Co-Authorship Visualization of Research on COVID-19 from Web Co-Authorship Visualization of Research on COVID-19 from Web of Science Data using Bibliometric Analysis

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Abstract

Bibliometric analysis is one of the research approaches that utilizes quantitative and mathematical data to address problems posed in the context of visualization to see patterns in the field of science. In fact, bibliometric analysis may also include a wider overview of the names of the most influential writers in the area of science. This data analysis would discuss the co-authorship of COVID-19 research covering author productivity and author collaboration. The data was collected on 11th May 2020 of Web of Science (WoS) Core Collection database. The literature review was conducted using the keyword: TOPIC: ("covid") AND YEAR PUBLISHED: (2020). The bibliometric analysis is visualized utilizing the VosViewer software. Type of analysis using co-authorship with unit of analysis are authors, and countries.

Keywords: Covid-19; Co-Authorship; Bibliometric Analysis; Web of Science.

1. Introduction

In last of 2019 (December 2019), there is one incident that has shocked the world, namely the COVID-19 pandemic (Mansi, 2020; Ahmar & Boj, 2020; Patil, Patel, & Sarkar, 2020). Hence, the overall public health crisis in food nutrition takes under consideration to decreased. The political, cultural, and socio-economic impacts of this pandemic can jointly cause significant changes in human society like increased remote-jobs, localization of worldwide supply chains, and increased political polarization (Rana, et.al., 2020).

Lately the world is enlivened by an outbreak of COVID-19 or Coronavirus diseases. Corona Virus Diseases (COVID-19) is a virus that was first discovered in Hubei Province, China. This disease affected millions of the world's population and killed hundreds of people. There are other casualties, not only individual offenders, but they also impact the nature and social life of the society. The cause of this epidemic is a virus named Coronavirus that affects the immune system of the human body (Chowdhury, et. al., 2020).

Progress and development trends in COVID-19 have been analyzed by numerous researchers and the findings of these studies have been listed in the Web of Science publication database and the number of Covid-19 experiments continues to increase. Bibliometrics analysis on Covid19 in the Web of Science database are still lacking by researchers (Fan, et.al. 2020;

Gong, et.al., 2020). Bibliometric analysis is one of the research approaches that utilizes quantitative and mathematical data to address problems posed in the context of visualization to see patterns in the field of science.

2. Methods

The bibliometric method used in this analysis. This data analysis would discuss the co-authorship of Covid-19 research covering author productivity and author collaboration. The data was collected on 11th May 2020 of Web of Science (WoS) Core Collection database included citation indexes: Science Citation Index Expanded (SCI-EXPANDED), Social Sciences Citation Index (SSCI), Arts & Humanities Citation Index (A&HCI), Conference Proceedings Citation Index- Science (CPCI-S), Conference Proceedings Citation Index- Social Science & Humanities (CPCI-SSH), Book Citation Index– Science (BKCI-S), Book Citation Index– Social Sciences & Humanities (BKCI-SSH), and Emerging Sources Citation Index (ESCI). The literature review was conducted using the keyword: ***TOPIC: ("covid") AND YEAR PUBLISHED: (2020).*** The bibliometric analysis is visualized utilizing the VosViewer software. Type of analysis using co-authorship with unit of analysis are authors, and countries; counting method is full counting; the maximum number of authors per document is 100; minimum number of documents of an authors is 1; and minimum number of citations of an authors is 0. Based on analysis, there are 11520 authors and 2975 connected items.

3. Results and Discussion

Bibliometrics is a area of research that examines the quality and dissemination of scientific articles in a variety of scientific areas. This bibliometric analysis can be done in the form of authorship analysis, quotation analysis, authorship collaboration, document obsolescence, and so on. In fact, bibliometric analysis may also include a wider overview of the names of the most influential writers in the area of science.

Out of the findings of the WoS search, 2954 publications is composed of 11 document types as can be seen in Table 1.

Table 1 Document type of the collection of metadata on Keyword “Covid” and Year Publication “2020”

Type	No. of article	Percentage
Early access	1075	26,67
Article	978	24,26
Editorial material	924	22,92
Letter	532	13,20
Review	258	6,40
News item	235	5,83
Correction	25	0,62

Type	No. of article	Percentage
Meeting abstract	1	0,02
Biographical item	1	0,02
Proceedings paper	1	0,02
Data paper	1	0,02

Table 1 showed that the number of Covid publications in WoS with early access is 1075, the papers 978 and the paper reviews 258. And as many as 25 articles have been corrected. Early Access indicates an article that has been electronically published by a journal before it has been assigned to a specific volume and issue. These articles are also known as "articles in press" or "publish ahead of print" depending on the publisher's branding.

Table 2 Open access document

Type	No. of article
All Open Access	2601
DOAJ Gold	517
Other Gold	286
Bronze	1865
Green Published	1051
Green Accepted	84

From the table 2 shown that there are 2601 publication with open access type. The dominan of open access by Bronze type and this meaning that There are 1865 publications given free access to the article for a limited period of time; and 1051 publication with green published type that final published versions of articles hosted on an institutional or subject-based repository (e.g. an article out of its embargo period posted to PubMed Central).

Table 3 Languages of document

No	Language	No. of article	Percentage
1	English	2842	96,21
2	German	43	1,46
3	Spanish	16	0,54
4	Hungarian	12	0,41
5	French	11	0,37
6	Portuguese	9	0,30
7	Norwegian	6	0,20
8	Czech	4	0,14

No	Language	No. of article	Percentage
9	Turkish	4	0,14
10	Italian	3	0,10
11	Polish	2	0,07
12	Icelandic	1	0,03
13	Russian	1	0,03

Table 3 indicates that there are 13 languages used in Covid research, which is dominated by English and European countries.

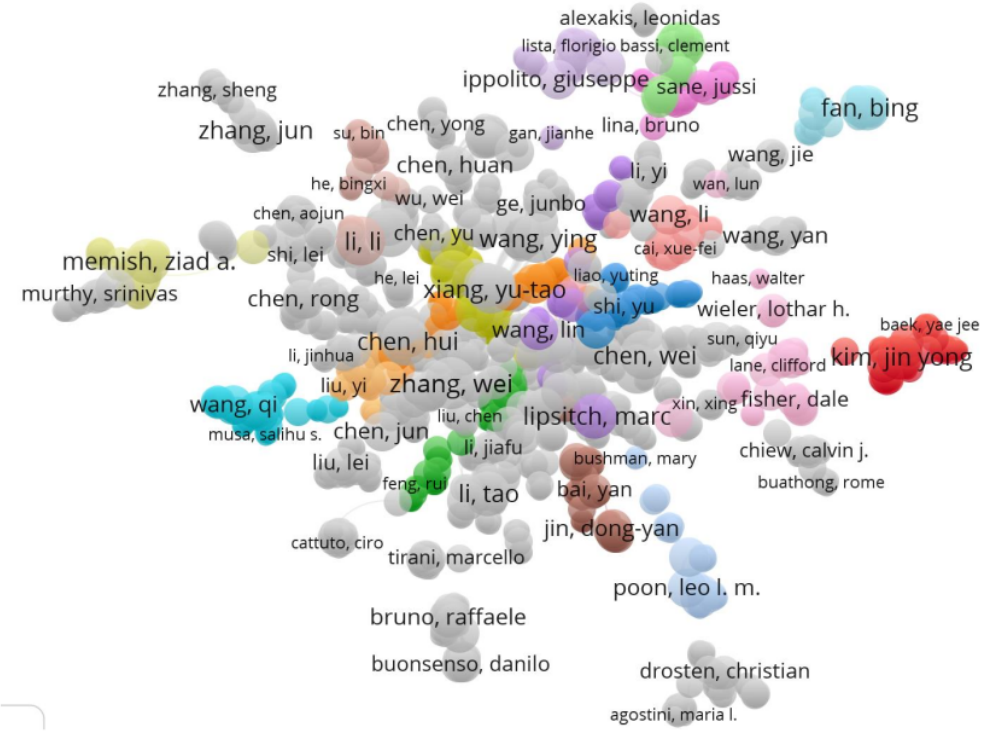

Figure 1 Network Visualization of Co-authorship (Authors unit analysis)

Figure 1 shown that the relationship between authorship and the color variations indicate the number of cluster researchers formed. Cluster analysis of the research co-authorship network shows that the network contains 61 clusters in various colors. Based on bibliometric analytics, there are 61 clusters of authorship. The summary of the clusters can be seen in table 4 and in detail the cluster can be seen in appendix 1.

Table 4 Summary of the clusters of Researchers

Cluster	Number of Researchers	Sum of Links weight	Sum of Documents weight	Sum of Citation weight
1	82	1262	106	18
2	81	864	92	114
3	81	1353	97	0
4	76	974	100	60
5	76	1173	93	36
6	74	948	102	0
7	72	1303	89	0
8	71	1634	91	0
9	69	2579	77	0
10	68	2728	76	2
11	67	4802	79	0
12	67	998	82	0
13	66	1580	84	0
14	66	1431	79	0
15	64	768	80	100
16	64	874	75	0
17	60	1807	74	0
18	59	586	92	0
19	59	862	74	0
20	58	2055	68	0
21	57	807	77	31
22	56	1046	65	0
23	56	846	67	3
24	56	1342	64	0
25	55	795	68	0
26	54	826	82	0
27	52	672	62	0
28	51	1997	55	0
29	49	791	59	6
30	49	1186	66	0
31	48	844	83	18
32	48	1809	54	0
33	46	825	55	0
34	46	617	56	0
35	45	738	55	138
36	45	779	50	0
37	44	1463	50	0
38	44	497	52	0
39	42	651	59	0
40	42	327	53	121
41	41	367	48	0
42	41	657	60	0
43	40	1575	41	0

Cluster	Number of Researchers	Sum of Links weight	Sum of Documents weight	Sum of Citation weight
44	38	547	46	0
45	35	411	51	0
46	35	897	59	44
47	34	411	40	0
48	33	350	39	0
49	32	275	37	3
50	32	316	56	0
51	30	394	35	26
52	29	362	35	0
53	28	369	37	0
54	28	772	29	0
55	25	233	34	0
56	21	242	23	0
57	20	187	22	0
58	20	400	20	0
59	19	193	20	0
60	15	180	18	0
61	14	61	20	24
Total	**2975**	**58638**	**3712**	**744**

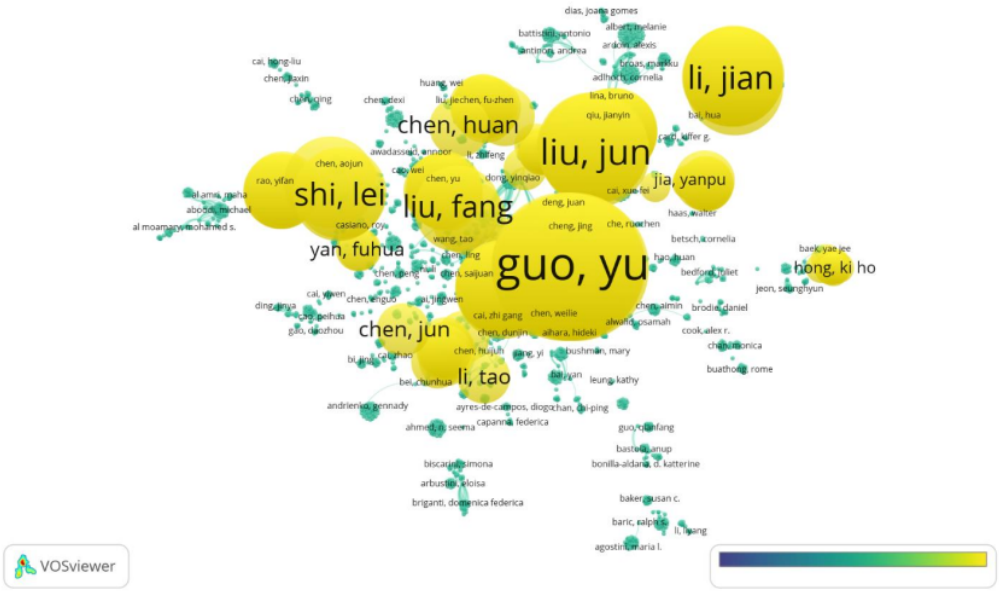

Figure 2 Overlay visualization of citations of Co-authorship (Authors unit analysis)

Figure 2 shown a visualization of the number of citations from each researchers. The most cluster citation is **Cluster of Guo, Yu** (with 23 citations) (Xia, 2020); **Cluster of Liu, Jun** (with 13 citations) (Zhao, et.al. 2020); **Cluster of Li, Jian** (with 10 citations) (Tian, et.al,

2020); **Cluster of Shi, Lei** (with 9 citations) (Xu, et.al., 2020); and **Cluster of Liu, Fang** (with 8 citations) (Liu, et.al, 2020).

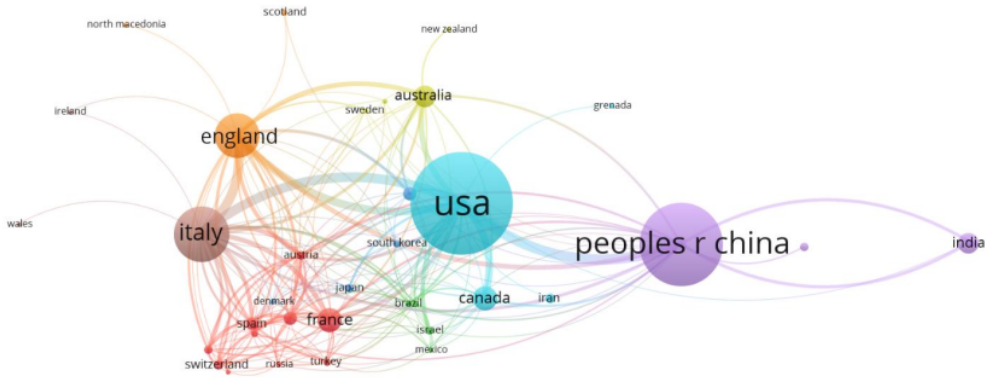

Figure 3 Network Visualization of Co-authorship (Countries unit analysis)

Figure 3 shown the Covid-19 publications are dominated by the USA, People's Republic of China, Italy, and England. The summary of number of publications per country can be seen in table 4. The table 4 also shown there are 36 countries grouped into 6 clusters.

Table 4 Summary of the clusters of Researchers

No.	Country	Cluster No.	No. of Documents	No. of Citations
1	USA	6	127	101
2	People's Republic of China	5	99	220
3	Italy	8	63	24
4	England	7	49	22
5	France	1	24	23
6	Canada	6	24	14
7	Australia	4	22	7
8	India	5	21	10
9	Germany	1	13	1
10	Singapore	3	12	1
11	Spain	1	11	3
12	Switzerland	1	9	3
13	Iran	6	9	1
14	Japan	3	8	9
15	Austria	1	8	3
16	Belgium	1	8	0
17	Taiwan	5	8	0
18	Netherlands	1	7	4
19	South Korea	3	7	1
20	Israel	2	6	1
21	Turkey	1	6	0

No.	Country	Cluster No.	No. of Documents	No. of Citations
22	Brazil	2	5	5
23	Thailand	5	5	2
24	Scotland	7	5	0
25	Sweden	4	4	3
26	South Africa	2	3	0
27	Wales	8	2	3
28	Denmark	3	2	1
29	New Zealand	4	2	1
30	Norway	4	2	1
31	Russia	1	2	0
32	Mexico	2	2	0
33	Ireland	8	2	0
34	Czech Republic	1	1	0
35	Grenada	6	1	0
36	North Macedonia	7	1	0

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships which have, or could be perceived to have, influenced the work reported in this article.

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