Non-Fungible Token (NFT) Overview Research Trends

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Abstract

Non-Fungible Tokens (NFTs) now becomes the latest digital currency phenomenon. This phenomenon began in 2014 and widely used in nowadays. Based on this phenomenon, this research was carried out. The research conducted to do overview research related to Non-Fungible Tokens based on the SCOPUS database from 2017-2021. From the search results of the SCOPUS database, it was found that there were 68 studies related to Non-Fungible Tokens from 2017-2021. The most numerous documents are conference papers (N=37) and the publication source with the most documents (N=5) is Lecture Notes In Computer Science Including Subseries Lecture Notes In Artificial Intelligence And Lecture Notes In Bioinformatics. The country with the most Non-Fungible Token keyword research is the United States (N=14). While the subject area of research that discusses the most Non-Fungble Token is Computer Science (N = 54). Based on the results, the research trend over Non Fungible Token is related to 2 cluster which is about Blockchain and Technology. So, there is there are still many opportunities for other research to be carried out outside the two clusters and their relationships.

Keywords
Non-Fungible Token, Overview, Research, Trend and Bibliometric.

1. Introduction
Developments in the field of technology and information have an impact on the emergence of various phenomena that accompany it within the scope of the global community. One of the developments in the field of technology and information that present nowaday and becoming a new phenomenon in the global community is the Non Fungible

Token (NFT). Based on the search for the keyword "NFT" on Google Trend Indonesia in the period January 2021-January 2022, the search increase is more than 100%.

Based on this data, it shows that NFTs are becoming a new phenomenon that is still open to research opportunities. Thus this research was conducted to review the research on Non Fungible Tokens that had been carried out previously. This is done to see research opportunities related to Non Fungible Tokens from a point of view that has not been studied before. For this reason, this research is limited to 2017-2021, so that the results of research trends related to Non Fungible Tokens that have been carried out can be found.

1.1 Objectives

The purpose of this study is to conduct the research trend related to Non Fungible Token. This research is based on publications in the Scopus database during 2017-2021. This was done to do an overview about research trends that related with Non Fungible Token. In addition, this research can also present data related to various research topics that have not received enough attention. So that it can enrich research related to Non Fungible Token, which in fact is still a new topic of the decade.

2. Literature Review

Developments in the field of technology and information have an impact on the emergence of various phenomena that accompany it within the scope of the global community. Special phenomenon is paid to tokenization. One of the developments in the field of technology and information that present nowaday and becoming a new phenomenon in the global community is the Non Fungible Token (NFT).

Referring to Mirriam-Webster, NFT or Non-Fungible Token has a definition as a unique digital identifier that cannot be copied, substituted, or subdivided, and recorded in a blockchain that is used to certify authenticity and ownership (as a digital asset and the specific rights associated with it) (Webster-Merriam, 2021). Blockchain is a database with distinguishing characteristics, indicated by storing information (Lewis, 2018). Blockchain technology comes from "Bitcoin". A distributed shared ledger that links data sequentially do this by blocking into the data chain and using cryptographic algorithms and make sure that the data is not tampered (Zeng, 2020).

3. Methods

This study used bibliometric methods. Bibliometric is a type of qualitative and quantitave evaluation (Wang et al., 2021). These variables were measured using the following criteria: institutional, affiliation, productive author, subject area, source document, year of publication, number of copies by country, and paper citation (Maulana et al., 2021). Data collection is done by identifying keywords based on Scopus database. This is because Scopus is one of the centers of a comprehensive database related to citatons and abstracts of literature reviewed (Zahra et al., 2021). Data is collected based documents search within article title, abstract, and keywords. The documents search is TITLE-ABS-KEY *(non* AND *fungible* AND *token*), and also (EXCLUDE(PUBYEAR, *2022*)).

4. Data Collection

Based on Scopus database, 68 documents were found related to the title, abstract, and keywords containing the word Non Fungible Token. The data restrictions is excluding 2022 as the time of publications. So, the data conducted in time range between 2017-2021. The documents than extradited in RIS format for proccessing with help of the VOSviewer software.

5. Results and Discussion

5.1 Documents by Years of Non Fungible Token Publication

The number of Non Fungible Token publications from 2017-2021 shows an upward trend every year. In 2017 the number of publications was 1 document. Then it continues to increase in 2018 is 2 documents, 2019 is 5 documents, 2020 is 12 documents, and 2021 is 48 documents. In 2021 the number of documents increased significantly (Figure 1).

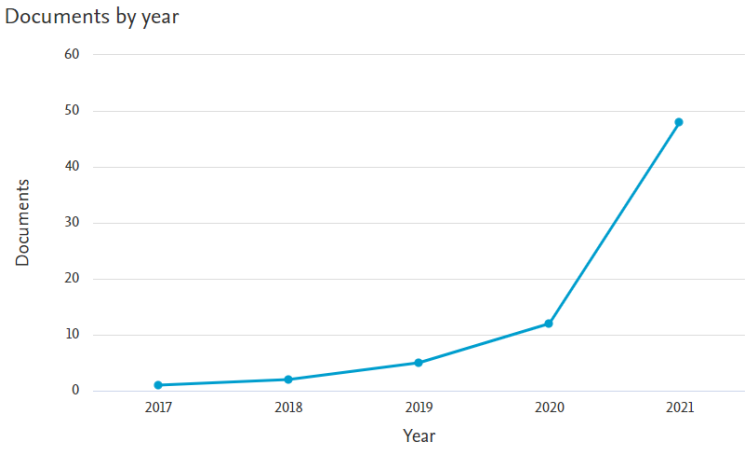

Figure 1. Graph of the increase in the number of Non Fungible Token documents from 2017-2021 on SCOPUS

5.2 Documents per Year by Source of Non Fungible Token

Publication data with the keyword Non Fungible Token in each year finds 5 publications with the highest level of documents. The first publication was Lecture Notes In Computer Scince Including Subseries Lecture Notes In Artificial Intelligence And Lecture Notes In Bioninformatics totaling 5 documents. The second publication, namely Cens, amounted to 4 documents. The third publication, namely the Ceur Workshop Proceedings, amounts to 3 documents. The fourth publication, the ACM International Conference Proceeding Series, has 2 documents. And the fifth publication is Advances in Information Security totaling 1 document (Figure 2).

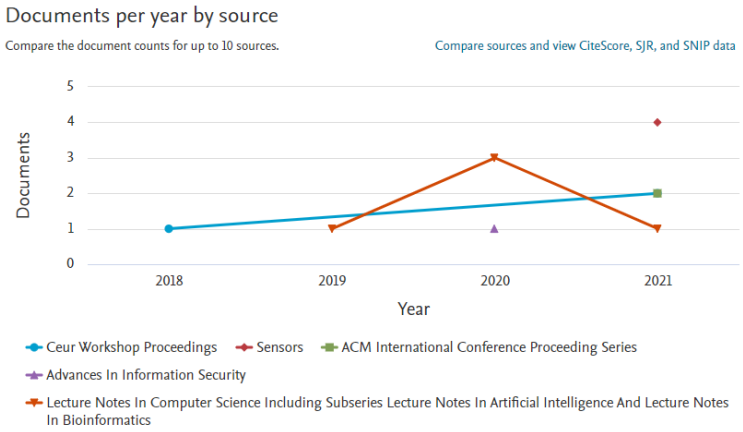

Figure 2. Graph of the highest documents per year by source of Non Fungible Token documents from 2017-2021 on SCOPUS

5.3 Documents by Type of Non Fungible Token Publication

Based on the analysis of SCOPUS data, there is a percentage of document sources. The data shows that the most documents are Conference Papers totaling 37 documents (54.4%). There were 24 documents (35.3%). Book Chapters total 2 documents (2.9%). Conference Review totaled 2 documents (2.9%). Letters total 1 document (1.5). Notes totaled 1document (1.5%).and Short Survey amounted to 1 document (1.5%) (Figure 3).

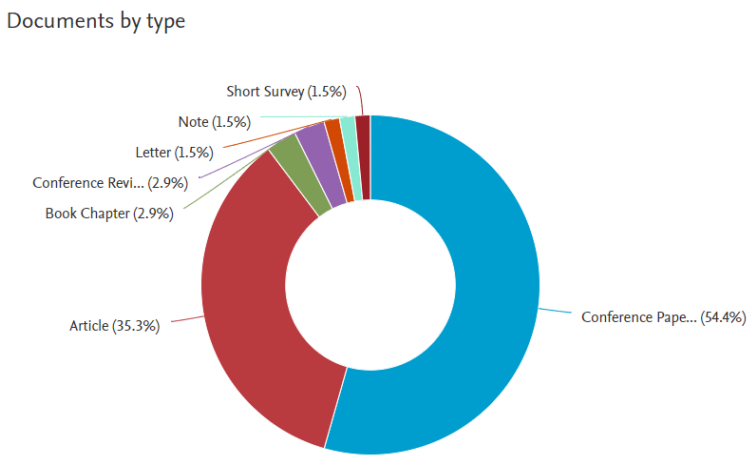

Figure 3. Graph of the persentation documents by type,
sourced by Non Fungible Token documents from 2017-2021 on SCOPUS

5.4 Documents by Country/Territory of Non Fungible Token Publication

The regions or countries with Non Fungible Token publications that are in the top 10 list are the United States with 11 documents, United Kingdom with 7 documents, Italy with 4 documents, Netherlands with 4 documents, Spain with 4 documents, Australia with 3 documents, Canada with 3 documents, China with 3 documents, Germany with 3 documents, and New Zealand with 3 documents. The United States is the country with the highest Non Fungible Token publication, with 11 documents (Figure 4).

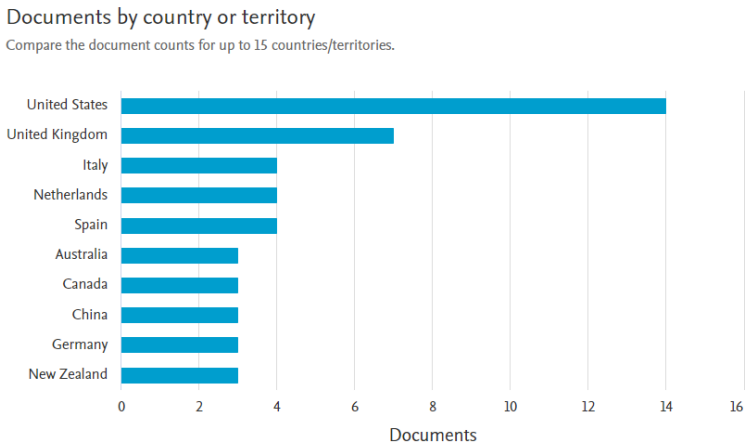

Figure 4. Graph of the highest documents by country/territory,
sourced by Non Fungible Token documents from 2017-2021 on SCOPUS

5.5 Documents by Affiliation of Non Fungible Token Publication

There are top 10 affiliates of the data related to the publication of Non Fungible Token. The affiliates are Consejo Superior de Investigaciones Cientificas with 2 documents. University College London with 2 documents. Instituto de Microelectronica de Sevilla with 2 documents. The University of Edinburgh with 2 documents. Ecole Polytechnique Federale de Lausanne with 2 documents. Pohang University of Science and Technology with 2 documents. Universidad de Sevilla with 2 documents. University of China with 1 document. University of Los Angeles with 1 document, and Paris School of Business with 1 document(Figure 5) .

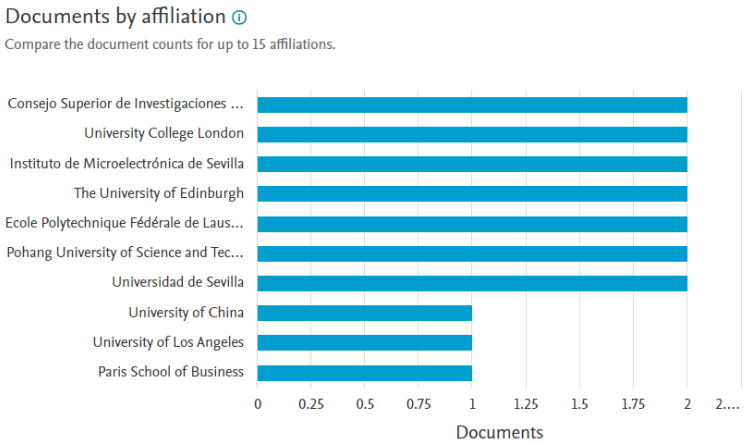

Figure 5. Graph of the highest documents by affiliation,
sourced by Non Fungible Token documents from 2017-2021 on SCOPUS

5.6 Documents by Subject Area of Non Fungible Token

The subject area of the Non Fungible Token research subject from SCOPUS data during 2017-2021 saw several dominant area subjects. Subject area in the field of Computer Science dominates with 54 documents (38.0%). The field of Engineering with 19 documents (13.4%). The field of Decision Sciences 12 documents (8.5%). The field of Social Sciences 10 documents (7.0%). The field of Business, Management, and Accounting with 8 documents (5.6%). The field of Mathematics with 8 documents (5.6%). The field of Physics and Astronomy with 8 documents (5.6%). The field of Arts and Humanities with 5 documents (3.5%). The field of Biochemistry, Genetics, and Molecular Biology with 4 documents (2.8%). The field of Chemistry with 4 documents (2.8%). The other fields is Material Science; Economics, Macroeconomics and Finance; Medicine; Chemical Engineering; Multidisciplinary; and Neuroscience with both of field is 1 document (the total percentage is 7%) (Figure 6).

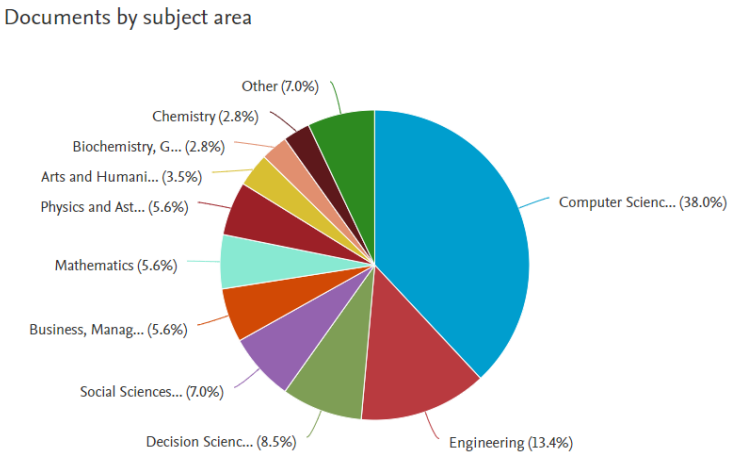

Figure 6. Graph of the highest documents by subject area,
sourced by Non Fungible Token documents from 2017-2021 on SCOPUS

5.7 Documents Most Cited of Non Fungible Token

Based on the analysis of SCOPUS data from 2017-2021, 5 documents with the highest number of citations were found. "Tracing manufacturing proceses using blockchain-based token compositions" with 65 citations. This document published in 2020 on Digital Communications and Networks 6(2), pp. 167-176 in 2020 (Westerkamp et al., 2020). "Lorikeet: A model-driven engineering tool for blockchain-based business process execution and asset management" with 39 citations. This document published in 2018 on CEUR Workshop Proceedings 2196, pp. 56-60 (Tran et al.,

2018). "Decentralized cloud manufacturing-as-a-service (CmaaS) platform architecture with configurable digital assets" with 31 citations. This document published in 2020 on Journal of Manufacturing Systems 56, pp. 157-174 (Hasan & Starly, 2020). "Construction payment automation using blockchain-enabled smart contracts and robotic reality capture technologies" with 15 citations. This document published in 2021 on Automation in Construction 132, 103926 (Hamledari & Fischer, 2021). "NFTs in practice – Non fungible tokens as core component of a blockchain-based event ticketing application" with 12 citations. This document published in 2019 on 40th Internation Conference on Information Systems, ICIS 2019 (Regner et al., 2019).

5.8 Ovierview Research Trend of Non Fungible Token

In order to be able to overview research trends related to Non Fungible Token, VOSviewer software assistance is used. The data visualization results found 2 related clusters based on the title and abstract. A green cluster consisting of Blockchain. This cluster is related to systems, smart contracts, and ethereum. The second cluster is the red cluster. The red cluster consists of Technology. This cluster is related to paper, non fungible tokens, nfts, nfts, and challenges (Figure 7).

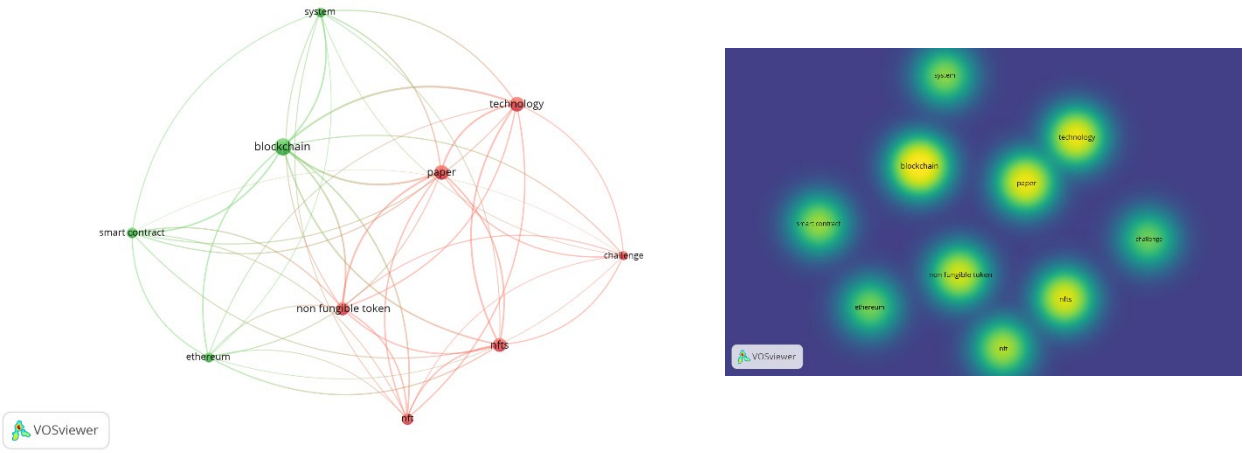

Figure 7. Network visualitation (left) and density visualization (right) Non Fungible Token by VOSviewer

5.7 Author Publication Network of Non Fungible Token

Based on VOSViewer map based on bibliographic data found 1073 authors with a minimum number of documents of an author is 3. There are 3 authors meet the threshold with documents related to Non Fungible Token. There is Arjona, R; Arcenegui, J; and Baturone, I (Figure 8).

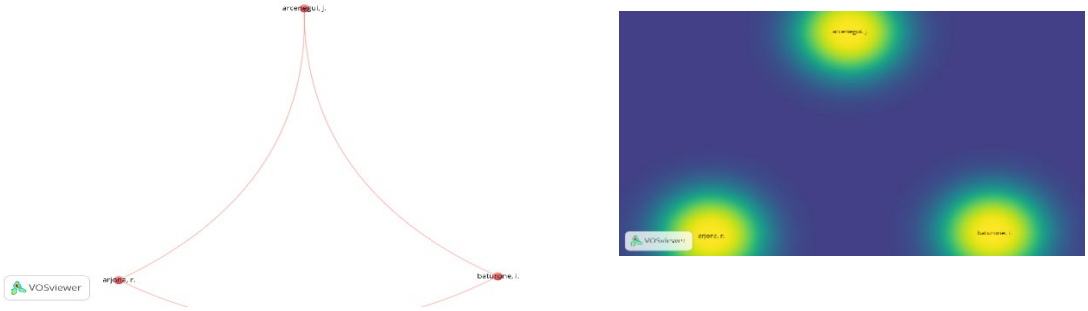

Figure 8. Network visualitation (left) and density visualization (right) Non Fungible Token by VOSviewer

6. Conclusion

Based on the data related to Non Fungible Token sourced from SCOPUS database around 2017-2021 found a few results. The first result is that a document related to Non Fungible Token shows an increasing trend, especially starting from 2017 to 2021. In 2017 there only 1 document found and then continued increased to 48 documents in 2021.
The dominant type of document is conference paper with 37 documents or 54.4% compared to other source such as article (35.3%), book chapter (2.9%), conference review (2.9%), letter (1.5%), note (1.5%), and short survey (1.5%).
The largest source of documents is in the publication of Lecture Notes In Computer Science Including Subseries Lecture Notes In Artificial Intelligence And Lecture Notes In Bioinformatics, which is 5 documents.
The country with the most documents is the United States with 14 documents. The affiliate with the dominating number of 2 documents is Consejo Superior de Investigaciones Cientficas. Related to the Non Fungible Token, the most area subjects are in the field of Computer Science with a percentage of 38.0% or 54 documents. The document with the most citations was "Tracing manufacturing processes using blockchain-based token compositions" in 2020 with 65 citations. Research trends related to Non Fungible Token found there are 2 clusters which is green clusters consisting of Blockchain and related with systems, smart contracts, and ethereum. The second cluster is the red cluster consisting with Technology and related to paper, non fungible tokens, nfts, nfts, and challenges. Based on the results, the research trend over Non Fungible Token is related to 2 cluster which is about Blockchain and Technology. So there is there are still many opportunities for other research to be carried out outside the two clusters and their relationships.

Acknowledgements

This research is part of "BRUN: Binus Research Untuk Nusantara", internal research grant from Bina Nusantara University.

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Biographies

Raden Aditya Kristamtomo Putra born in Bandung, December 7, 1984, since 2016 until now he has worked as a lecturer, currently at Bina Nusantara University, Indonesia. His areas of expertise are finance and entrepreneurship. He graduated with a Bachelor of Petroleum Engineering from a concentration in oil and gas economics at the Bandung Institute of Science Technology in 2002 to 2008, then completed a master's degree from a concentration in Financial Management at Padjadjaran University Bandung from 2008 to 2010 and completed the doctoral studies at the Doctoral Management Science from financial management concentration at Universitas Pendidikan Indonesia from 2017 to 2020. The research that has been published and indexed on Scopus is 1 article and 22 articles on Google Scholar.

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