increasingly being used as potted plants [3]. The orchids depend on the other plants and their biological [2] ecosystems to survive. In the climate change era, there is still an urgent need for intensive monitoring of the diversity of this area to detect changes in the status and use of this precious forest in terms of its plant diversity. Therefore, providing baseline information on plant and orchid diversity data is a basic step in planning, and the Indonesian conservation authority should give priority to it [4]. This study focuses on exploring research trends related to Artificial Intelligence (AI) and *Dendrobium* Orchids with bibliographic concept [5]. AI is a fast-evolving field that has the potential to revolutionize diagnosis [6] and prevention of *Dendrobium* Orchids [7]. Systems that leverage AI can be used to analyze large amounts of data [8],[9], identify patterns [10], and make predictions. This can help expert diagnose naming of *Dendrobium* Orchids earlier and more accurately and develop more effective treatments.

Bibliometric analysis has become an important tool in understanding research trends and scientific developments in various fields [11],[12]. In this study, bibliometric analysis was used to explore and analyze research related to a particular topic, namely AI in the context of *Dendrobium* Orchids. Bibliometric analysis was performed using the Scopus database. The keywords "Artificial Intelligence" and " *Dendrobium* Orchids " are used to find relevant articles. Search results are limited to articles published in English until 2023. Google Scholar is the best database in *Dendrobium* Orchid [13]. However, the analytical viewpoint of the Google Scholar database is more complex than that of the Scopus database [11]. Artificial intelligence is a branch of computer science and this field is quantitatively more numerous in the Google Scholar database even though compared to the web Google Scholar database [14]. Therefore, we use Google Scholar database in this study. Bibliometric analysis reveals that the number of published articles on AI in the naming of *Dendrobium* Orchids has steadily increased over the last decade. Most of these articles are published in high-impact journals. The most active research countries in this field are Indonesia, United States and Switzerland. The bibliometric analysis also identified a number of research gaps in this area [13],[15]. For example, therefore it is very necessary to have a Decision Support System for *Dendrobium* Orchids at this time [15]. Further research is also needed to use AI to develop new treatments for dendrobium such as naming object [16].

The research gap that can be identified through this bibliometric analysis is the need to increase diagnostic accuracy in naming *Dendrobium* Orchids using AI. In this regard, research can be focused on developing more sophisticated algorithms to diagnose diseases with higher accuracy. In addition, attention should also be paid to increasing the sensitivity and specificity of using AI to support identification of *Dendrobium* Orhids [17]. In addition, this bibliometric analysis also reveals that machine learning and deep learning are the methods most widely discussed in research related to AI in Thalassemia. Therefore, the novelty of this study lies in the development of more advanced and complex learning techniques in the application of AI in identification of *Dendrobium* Orhids.

By understanding the gaps and opportunities for updating this research, it is hoped that further research can fill existing knowledge gaps and achieve significant progress in the use of AI for the treatment of *Dendrobium* Orhids.Thus, this research is expected to provide a valuable contribution to the development of science and progress in efforts to provide naming of Orchids [17]. The contribution made by this study is to find the potential need to improve diagnostic accuracy in the treatment of *Dendrobium* Orhids. Using AI so that high sensitivity

and specificity is needed in the use of AI to support the diagnosis and treatment of *Dendrobium* Orhids.

2. MATERIALS & METHODS

This study followed the stages according to the bibliometric analysis. The right keywords are the key to success in analysis according to bibliometric studies [18]. The article data analyzed in this study were obtained from the Google Scholar database with the keywords "Artificial Intelligence" and "*Dendrobium* Orchids". This research was carried out in accordance with predetermined systematic steps. The stages of bibliometric analysis are presented in Figure 1.

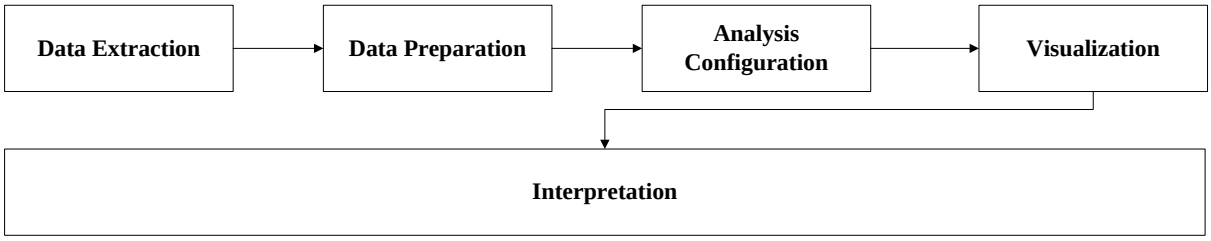

Figure 1. Stage of bibliometric analysis

2.1. Data Extraction

Data extraction refers to the process of systematically collecting relevant information from various sources, typically academic publications, and converting it into a structured format that can be analysed [19]. Data extraction aims to gather the raw information needed for analysis. This stage requires careful attention to detail to ensure accurate and consistent capture of data elements. Data Extraction in bibliometric analysis is the process of gathering and extracting relevant information from the raw data sources used in the study [20],[21]. Data extraction is the first step in the process of bibliometric analysis and is essential to obtain datasets suitable for research purposes.

By performing good data extraction, researchers can obtain structured, complete, and relevant datasets for bibliometric analysis [22],[23]. Efficient data extraction allows researchers to proceed to the analysis phase with information that has been collected systematically. Combined with good data preparation, proper data extraction can provide a solid foundation for gaining valuable insights and findings through bibliometric analysis.

2.2. Data Preparation

Data preparation involves processing and transforming the raw data obtained from the extraction stage into a format suitable for analysis [24]. This includes cleaning the data to correct errors, standardising inconsistent entries, removing duplicates, and structuring the data to enable meaningful analysis. Data preparation ensures that the data is reliable, consistent, and ready for statistical or computational analysis. Data preparation in bibliometric analysis is a crucial step in preparing raw data before analysis. Compiling data simplifies and organises data so that it can be processed and analysed more effectively and efficiently [25]. Data was prepared by collecting bibliographic data to be used in the analysis in the research information system (.ris) file format [26]. The need to ensure bibliographic data includes information such as article title, author's name, year of publication, journal of publication, keywords, and other important information. If the bibliographic data does not contain complete information, it is necessary to enrich it.

2.3. Analysis Configuration

Researchers can obtain more focused and relevant analysis results through the proper configuration of bibliometric analysis. The selection of methods, units of analysis, calculation techniques, and other parameters must be adjusted to the research objectives and the data characteristics used [27],[28]. The proper configuration will help reveal trends, patterns and valuable information related to the research topic in the scientific literature. In this study, the type of analysis used was co-occurrence analysis, with the unit of analysis involving all relevant keywords, using the "Full count" calculation method with a threshold of 2. The number of keywords selected was 47.

2.4. Visualization

Using graphical visualisations makes it easy to see and understand complex collaboration networks. Visualisation can make it easier to identify related clusters and see research themes emerging from bibliometric data [18], [29]. Visualisation can also make identifying related clusters easier and seeing research themes emerging from bibliometric data.

2.5. Interpretations

It is essential to interpret the visualisation results displayed by VOSviewer by identifying the formed clusters and observing the patterns of relationships between documents or keywords in these clusters [30]. Next, pay attention to the keywords that appear most often or are most typical in the analysis results.

3. RESULTS

Articles that have been obtained from the Google Scholar database are then identified based on the field of study. This identification is essential because it makes it easier to find the many fields of study discussing research topics with the keywords "artificial intelligence" and "*dendrobium* orchids". Research trends regarding *dendrobium* orchids can be seen based on the number of articles published yearly. The number of papers and country we have collected in the last one decades is presented in Figure 2.

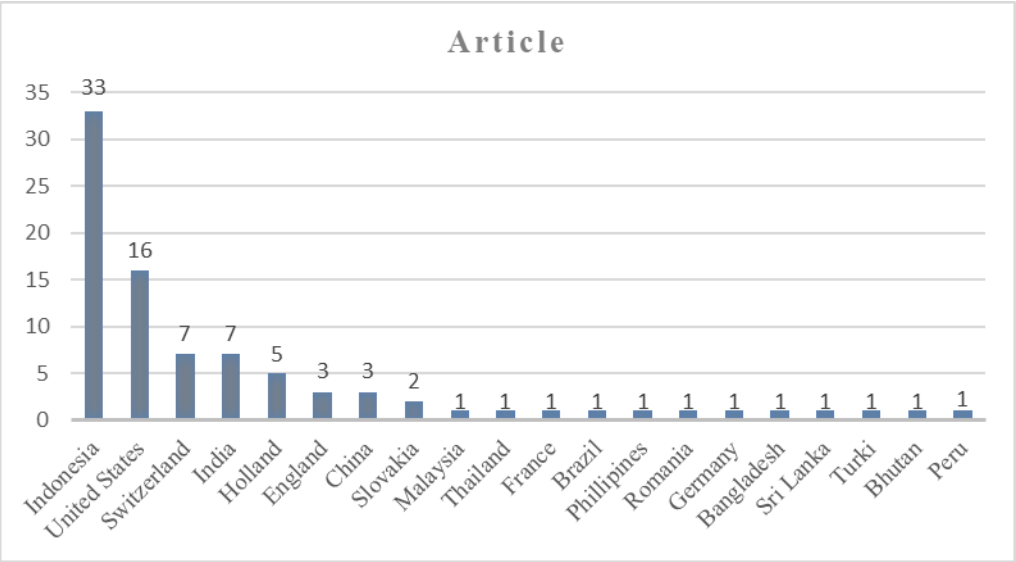

Figure 2. Number papers and country publish the paper

In general, the number of papers related to these keywords continues to increase every year. Even though it experienced a decline, in the following years the number continued to increase. It is possible that in the next few years, this issue will still be a hot topic to discuss

and presented. The number of papers by country successively found in 20 countries, namely Indonesia (33), United States (16), Switzerland (7), India (7), Holland (5), England (3), China (3), Slovakia (2), Malaysia (1), Thailand (1), Philippines (1), Sri Lanka (1), France (1), Brazil (1), Romania (1), Germany (1), Bangladesh (1), Turki (1), Bhutan (1), and Peru (1). Indonesia, United States and Switzerland are the countries with the highest number of studies related to these keywords. This shows that these countries have a high interest in developing AI technology for indonesian *dendrobium* orchids. the results of this analysis can also be used to identify countries that can become partners in research on artificial intelligence [31] for *dendrobium* orchids

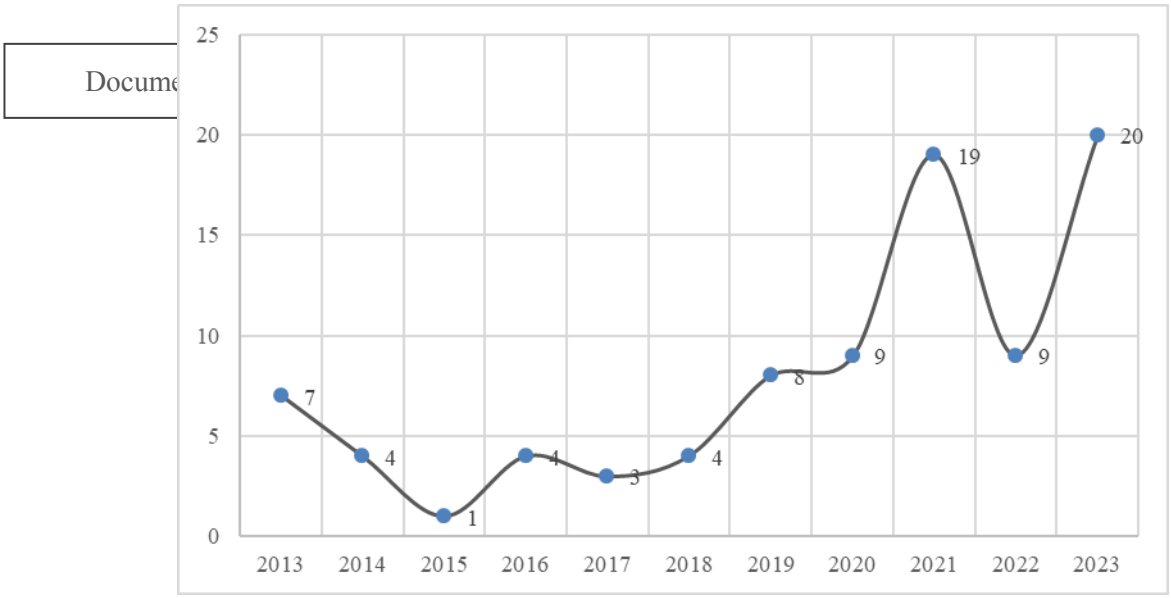

Figure 3. Trend of publication

Based on the field of study of the article with these keywords, we got in years 2013(7), 2014(4), 2015(1), 2016(4),2017(3), 2018(4), 2019(8), 2020(9), 2021(19), 2022(9), 2023(20). This shows that there are many authors who are interested in discussing research topics with these keywords and displays in Figure 3.

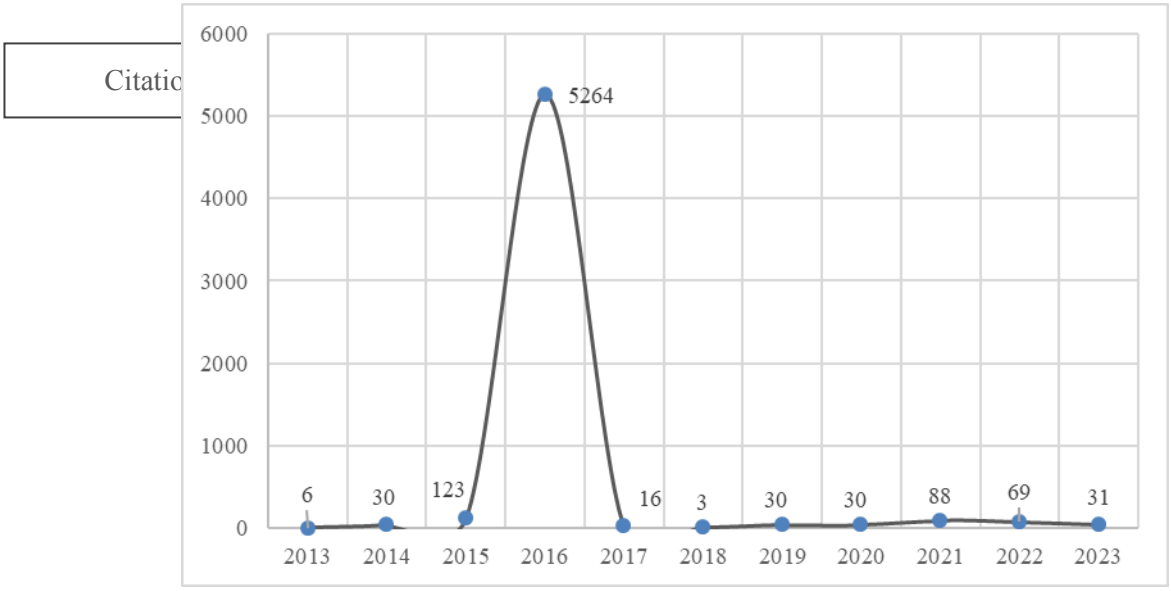

Figure 4. Trend of Citation

Figure 4 shows that papers experienced movement in the number of citations, the highest citations were for papers published in 2018 with 5096 citations and the lowest in 2018 with 3 citations. This shows that this theme will continue to develop [32] as material for research discussions.

We also get ten authors who write the most according to these keywords and get much citation. PB Tomlinson have published 1 paper in 2016 with largest citation as 5086 cite. A Hinsley, TE Lee and JR Harrison has published 1 paper in 2016. This shows that there are many paper authors who consistently discuss this topic which are published in google scholar and get more cite.

Table 1. Top ten most-cited papers in artificial intelligence for *dendrobium* orchid

No	Title	Total Citation	Average Per Year	Country	Publisher	Authors	Year
1st	The botany of mangroves & Orchids	5086	635.75	United States	Cambridge University Press	PB Tomlinson	2016
2nd	Estimating the extent and structure of trade in horticultural orchids via social media	125	15.63	United States	Wiley Online Library	A Hinsley, TE Lee, JR Harrison	2016
3rd	Formosa: a study in Chinese history	123	13.67	Switzerland	books.google.com	W. G. Goddard	2015
4th	Implementation of Lenet Deep Learning with Data Augmentation in Orchid Identification	111	111.00	Indonesia	jim.teknokrat.ac.id	F Rizki, MPK Putra, MA Assuja	2023
5th	Orchid fever: a horticultural tale of love, lust, and lunacy	53	6.63	United States	books.google.com	E Hansen	2016
6th	Curatorial practices for botanical gardens	47	23.50	United States	books.google.com	TC Hohn	2022
7th	Progress and prospects of mycorrhizal fungal diversity in orchids	46	15.33	Switzerland	frontiersin.org	T Li, W Yang, S Wu, MA Selosse, J Gao	2021
8th	Ecological niche modelling of the pantropical orchid Polystachya concreta (Orchidaceae) and its response to climate change	21	5.25	London	nature.com	M Kolanowska, A Rewicz, P Baranow	2020
9th	Orchid-type classification using supervised learning algorithm based on feature and colour extraction	19	6.33	Indonesia	beei.org	PN Andono, EH Rachmawanto, NS Herman	2021
10th	Mangrove health: A review of functions, threats, and challenges associated with mangrove management practices	19	19.00	Switzerland	mdpi.com	H Akram, S Hussain, P Mazumdar, KO Chua, TE Butt	2023

VosViewer is a tool that can be used to discover research novelties using bibliometric analysis techniques. We use co-occurrence in this bibliometric analysis. Co-occurrence refers to the simultaneous occurrence of two or more keywords or terms in a particular document or collection of documents. This concept is used to identify relationships and patterns of presence of keywords or terms in scientific literature. In this bibliometric analysis, co-occurrence is applied to various elements, such as keywords, words in the title of the article, or terms in the abstract. In this context, co-occurrence can provide insight into topics or subtopics that frequently appear together in the scientific literature. Visualization of the relationship between keywords processed using the VosViewer application is presented in Figure 5.

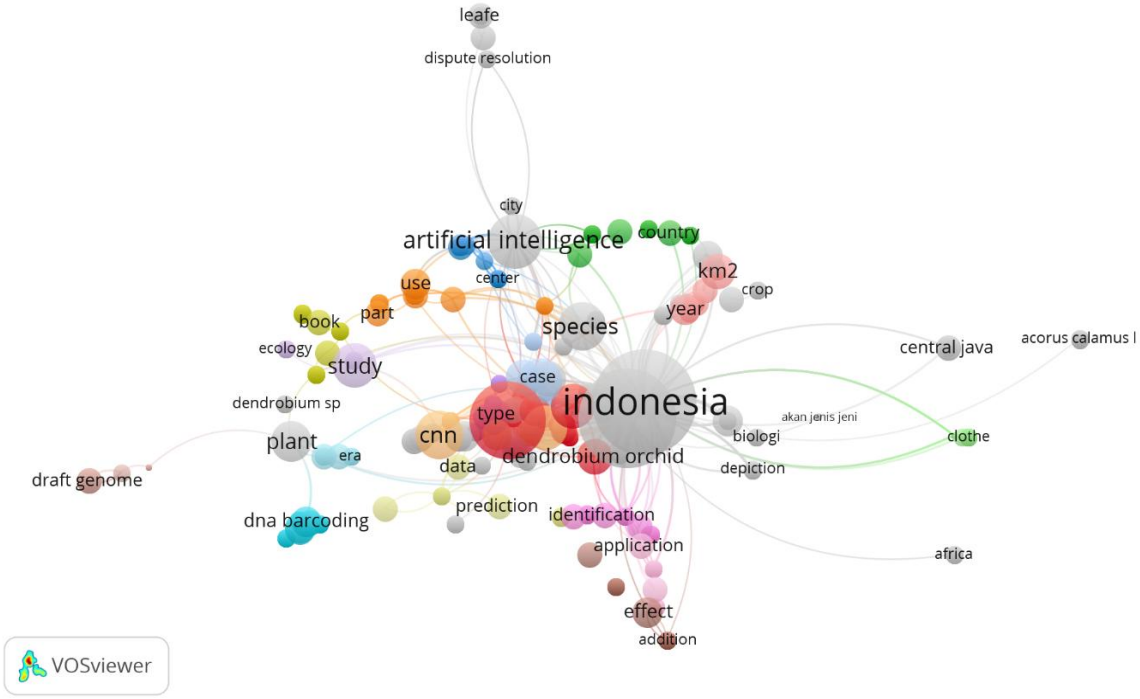

Figure 5. Network visualisation

Based on the network visualization shown in Figure 5 with the keywords " *Dendrobium* Orchids " and "Artificial Intelligence", here we can see a topic that we can use as a reference in obtaining new opportunities, namely "diagnostic accuracy". This topic is worthy of consideration as a research topic because it is the furthest node from the two main keywords [28]. Meanwhile, to see trends in related research topics using the overlay visualization presented in the Figure 6. The goal of overlay visualisation is to help researchers understand the complex relationships between different elements in the scientific literature. By overlaying bibliometric data visualization, we can identify patterns, trends or relationships that might not be obvious. Meanwhile, based on the overlay visualization, the two topics were hot issues discussed recently. Meanwhile, based on the density visualization presented in Figure 7.

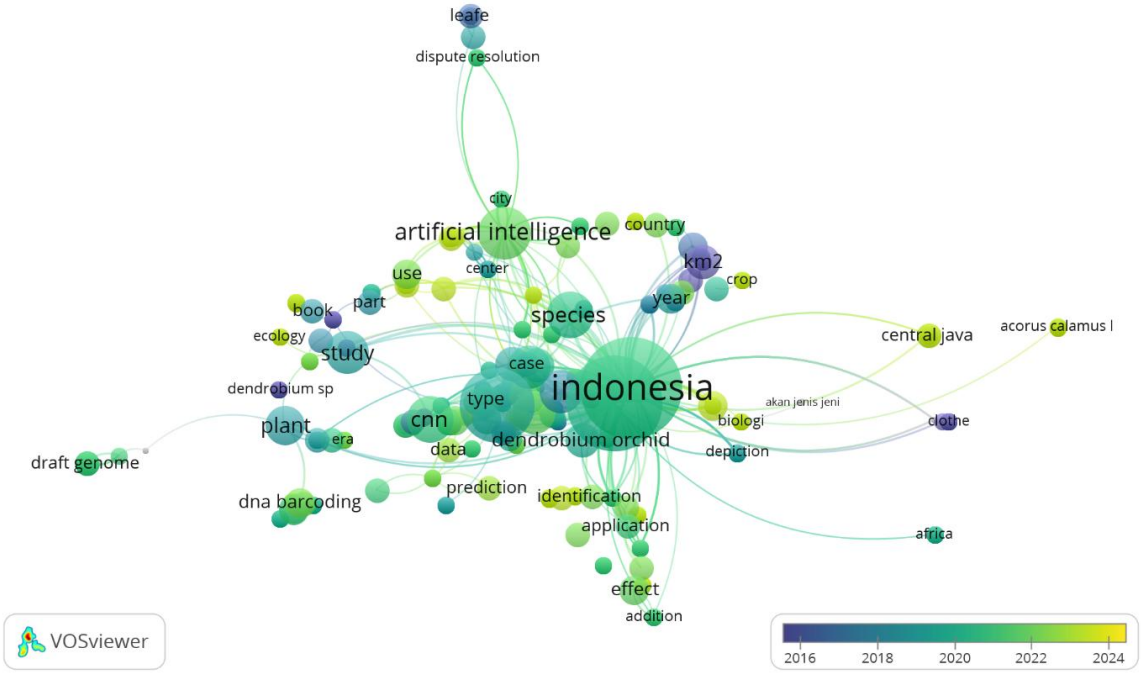

Figure 6. Overlay Visualization

The density visualization shows the number of article nodes for each topic. The more articles there are, the thicker and clearer the knot will be. On the other hand, nodes will fade as the number of articles decreases.

Figure 7 show that the research topic of diagnostic accuracy is the furthest node, is a topic that has begun to be discussed recently, and is still rarely discussed. These findings indicate that there is an unexplored space in the use of AI to increase the *Dendrobium* Orchids. This suggests that deeper and broader research on this topic can make a significant contribution to the fields of *Dendrobium* Orchids and AI. With this new potential, further research on diagnostic accuracy can provide new insights and innovative methods to improve the accuracy and effectiveness of *Dendrobium* Orchids. This kind of research can help improve early detection, more accurate classification, and the development of a personalised approach to treating *Dendrobium* Orchids. However, it should be noted that this novelty still has potential and requires further research and development to fully explore its possibilities. Research involving practical implementation and validation of a more extensive and diverse population of *Dendrobium* Orchids data will be an essential step to test the effectiveness and novelty of the AI approach in increasing diagnostic accuracy of *Dendrobium* Orchids problems.

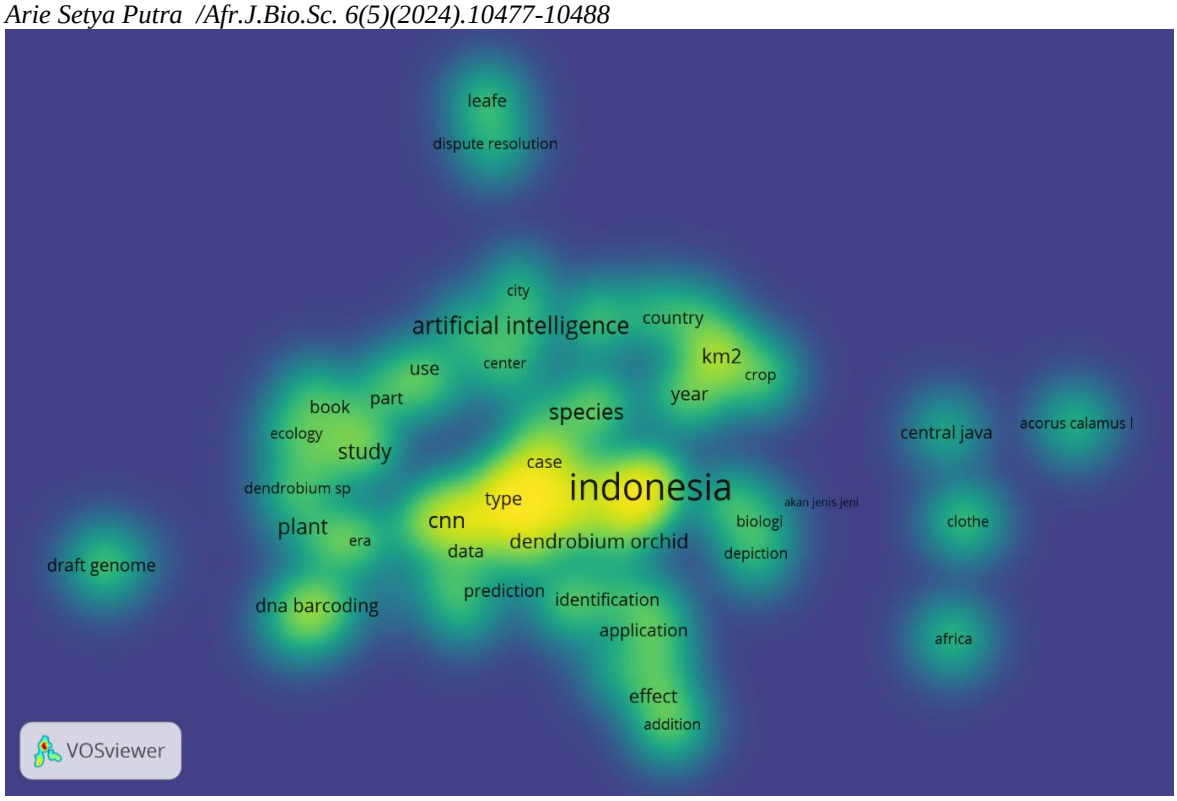

Figure 7 Density Visualization

The results of this bibliometric study also open up opportunities for collaboration with international authors. International authors may have more in-depth knowledge of the latest developments in *dendrobium* orchids research and may have access to different resources.. *dendrobium* orchids research often requires access to naming of Indonesian Orchids. Collaboration with international authors can help gain access to larger data collections and samples, which may be difficult to achieve when working independently. Collaboration with international authors who have different backgrounds or expertise in related fields can open up opportunities for more comprehensive multidisciplinary research. This can help explore new aspects of *dendrobium* orchids and create a more holistic solution.

4. CONCLUSION

This research summarizes the latest advances in artificial intelligence technology in *dendrobium* orchids research. In this study, we found that the emerging trend was "diagnostic accuracy". Future research on the problem of *dendrobium* orchids based on artificial intelligence can consider the results of this bibliometric analysis to obtain more possible novelties. . Our findings will provide valuable clues relevant to future research directions on *dendrobium* orchids using artificial intelligence technologies.

ACKNOWLEDGEMENT

We thank Universitas Mitra Indonesia for supporting this research in contract number S.14/Umitra/P.011/S3. Thank you to the Liwa Botanical Gardens for supporting this research as well.

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