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Research Article

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A Scientometric Analysis of Mobile Computing Research Based on Web of Science Database

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T his present study attempts to analyze the growth and development of mobile computing, as reflected in research

publication output covered by the web of science (WoS) online database during 2007 to 2022., total citations count and average citations of the mobile computing publications during the reported period. All 77 countries contributed 71080 citations. The list of top ten highly cited countries. China topped the list with the highest citations (29223). The other productive countries were the USA with 10997 citations followed by Singapore with 3286 and Korea with 2748 citations. It is also important to note that Norway is the country with the highest citations (134.467) per article. Out of total citations, the top 10 countries share 58384 (405.13 %) citations. bibliometric profile of mobile computing research output. most cited countries, source impact, prominent affiliations, most local cited references(LCR), lotka's law productivity.

Keywords: mobile computing, scientometric, research based, mobile, computing.

1. Introduction

Mobile computing is a computing environment over physical mobility. The user of the mobile computing environment is able to access the data, information or other logical objects from any device in the network while on move. Mobile computing system allows the users to perform a task from anywhere using a computing device in public, corporate business information and personal information areas medical record, address books etc. To make the mobile computing environment effective. It is necessary that the communication bearer is spread over both wired and wireless media. Wireless networking technology has

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engendered a new era of computing, called mobile computing.

Mobile computing is human-computer interaction in which a computer is expected to be transported during normal usage, which allows for the transmission of data, voice, and video, Mobile Computing involves mobile communications, Mobile hardware, and mobile software, Communications issues include ad-hoc networks and infrastructure networks as well as a communication property, protocols, data formats and concrete technologies. Hardware includes mobile devices or device components. Mobile software deals with the characteristics and requirements of mobile applications.

Mobile computing is an umbrella term used to describe technologies that enable people to access network services any place, anytime, and anywhere. A technology that allows transmission of data, via a computer, without having to be connected to a fixed physical link.

2. Review of Literature

Bharath Kumar Reddy China, (2021) Mobile computing has the capability of device control to form a trained model of machine learning. The devices use the network and relate to the wireless or wired networks which may be a satellite, global, and cellular digital packet data (CDPA). The device's hardware included battery life, screen size, carriables and inputs and outputs of the devices. The design mainly depends on the requirement of the organization's needs and its budget

S.M. Dhawana, B.M. Guptab and Ritu Gupta's (2017) this present study is to examine 34641 global publications output on mobile computing research, as covered in the Scopus database during 2007-16. The study finds that mobile computing research is growing at a 9.35% rate per annum and its citation impact averaged 3.39 citations per paper.

Chen, Y. and Kamara, J.M. (2008), this present study explores how mobile computing can be used on construction sites to manage on-site information. This model, firstly, identifies the key factors of mobile computers, wireless networks, mobile applications, construction personnel, construction information and a construction site; secondly, it describes the relationships and interactions among these factors. Based on the model, the selection process for mobile computing strategy includes the clarification of the information management process, the creation of an overview of mobile computing solutions, the identification of mobile computing strategy, and the selection of appropriate mobile computing technology.

3. Objectives

The main objective of the study is to analyze the performance of mobile computing research publications reported during 2007 to 2022.and indexed in the web of science database. In particular, the study aims to find,

- Bibliometric profile of mobile computing research output.
- Most cited countries
- Source impact
- Prominent affiliations
- Most local cited references (LCR)
- Lotka's law productivity

4. Methodology

A scientometric method is used for the present study. The study is based on the mobile computing research publications indexed by a web of science core collection database. Clarivate analysis. It was originally produced by the institute for scientific information. It is currently owned by Clarivate previously the intellectual property and science business of Thomson Reuters. The research data was retrieved from the web of science database using criteria (Text -Mobile Computing, Publication year 2007 to 2022).

Biblioshiny and VoSviewer are the scientometric analysis tools that were employed to analyze the results of the mobile computing research output. The Biblioshiny (The shiny app for bibliometrics from R Statistical Package) interface was used to identify bibliometric profile, Most cited countries, Source impact, most relevant institutions, collaboration among the prominent institutions, and most local cited references (LCR) related to Mobile Computing research publication.

5. Data Analysis and Findings

Main information about the collection

Table.1 Bibliometric profile of mobile computing research output

| Description | No. of Articles |
|-------------------------------------|------------------------|
| Documents | 3825 |
| Sources | 1755 |
| Keywords Plus | 1328 |
| Author's keywords | 6252 |
| Period | 2007(Up to April 2022) |
| Average citations per documents | 18.67 |
| Authors | 8532 |
| Author appearances | 14898 |
| Authors of single-authored | 176 |
| Authors of multi-authored documents | 8356 |
| Single-authored documents | 190 |
| Documents per Author | 0.448 |
| Authors per document | 2.23 |
| Co-authors per documents | 3.89 |
| Collaboration Index | 2.3 |

Table.1 displays the descriptive statistics of mobile computing research output. The papers have been widely spread, with 1755 individual sources represented. The majority of articles are multi-authored, with only 176 being single-authored. Such multiauthorship is increasing common in sciences.

6. Most cited Countries

| Table.2 Profile of top 10 most productive countries in |
|--|
| terms of citations |

| Rank | Country | Total Citation | Average Article Citations |
|------|-----------|-------------------|------------------------------|
| 1 | China | 29223 | 19.961 |
| 2 | USA | 10997 | 26.121 |
| 3 | Singapore | 3286 | 96.647 |
| 4 | Korea | 2748 | 11.948 |
| 5 | Malaysia | 2448 | 36.537 |
| 6 | Canada | 2439 | 20.325 |
| 7 | Italy | 2028 | 24.143 |
| 8 | Norway | 2017 | 134.467 |
| 9 | Australia | 1628 | 28.069 |
| 10 | India | 1570 | .9166 |

 $N \ge 1570$ N= No. of the Citations

7. Source Impact





The mobile computing research output originated from 77 countries during the study period. Table.2 shows the total citations count and average citations of the mobile computing publications during the reported period. All 77 countries contributed 71080 citations. The list of top ten highly cited countries. China topped the list with the highest citations (29223). The other productive countries were the USA with 10997 citations followed by Singapore with 3286 and Korea with 2748 citations. It is also important to note that Norway is the country with the highest citations (134.467) per article. Out of total citations, the top 10 countries share 58384 (405.13%) citations.

| Source | h-index | g-index | m-index | ТС | NP | PY start |
|---|---------|---------|---------|------|-----|----------|
| IEEE access | 30 | 58 | 3.75 | 4077 | 175 | 2015 |
| IEEE internet of things journal | 31 | 62 | 3.0 | 3921 | 71 | 2014 |
| IEEE transactions on vehicular technology | 27 | 55 | 1.8 | 3037 | 58 | 2008 |
| wireless communications & mobile computing | 10 | 37 | 0.6 | 1388 | 58 | 2008 |
| Future generation computer systems-the international journal of science | 23 | 49 | 1.4 | 2882 | 49 | 2007 |
| IEEE transactions on wireless communications | 26 | 41 | 2.3 | 3723 | 41 | 2012 |
| Mobile networks & applications | 9 | 27 | 0.0 | 767 | 33 | 2007 |
| IEEE communications magazine | 21 | 30 | 1.9 | 2550 | 30 | 2012 |

| Table 3 | Prolific | sources | contributing | to | Mohile | comn | ntino | Research | output |
|----------|-----------|---------|--------------|----|--------|------|-------|------------------|--------|
| I apre.5 | 1 I Unnit | sources | contributing | w | MUDIIC | comp | uung | MUSUAL CH | υμιραι |

 $N \ge 380$ N= No. of the Citations

Table. 3 represents' the top 10 highly cited sources N \geq 380 preferred by the researchers in the mobile computing research field. The journal IEEE access published by the IEEE publishing group was found to be a highly cited journal during the reported period. The journal IEEE internet of things journal contributed the highest h-index (31) and m- index (3) values. Regarding the g – index, the "IEEE internet of things journal" ranked top in the list.



Fig.2. Prolific sources contribution

8. Most Relevant Affiliations

| Table.4 Top 10 Prominent affiliation publishing mobi | le |
|--|----|
| computing research | |

| Affiliations | Articles |
|----------------------------------|----------|
| Beijing univ posts and telecomm | 237 |
| Xidian univ | 91 |
| Tsinghua univ | 85 |
| Shanghai jiao tong univ | 73 |
| Univ elect sci and technol china | 67 |
| Univ malaya | 55 |
| Carleton univ | 53 |
| Zhejiang univ | 53 |
| Huazhong univ sci and technol | 49 |
| Sun yat sen univ | 47 |

 $N \ge 47$ N= No. of Articles

Table. 4 throws light on the top 10 highly productive that have contributed 47 or more publications on mobile computing research publications during the reported period. The 10 global institutions involved in mobile computing research contributed 810 papers to the cumulative publications output of the world, with an average of 81 papers per institution. It is found that the majority of institutions contributing to mobile computing-related publications are Beijing university posts and telecommunication 237 publications, followed by the Xidian University, with 91 Publications.



Fig.3. Top 10 Prominent affiliation

9. Most Local Cited References (LCR)

Table.5 Top 20 Local Cited References

| Cited References | Citation |
|--|----------|
| SATYANARAYANAN M, 2009, IEEE PERVAS COMPUT, V8, P14, DOI 10.1109/MPRV.2009.82 | 375 |
| CHEN X, 2016, IEEE ACM T NETWORK, V24, P2827, DOI 10.1109/TNET.2015.2487344 | 364 |
| CUERVO E., 2010, P INT C MOB SYST APP, P49, DOI [10.1145/1814433.1814441, DOI 10.1145/1814433.1814441] | 317 |
| KUMAR K, 2010, COMPUTER, V43, P51, DOI 10.1109/MC.2010.98 | 281 |
| MAO YY, 2017, IEEE COMMUN SURV TUT, V19, P2322, DOI 10.1109/COMST.2017.2745201 | 273 |
| DINH HT, 2013, WIREL COMMUN MOB COM, V13, P1587, DOI 10.1002/WCM.1203 | 252 |

| SHI WS, 2016, IEEE INTERNET THINGS, V3, P637, DOI 10.1109/IIOT 2016 2579198 | 144 |
|--|-----|
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| ZHANG WW, 2013, IEEE T WIREL COMMUN, V12, P4569, DOI 10.1109/TWC.2013.072513.121842 | 159 |
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The top 20 cited references lead to IEEE pervas Comput secured the highest citations (375).the article by satyanarayanan m, (2009). It is interesting to note that the list of highly cited references is dominated by two journals i.e. IEEE internet things (144 LCR) and IEEE internet things (144 LCR).

10. LOTKA'S Law Productivity

Table.6 The frequency distribution of Scientific Productivity

| Documents written | No of Authors | Proportion of Authors |
|-------------------|---------------|-----------------------|
| 1 | 6170 | 0.723 |
| 2 | 1171 | 0.137 |
| 3 | 465 | 0.055 |
| 4 | 252 | 0.03 |
| 5 | 138 | 0.016 |
| 6 | 95 | 0.011 |
| 7 | 77 | 0.009 |
| 8 | 33 | 0.004 |
| 9 | 31 | 0.004 |
| 10 | 24 | 0.003 |
| 11 | 13 | 0.002 |
| 12 | 7 | 0.001 |
| 13 | 10 | 0.001 |
| 14 | 4 | 0 |
| 15 | 3 | 0 |
| 16 | 3 | 0 |
| 17 | 4 | 0 |
| 18 | 5 | 0.001 |
| 19 | 4 | 0 |
| 20 | 1 | 0 |



Fig.5. Frequency distribution of Scientific Productivity

Table 5 depicts the top 20 highly cited references on

mobile computing.



Fig.4. Top 20 Local Cited References

11. Findings

The descriptive statistics of mobile computing research output. The papers have been widely spread, with 1755 individual sources represented. The majority of articles are multi authored, with only 176 being single authored. Such multi-authorship is increasing common in sciences.

The mobile computing research output is originated from 77 countries during the study period. Table.2 show that total citations count and average citations of the mobile computing publications during the reported period. In all 77 countries contributed 71080 citations. The list of top ten highly cited countries. China topped the list with the highest citations (29223). The other productive countries were USA with 10997 citations followed by Singapore with 3286 and Korea 2748 citations. It is also important to note that Norway is the country with the highest citations (134.467) per article. Out of total citations, the top 10 countries share 58384 (405.13 %) citations.

In all, 3825 records on mobile computing research output have published in Sources. Table. 3 represents' the top 10 highly cited sources $N \ge 380$ preferred by the researchers in mobile computing research field. The journal IEEE access published by IEEE publishing group was found to be a highly cited journal during the reported period. The journal IEEE internet of things journal contributed highest h-index (31) and m- index (3) values. Regarding g – index, "IEEE internet of things journal" ranked top in the list.

Throw light on the top 10 highly productive that have contributed 47 or more publications on mobile computing research publications during the reported period. The 10 global institutions involved in mobile computing research contributed 810 papers in the cumulative publications output of the world, with an average of 81 papers per institution. It is found that the majority of institutions contributing to mobile computing related publication are from Beijing university posts and telecommunication 237 publications, followed by the Xidian University, with 91 Publications.

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12. Conclusion

The present study made an attempt to trace the publication output of mobile computing from 2017 to 2022 as reflected in the web of science database and to assess its growth, nature of citation and the research impact in terms of various scientometric parameters. Researchers have observed a consistent growth of research output throughout the study period and over the past six years. Mobile computing had better citations in foreign countries and the publications appeared in different national and international journals of high reputation and impact factors. This study provides an indication of current publication patterns and its citation analysis of mobile computing and helps the researchers to analyse the publication trends in their respective areas.

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