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A Bibliographic Survey on Detection of COVID-19 Patients using various sensors in the field of IOT

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Abstract

Due to a pandemic situation arising from the past few decades and the covid -19 patients are increasing at the rapid rate. Looking in the near future an IOT model is build which can be useful for people in coming years and allows rapid testing and efficient testing methodologies using various sensors such as Temperature, Respiration, RFID etc which takes various parameters. The study focuses around 412 scientific documents such as Journals, articles, book chapters and Patents in various papers. These documents are extracted from the scopus databases after querying with the keywords related to covid patients and IOT. The articles were analysed for the time period of a few months. For this model, open source tools are used where analysis is done through Node XL, Gephi and VOSviewer. The survey prominently focuses on the type of publications, Publication by Country, Based on the geographical locations, Documents by Year, By Subject Area, By Affiliation and By Author. It was observed from the sides as English was a major language which was used in publishing of the documents. Study of Journal shows the sufficient contribution of Computer Science and Technology in detecting the Covid-19 patients.

Keywords : IOT,Health Monitoring,Covid19,Sensors,Hardware,Software.

1. INTRODUCTION

The medical experts need to diagnose the patients on the basis of various physiological parameters which take real time inputs of the patients such as temperature, IR Sensor, Respiration, Pulse rate and most importantly the oxygen level. Medical experts have sensors which can communicate as mesh and collect the threshold values[2,3]. The sensors are more efficient and reliable and are considered at more reasonable level[4]. The existing systems which update dynamically due to limited resources of medical equipment and it has to be made available for large number of population.

Medical practitioners cannot do supervision of a large number of patients every time. In earlier days the patients use to visit the doctor for cases of cardiac diseases and would get admitted in the Intensive Care Unit (ICU). Previously, the checking and monitoring of patients were done using monitor screen which is placed near to the bed of patient but it is more difficult to monitor many patients at the same time especially when the diseases is pandemic and spreading giantly. So, the need arises to monitor multiple patients at the same time. This can be achieved by using various sensors, certain alarms such as buzz are useful in the case which is helpful in detecting person's symptoms of covid-19 by maintaining social distancing rule.

This will be useful in increasing the efficiency of operation and will also provide the facility so that discharging of patients can be done faster[5]. The proposed setup will provide improvement in the normal life of the patients and decrease in the chances of infection of patient when the medical staff is not nearby. This will be based on the designing of the raspberry pi boards and various sensors which measures the parameters such as Blood Pressure, Heart beat Rate and temperature and displays the information collected on the monitor screen[6].

There is a threshold value which is decided for each parameter[3]. The system will display visual warning on monitor screen when it exceeds the value of threshold and it will be communicated to doctor or medical staff via email and message. Doctors and medical staff can see the signals which is displayed on the screen of monitor and where the patients are observed.

A normal human life can change to smart life using the new technology Internet of things (IoT). IoT is used to measure all the patients in any major or minor situation[4].

Thus, wireless transmission permits the examination of the physiological data of humans under normal conditions without any discomfort to a person under investigation[3]. This project

consists of simple and low-cost components which are capable of processing real time parameters like Temperature, Respiration/Oxygen, IR Sensor and Pulse Rate.

There are several devices available in the market in order to keep the track of internal changes of the body but there are many limitations due to the size of the device, heavy cost and portability of devices.

So, in the Smart Health Monitoring System the proposed design will be cost effective and a portable device in order to provide continuous monitoring of the patient's health.

1.1 Bibliometric Analysis of COVID-19 -19 Patient using IOT:

On coining the term “Bibliometric” the term is derived from two words “Biblio” and “metric”. Biblio means books and metrics means measurements[1]. So, seeing the present scenario of the pandemic researchers have performed to do bibliographic surveys and understand the pandemic situation and conclude a desired solution for the detection of COVID-19 patients using various research papers. The paper is widely used in education institutes and healthcare departments It is a prominent tool to quantitatively analyse the research data based on articles, citation counts, geographical locations and various other parameters. This study helps researchers to find out the research gaps along with the future scope that can be the contribution towards research papers.

To get better knowledge and ideas research team have gone through various research area and performed a bibliography survey on covid-19 patients.

The objectives of the bibliometric study as follows -:

- To identify the trends in publications based on affiliation
- To identify the type of publications in the field of research
- To identify the type by Author.
- To examine citation count for the publications.
- To identify the trends based on the year of publications.
- To identify the subject area.

2. INITIAL COLLECTION OF DATA :-

The scientific articles, publications, documents can be accessed in open access which can be accessed by anyone without payments and other is through the payments in which people can pay a certain amount and can get access to databases. The researchers can publish through administration registration and do their publications. It is also available free for various educational institutes and library portals. There are other alternatives which provide the access of large databases such as Scopus, ResearchGate, Web of Science etc.

Scopus is a large abstract and citation database for best quality literature and quality it provides for the web sources and has certain tools which can analyse, track the records of data and do the visualization of the data [8,9]. The various domains of research such as medical, biotechnical, science, arts etc. can be reviewed by peer experts in a better way by the experts of the domain. It covers wide ranges of field globally. Therefore, it is open source and more accurate database. The search can be done in the specific format through the primary and secondary keywords which are combinedly known as prominent Keywords which perform key tasks for the particular search area with certain conditions.

2.1 Prominent Keywords :-

The Scopus databases can be searched using prominent keywords which is divided into 2 Keywords which is defined as -:

1. Primary Keywords
2. Secondary Keywords

Table 1: Selection of keywords using Primary and Secondary Keywords

Primary Keywords	“Heath Monitoring”
Secondary Keywords using (AND)	“IOT”, “Covid-19”
Secondary Keywords using (OR)	“Sensors”, “Hardware”, “Software”, ”Raspberry -pi”

Thus, the query which is used to search the documents in the Scopus is:
 “Health Monitoring” AND”IOT” AND ”Covid-19” OR ”Sensors” OR
 “Hardware” OR “Software” OR “Raspberry -pi”

2.2 Preliminary Search Results

Table 2: Type of Publications and Number of Publications of each Paper

Type of Publications	Number of Publications	Percentage
Article	255	61.89
Review	69	16.74
Conference Paper	65	15.77
Book Chapter	14	3.398
Conference Review	6	1.456
Editorial	1	0.2427
Letter	1	0.2427
Short Survey	1	0.2427
	Total	100%

December,2020)

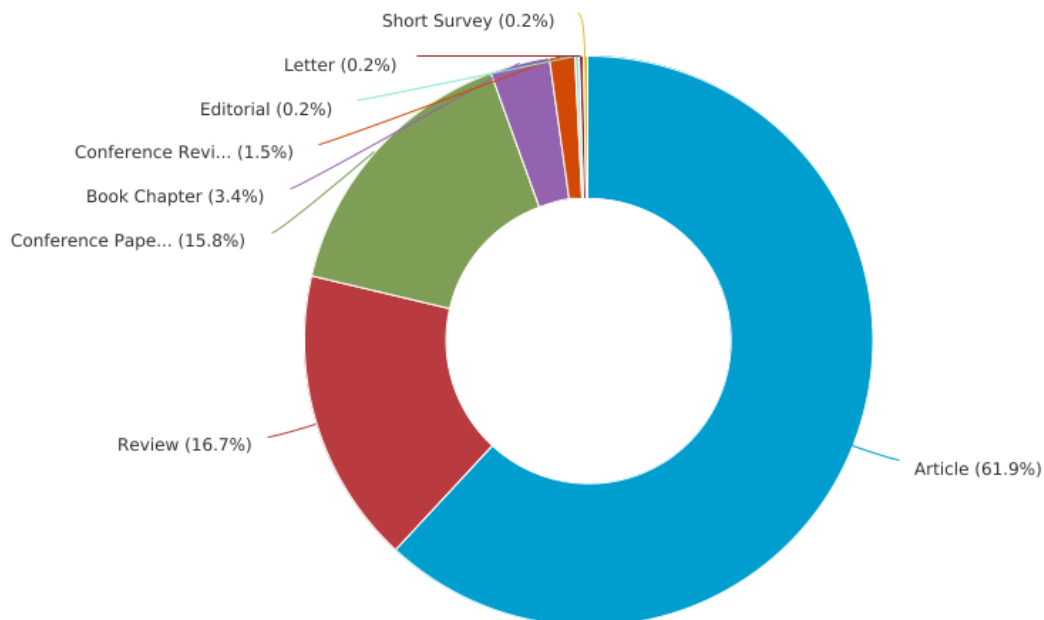
The search result was based on the datasets of the type of documents which are included by research team over a period of time. It basically covers the documents by Short Survey,Editorial,Letter,Book Chapter,Conference Paper,Review and Articles over a period of time.

So a visual representation of pie chart is shown below on the basis of type of publications which have been done over the recent times.

The analysis is given below from the pie chart.

Documents by type

Scopus



The analysis of the search results was analyzed on the basis of type of languages used for publishing documents. Table below denotes the trends in the languages used for publishing the documents of the covid-19 patients, The primary language was English and Spanish was used as a backend language.

Table 3: Trends based on Languages of Publishing and count of Publications

Sr. No.	Languages used for publishing	Count of Publications
1	English	410
2	Spanish	2
	Total	412

Dataset access information source:<http://www.scopus.com>(access on 11th December,2020)

2.3 Exploratory Data Highlights

The documents related to the Covid-19 were retrieved through for the span of 1 Year and surveys on the upcoming time the publication counts from 2020 to 2021. The table shows below the number of publications within the years in the research area of the covid-19 patients. By the analysis researchers have concluded that the research is increasing at the rapid rate from 2020 to 2021.The trends weredepicted from the time span of 2020-2021.

Table 4: Yearly Publishing Trends in Covid-19 Patient Diseases.

Year	Publication Count
2020	375
2021	37

Dataset access information source:<http://www.scopus.com>(access on 11th December,2020)

Figure 1 is the Graphical Representation of table 5 in the form of Line Chart clearly represents Year of Publications and Count of Publications.

Trends of highest documents published in year 2020 with the count of 375 documents.

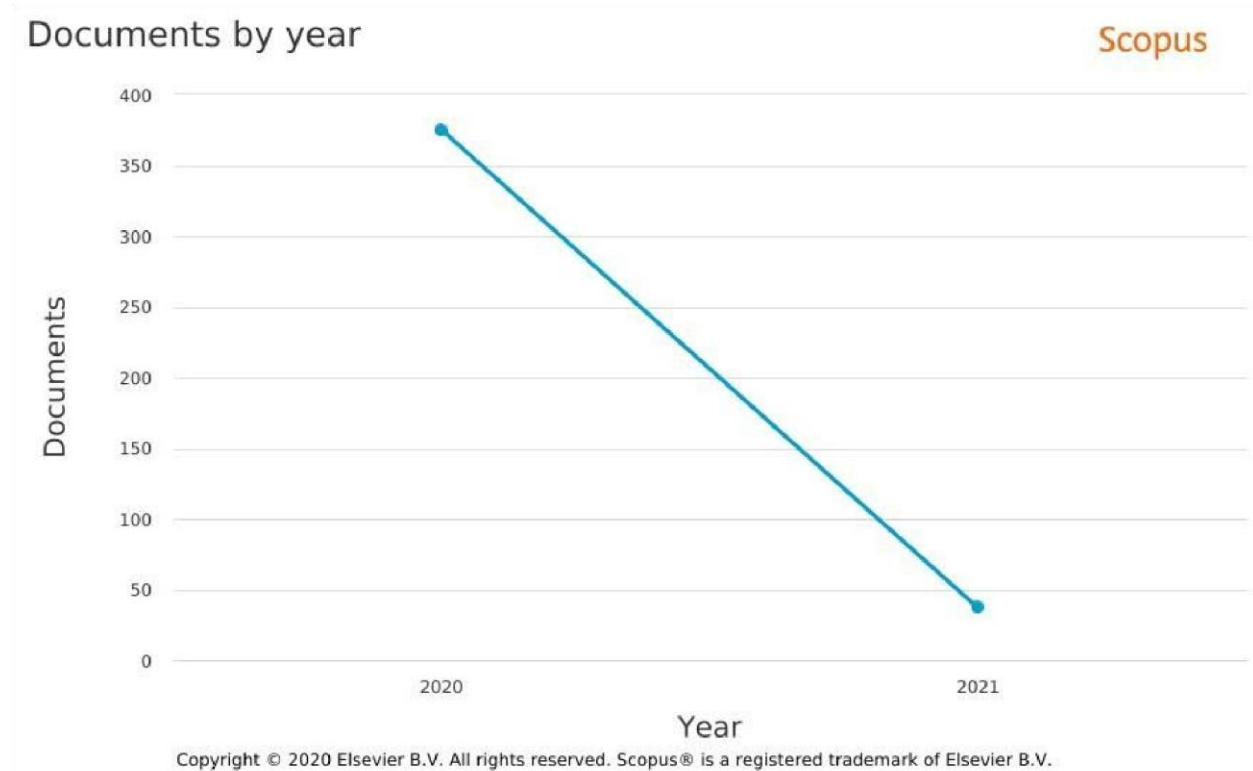


Fig 1 : Yearly Publishing trends in Covid-19 Patient Diseases.

Dataset access information source :<http://www.scopus.com>(access on 11th December,2020)

2.4 Evaluation of Data

A detailed bibliometric study is carried out in this section of Bibliographic paper which is divided as Section 3. It shows the ability to understand the detail and diversity in the Literature extracted from the Scopus. It provides significant researchers and research problems in Health Monitoring. It shows uniqueness which researchers see globally where various research is conducted, paper published, type of paper published. The search analysis was done through the keywords which researchers have used to search the primary and secondary keywords which are used to extract the literature from the Scopus

Database. The evaluation was also done on the basis of no of citations and collaborative research work.

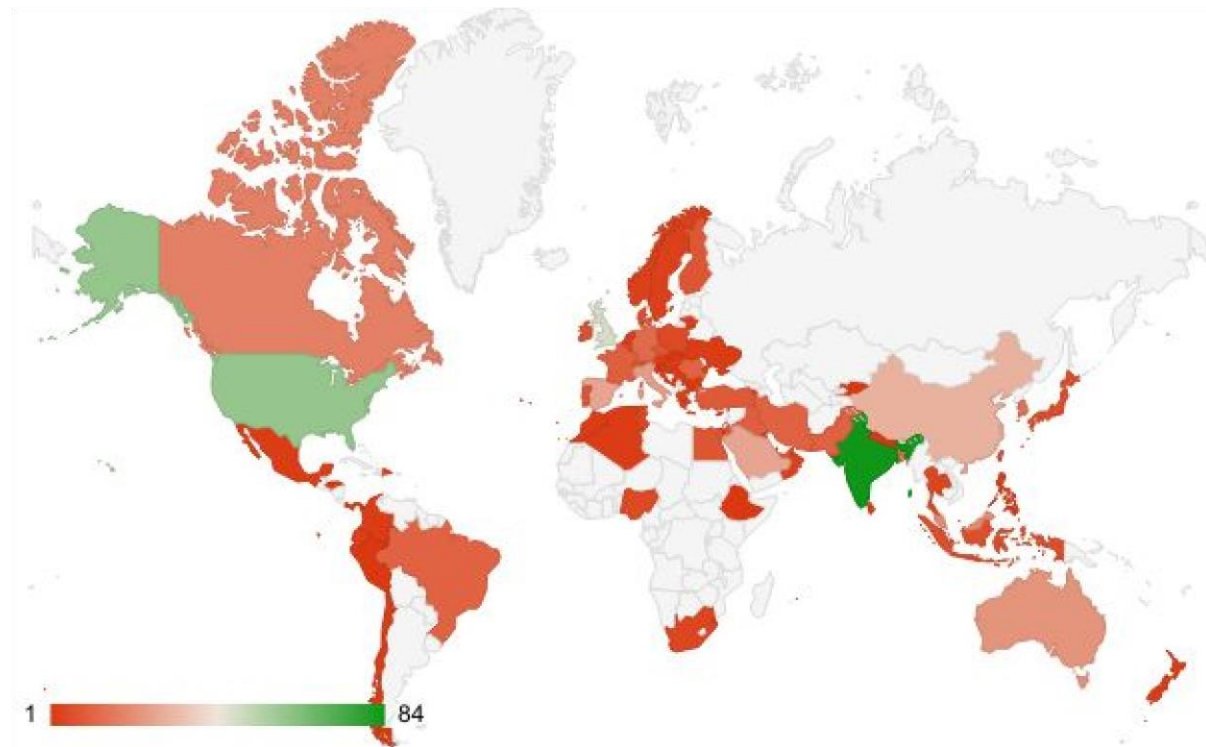
3 BIBLIOMETRIC SURVEY

In order to perform the Bibliometric survey analysis is divided into 2 parts -:

1. Statistical Analysis -: The survey is performed on the basis of contribution in the research area, Subject Area wise contribution, author's affiliation, authors source type, authors source titles
2. Networked Analysis -: The survey is performed basis on geographical locations, keywords, source title, citation count, year of publication and collaborative research with other authors.

3.1 Analysis Based on geographical locations

The top ten countries that have publications on the basis of the Covid-19 patients are shown below.



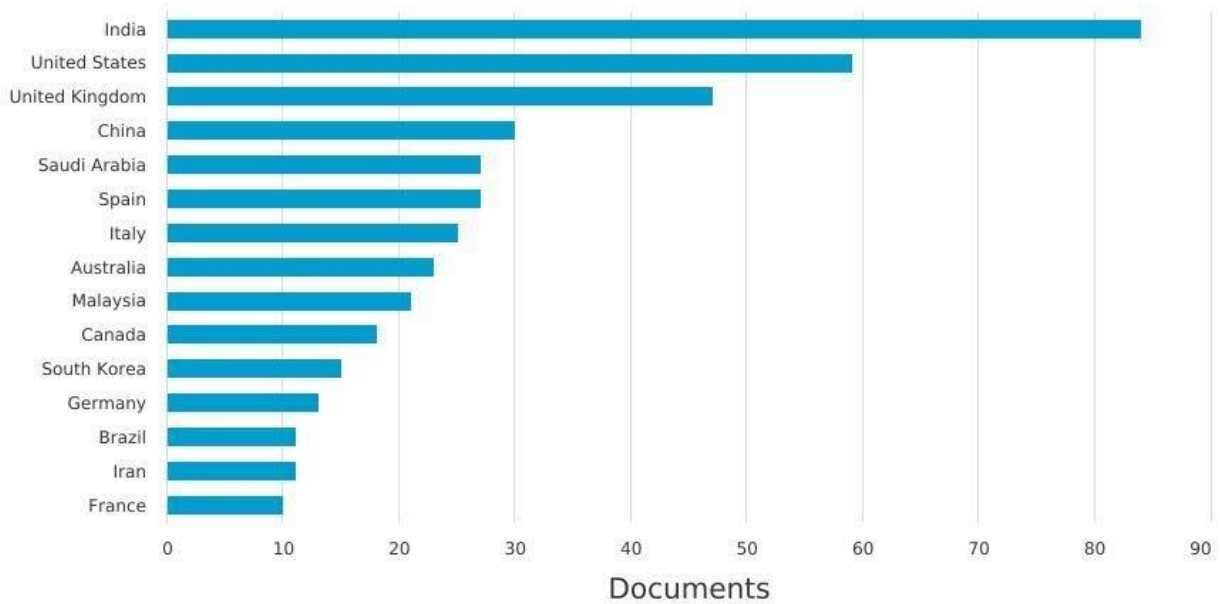
India has the highest no of publications of 84% and it is then followed by United States and United Kingdom of 59% and 47% respectively.

On the other hand Brazil, Iran and France in share in publications 11, 11 and 10 respectively.

Documents by country or territory

Scopus

Compare the document counts for up to 15 countries/territories.



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Figure 3 :Top Ten countries publishing papers on Covid-19 patient diseases.

Dataset access information source :<http://www.scopus.com>(access on 11th December,2020)

3.2 Statical Analysis Based on Keywords

The top keywords searched by Scopus Database is shown in Table 5. It gives an overview of the search area which researchers are looking in the database and proper combination allows research team to give an overview of the research field.It also insists the requirements of the people as it shows the wide range of keywords in the extracted literature.

Table 5: Analysis based on Keywords and No of publications

Keywords	Number of Publications
CoronaVirus Infection	19
Coronaviruses	19
Internet of Things(IOT)	10
Covid-19	12
Health Care System	10
Sensors	8

Dataset access information source :<http://www.scopus.com>(access on 11th December,2020)

3.3 Network Analysis

Network analysis is based on the association among the different computable attributes using graphical format. There are many tools which can be used for this purpose. Research team can analysis the research paper through VOSviewer, Gephi, Node XL. It shows the network analysis based on the derivation of various research paper databases.

VOSviewer has output of .csv file. The analysis or the visualization is done through density, network and overlay.

Representation of Visualization Graphs

Circles highlights the in the map about the document extracted from the databases of Scopus. The Bigger circle highlights the occurrence of frequency and links represents the distance between the keywords. Keywords of the same colour represents the keywords which are related to one another very closely.

There are 5 different types of clusters in the form of colours represented in the graph. There is the minimum value of occurrence of keyword.

Network Analysis based on Keyword and source title

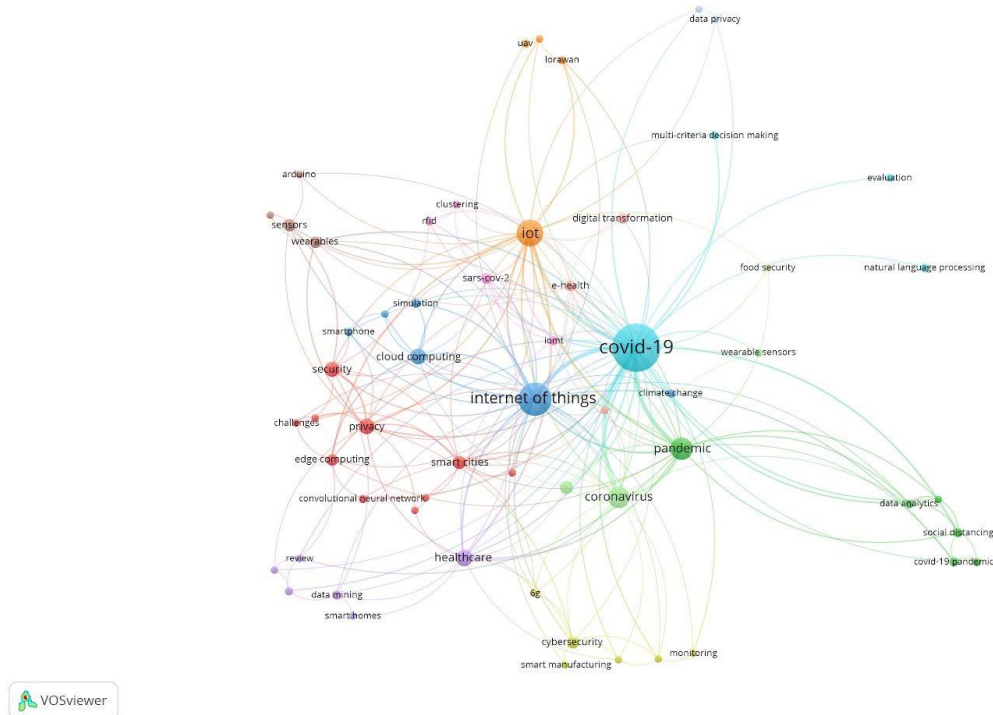
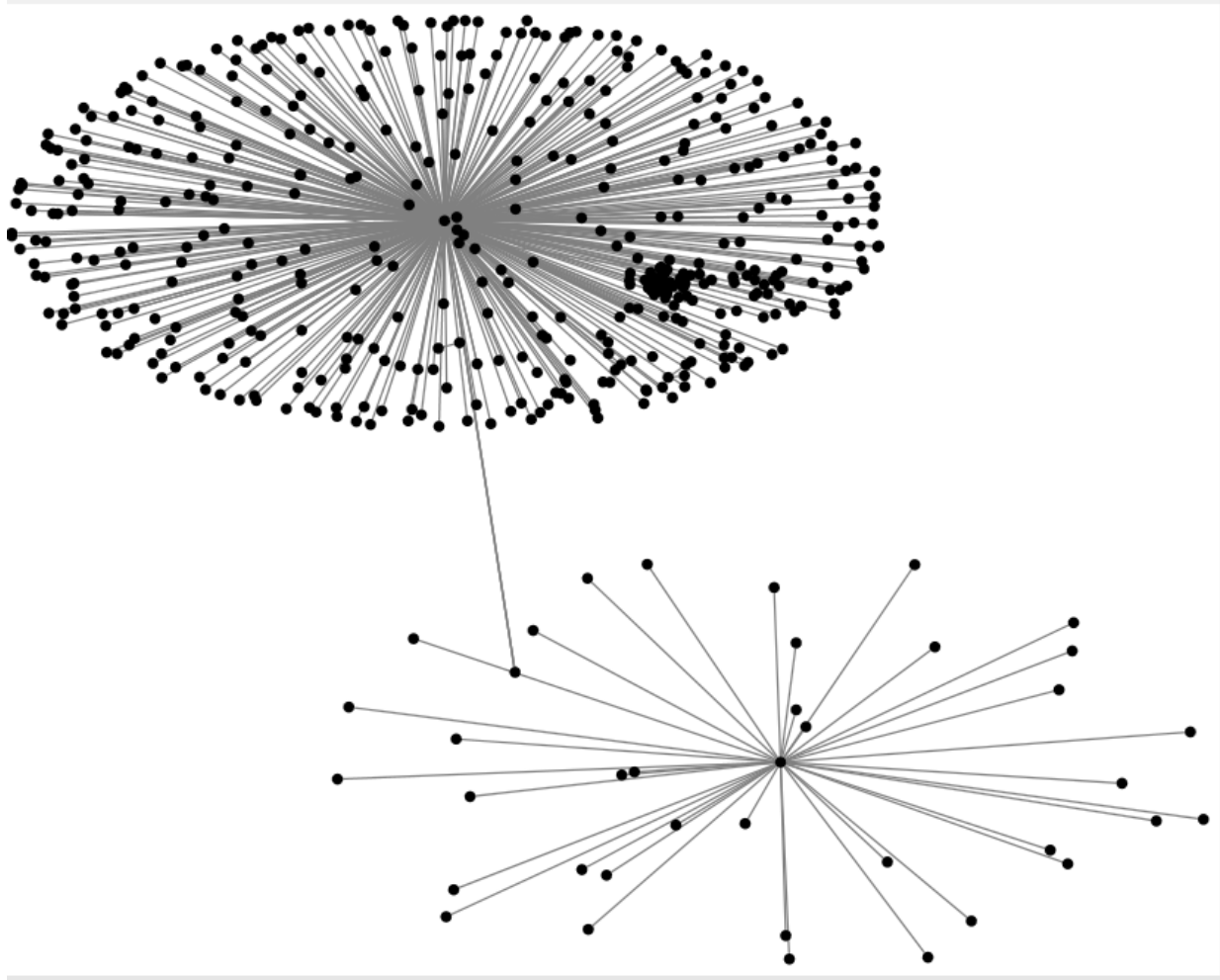


Figure 5 Analysis of keywords based on Keywords and source title

(source :<http://www.vosviewer.com>)

Network analysis diagram depicting cluster of publication year and its title

A cluster of the publication title and respective author year is depicted in Figure 6. This diagram is represented in Node XL which acts as an open source tool for networks[10]. The Node XL consists of nodes and edges. Nodes are represented by publication and publication Year. Edges are represented by connection between the entities. In this the cluster of majority of publications in the field of covid-19 patients in the year of 2020 followed by 2021.

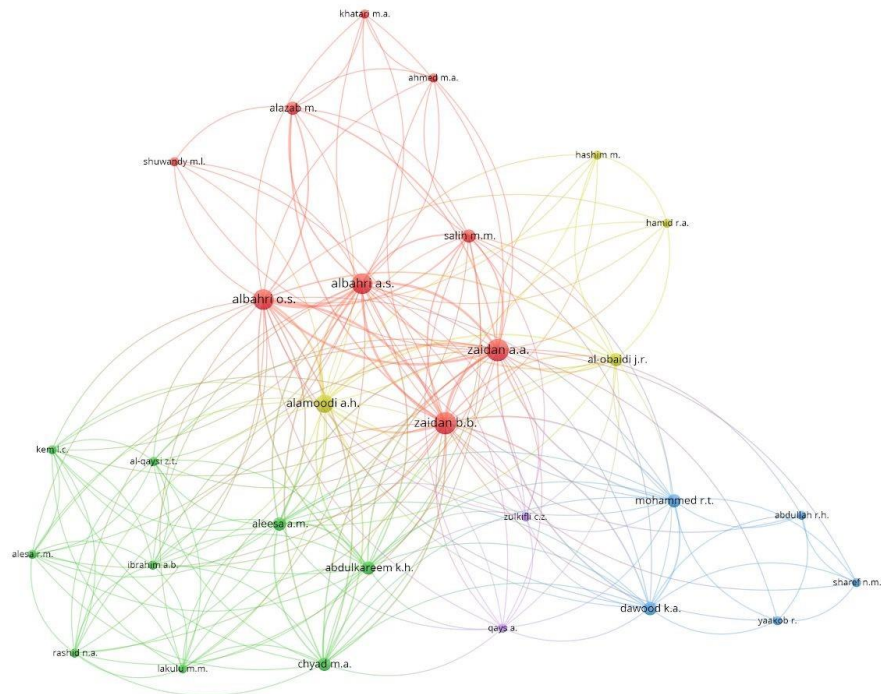


(Source : <http://nodexl.com/>)

Fig 7 Network Analysis based on author and co-authors on the same papers

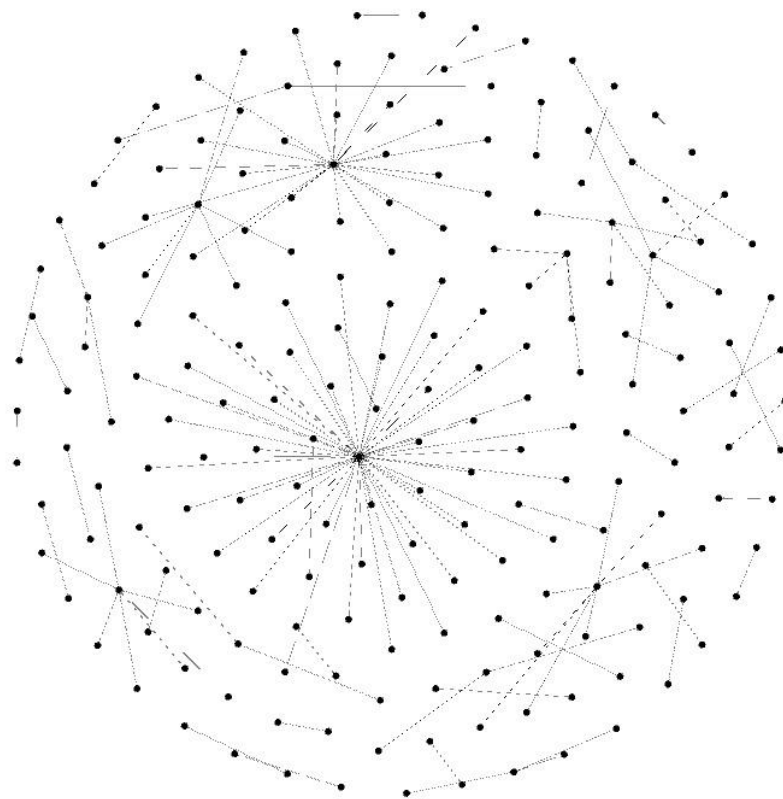
The collaboration is shown below. The collaboration is shown below the authors. The link represents authors on the documents published. The documents was manually added to 2 which resulted in 160 authors.

The link between the authorship and co-authorship links is displayed in Figure 7.



Dataset access information source :<http://www.scopus.com>(__access on 11th December,2020)

Network Map of Publication title and citation received by publication.



(Source : <http://gephi.org/>)

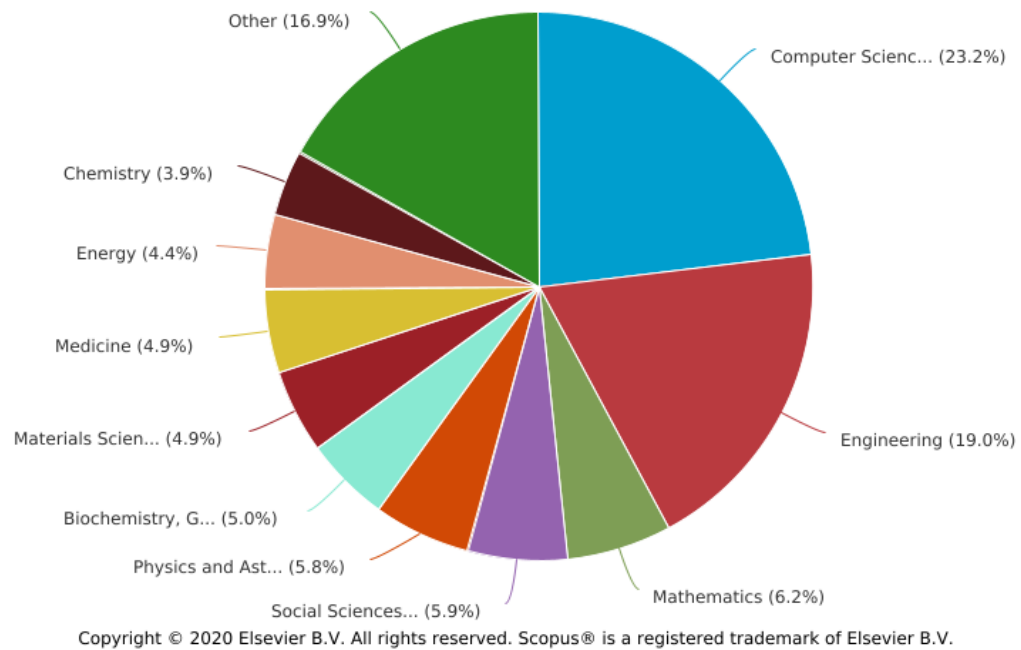
Figure 7 describes about the network map publication title and the citations received by publications published in it. Gephi is an open software is used to draw the diagram Frunchterman Reingold layout is used to draw the diagram. In the layout it clearly depicts number of nodes which shows publication title is 200 Nodes and 154 edges which shows as the authors. The edges were set to in degree property which means that the arrow coming to certain node has sited that particular paper.

3.4 Statical Analysis of Subject areas

Figure shows the various compartments of publications in different disciplines is retrieved through covidpatients. It can be concluded from the pi-chart that maximum publication is done by Computer Science and Technology(23.2%)and then it is followed by engineering(19%)and then followed by mathematics (6%)

Documents by subject area

Scopus



Dataset access information source : <http://www.scopus.com>(access on 11th December,2020)

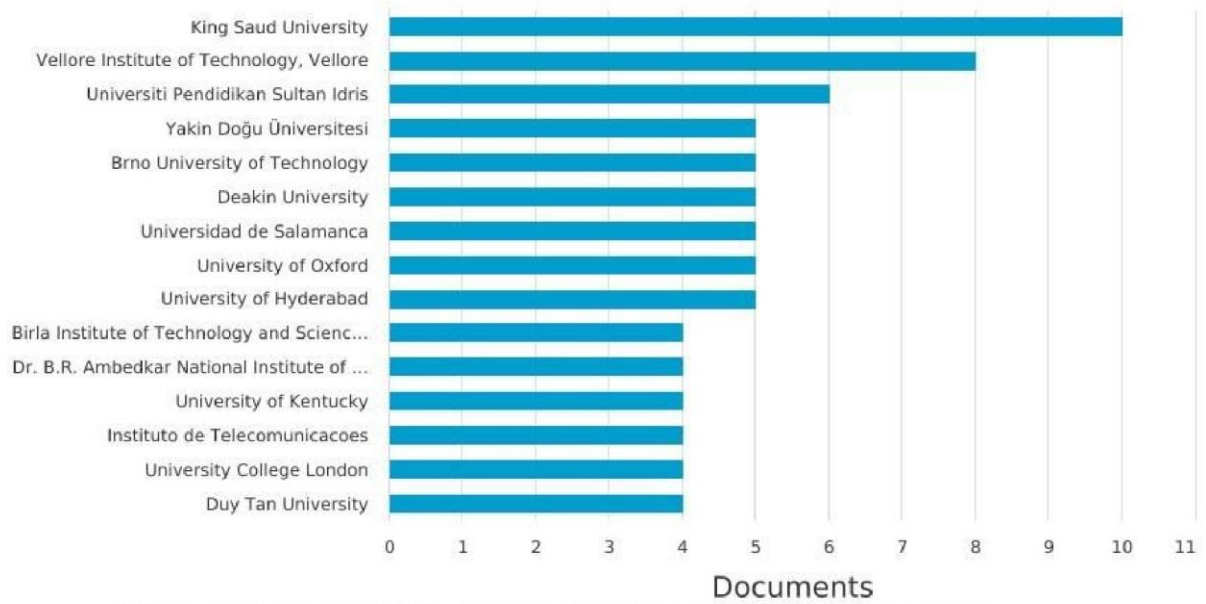
3.5 Statical Analysis based on Affiliations

The topmost ten universities and organizational affiliation contributing the field of Health Monitoring in the field of covid -19 patients.The maximum contribution is done by King Saud University followed by Vellore Institute of Technology.It can be seen as top 10 universities 4 universities belongs to India which is significant contribution in the period of covid-19 Patients.

Documents by affiliation

Scopus

Compare the document counts for up to 15 affiliations.

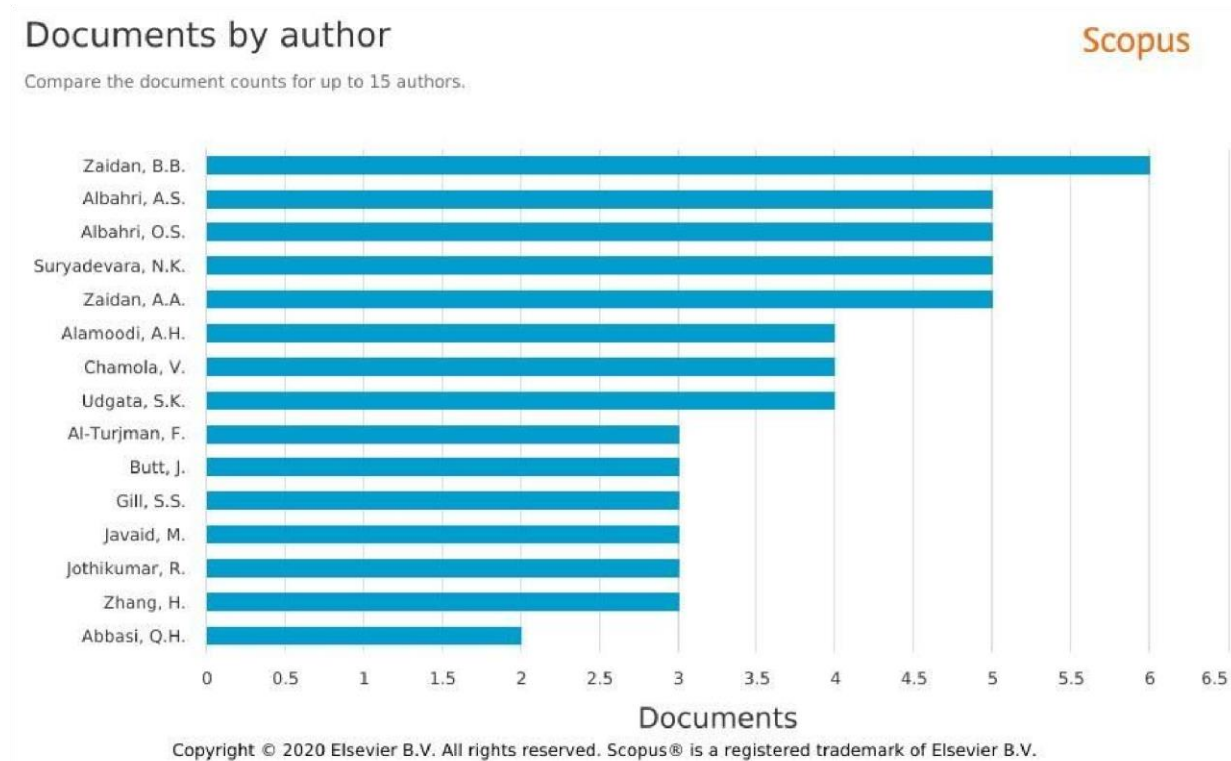


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Figure 9 : Affiliation statistics for the Covid-19 diseases

Dataset access information source :<http://www.scopus.com>(access on 11th December,2020)

3.6 Statistical Analysis Based on Authors



The Figure 10 depicts the significant contribution of authors in the research area of covid-19 patients. The figure depicts how the particular contribution of author in the research area.

Figure 10 : Top -15 Authors contributing for the research area of Covid-19 diseases

Dataset access information source : <http://www.scopus.com> (access on 11th December, 2020)

3.7 Statistical Analysis based on Source Type

The source type represents the scholarly of the article where the research paper comes out and published. It basically depicts the sources such as Journals, Conference Proceedings etc. In the covid-19 patient detection researches can easily see the graph Sensors Switzerland has a maximum contribution of 26 papers and then followed by IEE Access of 19 papers. The various contributions are basically an indicative of significant contribution of these journals and papers published from various sources.

Histogram of Number

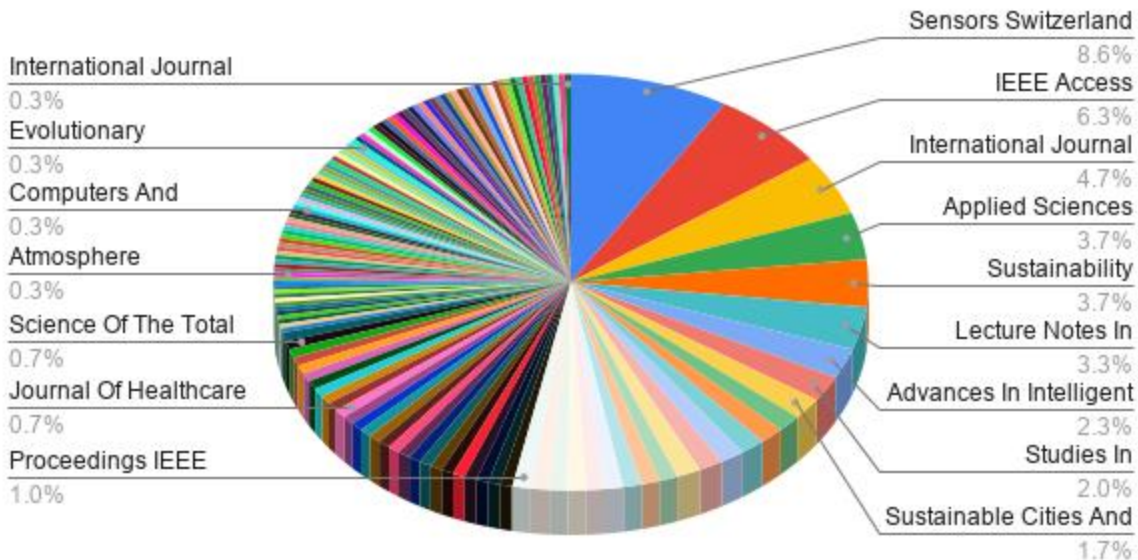


Figure 11 : Source Type for the contribution in research area of Covid-19 diseases

Dataset access information source : <http://www.scopus.com>(access on 11th December,2020)

3.8 Analysis based on the publication citations

Table 7 depicts citations count of Yearly basis is derived through publication extracted in the field of covid-19 patient. Till date the citation count is 399. As the pandemic is undergoing many more comes in the near future also comes out. The citation is highest recorded in 2020 and minimum in 2021.

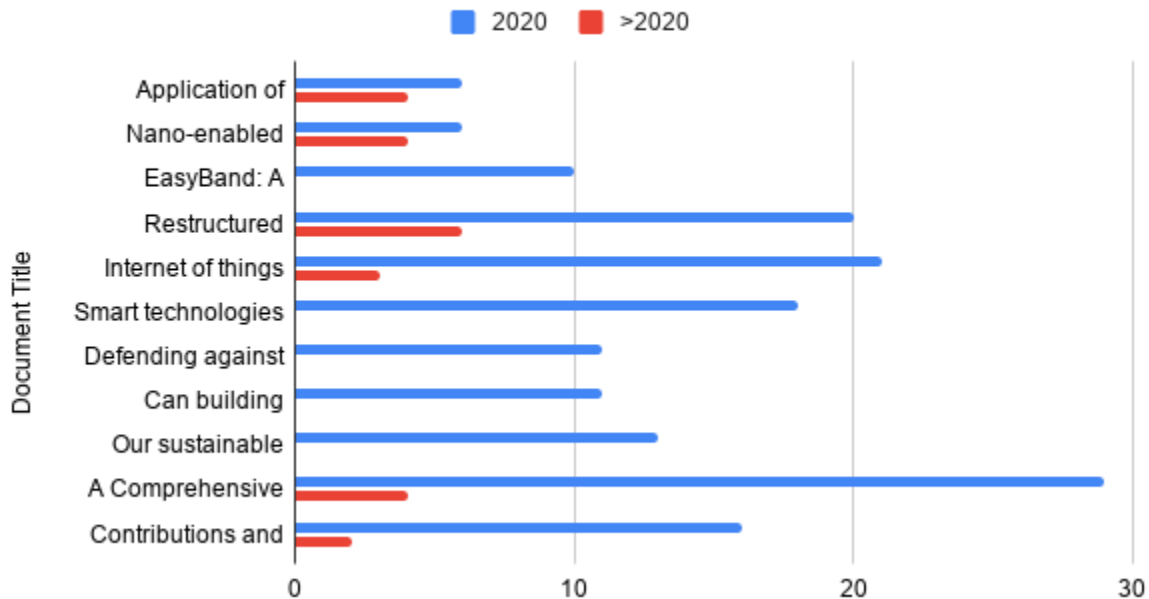
Table 6: Analysis based on Year and No of Citations

Year	No of Citations
2020	399
2021	47

Dataset access information source : <http://www.scopus.com>(access on 11th December,2020)

3.9 Statistical Analysis based on source titles

2020 and >2020



Statistical analysis based on source title in health monitoring research area in figure 12.

Dataset access information source :<http://www.scorp.us.com>(access on 11th December,2020)

The analysis was done on the basis of 2020 and years further and you can clearly see that maximum publication based on source title was “A Comprehensive Review of the COVID-19 Pandemic and the Role of IoT, Drones, AI, Blockchain, and 5G in Managing its Impact” has maximum number of publications with these source titles. However, “Application of cognitive Internet of Medical Things for COVID-19 pandemic” and “Nano-enabled biosensing systems for intelligent healthcare: towards COVID-19 management” shares equal and minimum contributions for the researchers to published their scientific documents.

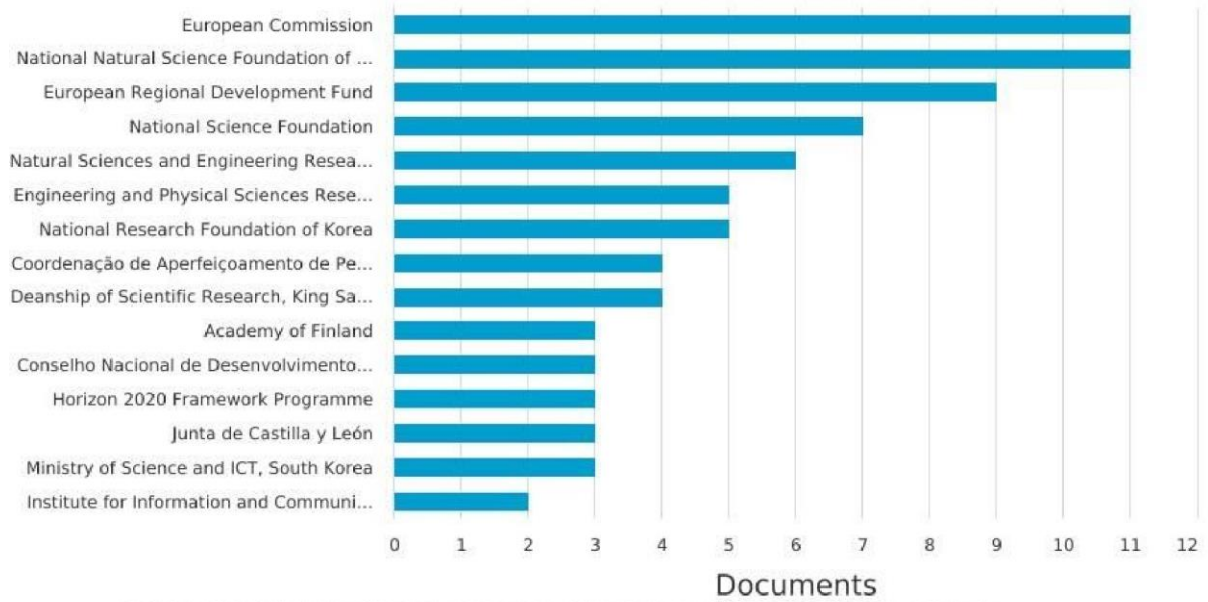
3.10 Analysis based on Funding Sponsors

Statistical Analysis based on funding sponsors in the Health Monitoring research area is shown in Figure 13. The top 15 Funding sponsors are considered and it can be clearly seen that European Commission and National Natural Science Foundation of China is the highest funding Sponsor.

Documents by funding sponsor

Scopus

Compare the document counts for up to 15 funding sponsors.



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Figure 12 : Funding Sponsors statistics based on Covid-19 Patient

Dataset access information source : <http://www.scopus.com>(access on 11th December,2020)

4. INFERENCES DRAWN FROM RESEARCH STUDY

In today's times the covid-19 is the hot debate in the world and in recent times it is increasing tremendously. This research paper will depict the prominence of contribution towards the Covid-19 patients in the field of IOT research area.

The type of publication preferred for implementation is articles followed by Review Papers. These types of research papers will brainstorm the ideas of various researchers in the field of HealthCare Monitoring. English is majorly used in publications by many of the publishers. Spanish then dominates in this field of research study. It is observed that the researchers are more prone to research the new pandemic disease.

Countries like India and the United States predominantly proved in the research area. It can be seen that Articles was the major source for researchers to publish their papers in their domains. Based on extracted literature articles contributed significantly in the domain of research area and then followed by Review Paper and Conference Paper.

There are 255 Articles published and 69 Review Papers published. The Keywords used for scopus databases are HealthCare, IOT, Sensors, Covid-19, Corona Virus, Coronavirus Infection. The Keywords are dominantly more important for people to search in various databases such as Scopus, Web of Science, Google Scholar etc.

Indian authors and universities have made significant contributions as researchers as well publishers. It can be concluded from the data that maximum citation is done in the year 2020 and it could significantly increase in the year 2021. As in upcoming times, the researchers can cover more fields of diagnosis which were overlooked in the past. In the coming times people will come to know about efficient and faster methods of diagnosis of diseases.

5. LIMITATIONS OF PRESENT STUDY

The bibliography study can do the evaluation of research documents which is quite useful and helpful for them to study in the near future. It will also help to write the literature survey, This study can also be used to find and map the research gaps. The study is used to find the trends in the research area. The collaboration of author indicates the inclination of the author in the collaborative of study.

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