Analysis of the Development of Big data and AI-Based Technologies for the Cloud Computing Environment

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ABSTRACT In cloud computing, users have on-demand access to a pool of configurable computing resources, such as data storage and processing power, located on a remote server. Most of a big cloud's operations are spread out across many data centers. When working in the cloud, users pool their resources for reliability and pay for what they use. In this context, we analyze the development of big data and AI-based technologies for the cloud computing environment in this paper. We used the Scopus database to formulate our observations. In this paper, we any many research question and presents our observation related to the development in the field of cloud computing environment.

KEYWORDS Big Data, Cloud Computing, Artificial Intelligence

I. INTRODUCTION

The era of big data has made cloud computing a necessity. Big data refers to datasets that are too huge or complicated to be processed by conventional means. The advent of big data radically altered the dynamics of the internet and presented several opportunities for digital solutions to enhance corporate processes and boost output[1], [2], [3]. The incorporation of cloud computing may provide the increased computational capacity required for big data analytics. Cloud computing makes it possible to access a vast pool of computer resources from anywhere in the world, on demand, using just a standard internet connection and a web browser [4], [5], [6]. A growing body of evidence suggests that cloud computing has the greatest technical promise in this age of globalization. Some of the most notable technological developments in recent years have been made possible by advancements in cloud computing [7], [8], [9]. We used the Scopus database to analyze the different research developments big data and AI-based technologies for cloud computing. We try to find the answer to the following research questions:

RQ1 Who are the important authors working in the field of metaverse security?

RQ2 What are the trending topics in the field of metaverse security?

RQ3 What are the important papers in the field of metaverse security?

The rest of the paper is organized as follows: section II presents our research methodology, the results are presented in section III; finally, the conclusion is presented in section IV.

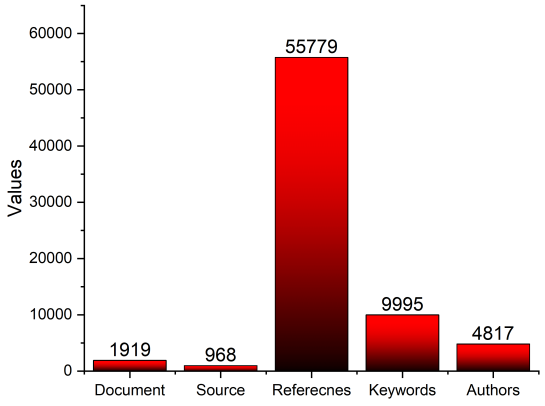
II. RESEARCH METHODOLOGY

In this paper, we analyze the development of different protocols and standards for Big data and AI technologies for cloud environments. In this article, we examine how artificial intelligence and big data can be used to create different cloud computing environments. For the purpose of answering the research question posed in the Introduction, we mine the Scopus database for relevant information. The articles from periodicals indexed by Scopus are analyzed. We search the Scopus journal through the follwing query:

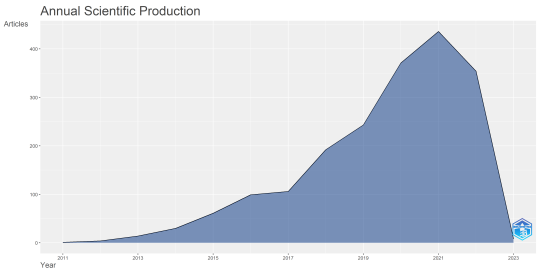
TITLE-ABS-KEY ("big data" AND (cloud AND "artificial intelligence")) AND (LIMIT-TO (DOCTYPE , "cp") OR LIMIT-TO (DOCTYPE , "ar") OR LIMIT-TO (DOCTYPE , "ch")) AND (LIMIT-TO (LANGUAGE , "English"))

III. RESULTS AND DISCUSSION

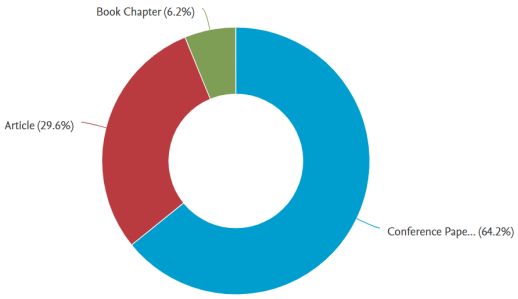
We analyze the literature published in Scopus-indexed journals to obtain information on the development of different protocols for Big data and AI technologies for cloud environments. The summary of the final database used for the analysis is presented in Figure 1a. From Figure 1b it is clear that the annual growth rate in published articles is 18.92%. Figure 1c and Figure 1d present importanat type and subject of our collected database. From Figure 1d it is clear that the majority of researchers in the computer science (35.7%) field are working to develop new security models for the metaverse. Figure 1c present that the majority of users are publishing their papers in conferences (64.2%).



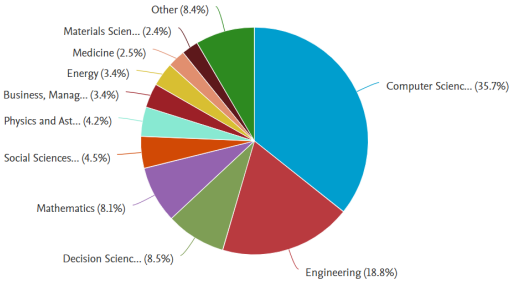
(a) Summery of Database



(b) Total Scientific production



(c) Type of Production



(d) Different Subjects

FIGURE 1: Analysis of Database

A. ANALYSIS OF AUTHORS

In this subsection, we give details about the most important authors working for the development of Big data and AI technologies for cloud environments. Figure 2 presents the distribution of authors according to total citation. From Figure 2, it is clear that *Wang Y, Wang X, Zhang Y, LI Y, Zhang X,* and *LIU Y* are the most important authors.

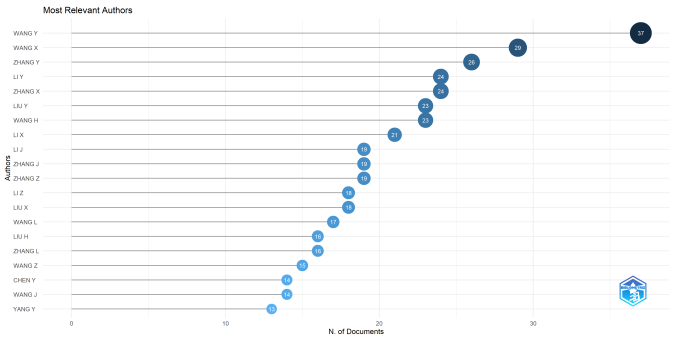


FIGURE 2: Important Authors

B. ANALYSIS OF TRENDING TOPICS

In this subsection, we give the details of the important keywords used by the authors in their papers. Figure 3 presents the distribution of important keywords. The most frequent keyword comes at the center and its size depends on the frequency of occurrence. The important keywords are as follows:

- big data (444)
- artificial intelligence (362)
- cloud computing (317)
- machine learning (202)
- internet of things (139)
- industry 4.0 (91)
- iot (70)
- deep learning (68)
- edge computing (59)
- big data analytics (56)

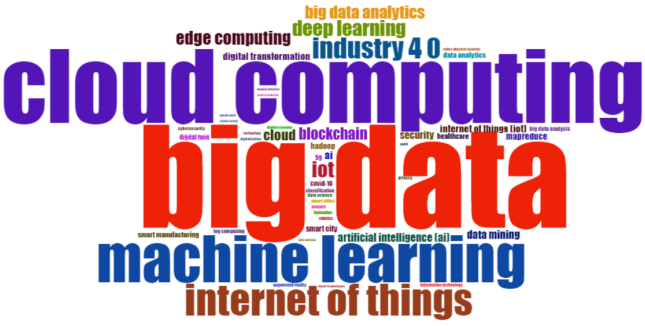


FIGURE 3: Important Keywords

C. ANALYSIS OF HIGHLY CITED COUNTRIES

Distribution of published papers according to the country is also a good factor in measuring the development of research work in metaverse security. Figure 4 presents the production of papers according to the countries. From Figure 4, countries with the highest publications are as follows:

- CHINA (2443)
- INDIA (696)
- USA (659)
- ITALY (198)
- SOUTH KOREA (192)
- UK (171)
- AUSTRALIA (122)
- SPAIN (115)
- GERMANY (114)
- GREECE (111)

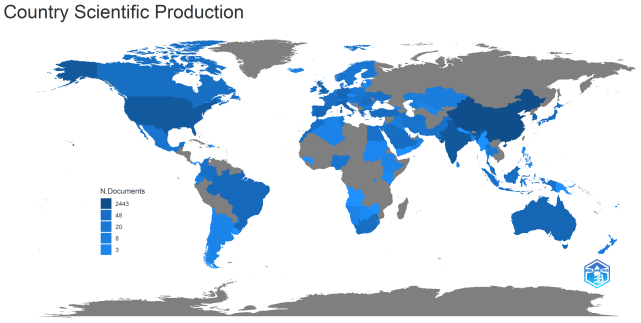


FIGURE 4: Highly Cited Countries

D. ANALYSIS OF DOCUMENTS

In this subsection, we give the details about the highly cited papers in the field of metaverse security. Table 1 arrange the papers according to the number of citations. Table 1 helps the new researchers to get information about the research field.

TABLE 1: Highly Cited Papers

Paper	Total Citations
TAO F, 2018, J MANUF SYST [10]	743
TAO F, 2017, IEEE ACCESS [11]	600
WIRTZ J, 2018, J SERV MANAGE [12]	585
SAYED AH, 2014, FOUND TRENDS MACH LEARN[13]	441
DEMIRKAN H, 2013, DECIS SUPPORT SYST [14]	411
TAO F, 2019, ENGINEERING [15]	364
AGRAWAL D, 2011, ACM INT CONF PROC SER[16]	353
ALAHAKOON D, 2016, IEEE TRANS IND INF[17]	334
SUTHAHARAN S, 2014, PERFORM EVAL REV [18]	252
ZEYDAN E, 2016, IEEE COMMUN MAG [19]	235
DIAMANTOULAKIS PD, 2015, BIG DATA RES [20]	226
RAFIQUE D, 2018, JOF OPT COMM AND NETW [21]	186
GANI A, 2016, KNOWL INF SYSTEMS SYST [22]	185
SINGH SK, 2020, FUTURE GENER COMPUT SYST[23]	183
TIAN S, 2019, J GLOB HEALTH [24]	160
ZHOU X, 2020, IEEE INTERNET THINGS J [25]	158
ALZUBI J, 2018, J PHYS CONF SER [26]	155
PIVOTO D, 2018, INF PROCESS AGRIC [27]	153
CHEN M, 2018, IEEE COMMUN MAG [28]	149
KUMAR PM, 2018, COMPUT ELECTR ENG [29]	146

IV. CONCLUSION

In recent years, data-related terminology have become common parlance in the academic and scientific communities. The studies often make use of phrases like "Big Data," "cloud computing," "data analytics," and "artificial intelligence." Many different kinds of enterprises all around the globe may benefit greatly from the combination of big data and cloud computing. Numerous cloud computing service providers exist, each with its own unique portfolio of available services and deployment options. In this context, in this paper, we analyze the literature related to cloud computing. We present information about important authors, keywords, and documents in this paper. This paper will help the new research to get a better understanding of the development big data and AI-based technologies for Cloud computing.

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