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Global Research output of Soft Computing using Engineering Information Village Database

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Abstract
This study examines the publication patterns of Soft Computing. Data collected were from Engineering Village database and it covers Conference articles, Journal Articles, and Conference proceedings and so on. A total of 6705 publications were sampled from the database, 1162 journal articles, 5479 conferences articles and 18 conference proceedings and analyzed. The result showed in the form of year wise distribution of publications, sources title wise, Institutions wise, subject keyword wise distribution of publications. Japan dominated with 13.18%, China with 11.77% and ranked second, India with 10.60 % ranked third and followed by Poland, Spain, United States.

Keywords: Soft Computing: Bibliometric Study; Bibliometric analysis

Introduction

Soft Computing is dedicated to system solutions based on soft computing techniques. It provides rapid dissemination of important results in soft computing technologies, a fusion of research in evolutionary algorithms and genetic programming, neural science and neural net systems, fuzzy set theory and fuzzy systems, and chaos theory and chaotic systems. Soft Computing encourages the integration of soft computing techniques and tools into both everyday and advanced applications. By linking the ideas and techniques of soft computing with other disciplines, the journal serves as a unifying platform that fosters comparisons, extensions, and new applications. As a result, the journal is an international forum for all scientists and engineers engaged in research and development in this fast growing field. Indexed by Science Citation Index, Inspec, Compendex, DBLP, Computer Science Index, Current Abstracts, Current Contents, EBSCO host, Ingent Connect, MetaPress, Springerlink, OCLC, SCOPUS, Ulrich´s, Zentralblatt Math. This study covers only engineering village2 database. Bibliometric analysis is one of the ways to helping to provide the answer to year wise distribution of publications, document wise, journal wise, institution wise, keyword wise and country wise publication output in the particular discipline(Soft Computing Journal).

Objectives

The objectives of the present study are:

- To study the year-wise distribution of publications in the field of Soft Computing;
- To study the Institution with Department wise distribution of the Publications;
- To study the authorship pattern of papers;
- To study the Document and Source Title-wise distribution of papers; and
- To study the country wise distribution of Publications.
- To find the dominant publishers

Methodology

The methodology applicable in bibliometric study which is used to analyses in detail the bibliographic attributes of the articles indexed in Engineering Village Database from 1997-2014 total of 6705 Publications. The data have extracted and tabulated in the form of tables and figures and analyze the data for the study.

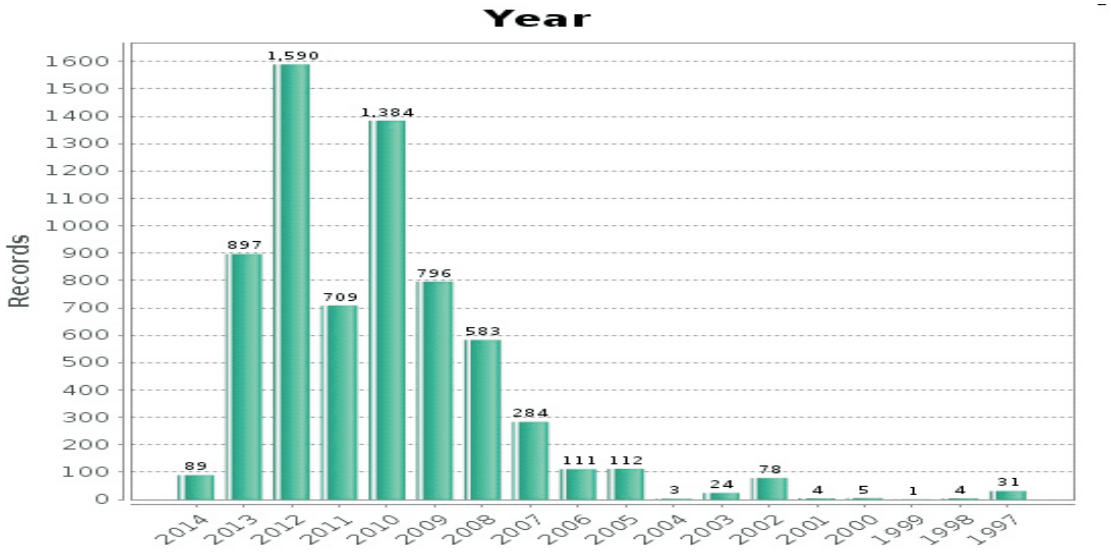
Data Analysis and Interpretations

Year wise Distribution of Publications

During the study period 1997-2014 6705 articles were published. Table 1 show that the year wise distribution of publications. Out of total 6705 articles, the highest number of publications are in year 2012 with 1590, 1384 articles in 2010. The less number of publications are published before 2000 because of initial stage of technological development such as web development, computational methods and so on.

Table 1. Shows that Year wise Distribution of Publications

Year	Publications	%
2014	89	1.33
2013	897	13.38
2012	1590	23.71
2011	709	10.57
2010	1384	20.64
2009	796	11.87
2008	583	8.70
2007	284	4.24
2006	111	1.66
2005	112	1.67
2004	3	0.04
2003	24	0.36
2002	78	1.16
2001	4	0.06
2000	5	0.07
1999	1	0.01
1998	4	0.06
1997	31	0.46
Total	**6705**	**100**

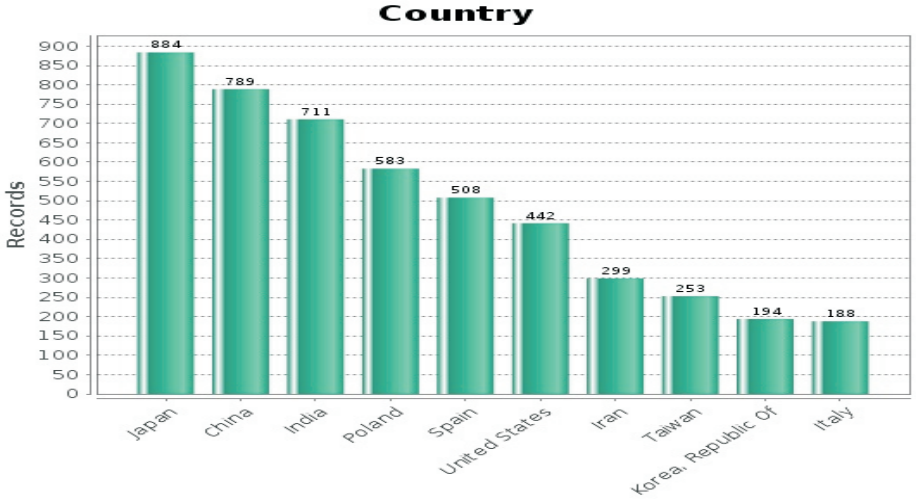


Country wise Distribution of Publications

Table 2 shows global contribution is 6705 publications to the Soft computing research. The highest number 884(13.18%) of papers were from Japan, 789 publications (11.77%) paper each was contributed by the authors from China and ranked second, India ranked third with 711Publications and followed by Poland, Spain and United States.

Table 2 shows that country wise distribution of publications

Country	Publications	%	Country	Publications	%
Japan	884	13.18	Tunisia	36	0.54
China	789	11.77	Slovakia	35	0.52
India	711	10.60	Thailand	34	0.51
Poland	583	8.70	Finland	32	0.48
Spain	508	7.58	Pakistan	31	0.46
United States	442	6.59	Hong Kong	28	0.42
Iran	299	4.46	Sweden	25	0.37
Taiwan	253	3.77	Netherlands	25	0.37
Korea, Republic Of	194	2.89	Serbia	22	0.33
Italy	188	2.80	Switzerland	21	0.31
United Kingdom	185	2.76	Cyprus	17	0.25
Malaysia	175	2.61	Chile	17	0.25
France	166	2.48	South Africa	15	0.22
Romania	164	2.45	Kazakhstan	15	0.22
Germany	163	2.43	Lithuania	13	0.19
Turkey	163	2.43	Azerbaijan	12	0.18
Czech Republic	155	2.31	Ireland	12	0.18
Mexico	138	2.06	Cuba	12	0.18
Canada	135	2.01	Jordan	12	0.18
Australia	93	1.39	Indonesia	12	0.18
Brazil	79	1.18	Slovenia	12	0.18
Portugal	78	1.16	Denmark	12	0.18
Greece	77	1.15	Argentina	11	0.16
Hungary	64	0.95	Kuwait	11	0.16
Singapore	50	0.75	Algeria	11	0.16
Belgium	49	0.73	Norway	10	0.15
Austria	45	0.67	Lebanon	10	0.15
Russia	43	0.64	Israel	9	0.13
Egypt	40	0.60	New Zealand	9	0.13
Saudi Arabia	36	0.54	United Arab Emirates	9	0.13



Document wise distribution of Publications

The below table concerning document type of publications they are mainly Conference articles with 5479 (81.72%) and Journal articles with 1162 (17.33%) as shown in table 3.

Table 3 shows that document wise distribution of Publications

Document Type	Publications	%
Conference article	5479	81.72
Journal article	1162	17.33
Article in Press	46	0.69
Conference proceeding	18	0.27
Total	**6705**	**100**

Source wise distribution of Publications

Table 4 indicates the contributed by various institutes with departments. The highest publication with 1048 in Lecture Notes In Computer Science (Including Subseries Lecture Notes In Artificial Intelligence And Lecture Notes In Bioinformatics) and followed by other source are listed in the below table.

Table 4 shows that Source wise distribution of Publications

Source Title wise	Publications	%
Lecture Notes In Computer Science (Including Subseries Lecture Notes In Artificial Intelligence And Lecture Notes In Bioinformatics)	1048	15.63
Advances In Intelligent And Soft Computing	894	13.33
6th International Conference On Soft Computing And Intelligent Systems, And 13th International Symposium On Advanced Intelligence Systems, SCIS/ISIS 2012	422	6.29
Advances In Intelligent Systems And Computing	307	4.58
SCIS AND ISIS 2010 - Joint 5th International Conference On Soft Computing And Intelligent Systems And 11th International Symposium On Advanced Intelligent Systems	302	4.50
40th International Conference On Computers And Industrial Engineering: Soft Computing Techniques For Advanced Manufacturing And Service Systems, CIE40 2010	288	4.30
Soft Computing	191	2.85
SOCPAR 2009 - Soft Computing And Pattern Recognition	137	2.04
Applied Soft Computing Journal	135	2.01
Civil-Comp Proceedings	129	1.92
5th International Conference On Soft Computing As Transdisciplinary Science And Technology, CSTST '08 - Proceedings	111	1.66
Proceedings Of The 2011 International Conference Of Soft Computing And Pattern Recognition, SOCPAR 2011	105	1.57
Proceedings Of The 2010 International Conference Of Soft Computing And Pattern Recognition, SOCPAR 2010	86	1.28
ICSCCW 2009 - 5th International Conference On Soft Computing, Computing With Words And Perceptions In System Analysis, Decision And Control	85	1.27
Proceedings Of The 9th Iasted International Conference On Artificial Intelligence And Soft Computing, ASC 2005	79	1.18
SMCIA/08 - Proceedings Of The 2008 IEEE Conference On Soft Computing On Industrial Applications	75	1.12
Multimedia, Image Processing And Soft Computing: Trends, Principles And Applications - Proceedings Of The 5th Biannual World Automation Congress, Wac 2002, ISSCI 2002 And IFMIP 2002	73	1.09
Proceedings Of The 10th Iasted International Conference On Artificial Intelligence And Soft Computing, ASC 2006	53	0.79
Expert Systems With Applications	53	0.79
Proceedings Of The 11th Iasted International Conference On Artificial Intelligence And Soft Computing, ASC 2007	50	0.75

Table 5 indicates the papers contributed by various institutes. The maximum of 53 publications are from Department Of Computer Engineering, Czestochowa University Of Technology. Next contribution is from Systems Research Institute, Polish Academy Of Sciences with 36 publications, Machine Intelligence Unit, Indian Statistical Institute with 16 publications and ranked 6 and followed by other institutions.

Table 5 shows that Institution wise distribution of Publications

Institutions with Department	Publications	%
Department Of Computer Engineering, Czestochowa University Of Technology	53	0.79
Systems Research Institute, Polish Academy Of Sciences	36	0.54
IEEE	27	0.40
Institute Of Computer Engineering, Control And Robotics, Wroclaw University Of Technology	26	0.39
Institute Of Control And Computation Engineering, Warsaw University Of Technology	18	0.27
Kansai University	16	0.24
Machine Intelligence Unit, Indian Statistical Institute	16	0.24
Aurel Vlaicu University Of Arad	15	0.22
Graduate School Of Information Science And Technology, Hokkaid o University	15	0.22
Institute Of Computational Intelligence, Czestochowa University Of Technology	14	0.21
Indian Institute Of Technology	14	0.21
Agh University Of Science And Technology	13	0.19
Department Of Computer Science And Intelligent Systems, Osaka Prefecture University	13	0.19
Academy Of Management (Swspiz), Institute Of Information Technology	13	0.19
Graduate School Of Engineering, University Of Hyogo	12	0.18
Nagoya University	12	0.18
Department Of Computer Science, Meiji University	12	0.18
Faculty Of Informatics, Kansai University	12	0.18
Graduate School Of Applied Informatics, University Of Hyogo	11	0.16
Department Of Computer Science And Artificial Intelligence, University Of Granada	11	0.16
Institute Of Control And Computation Engineering, University Of Zielona Gora	10	0.15
Kobe University	10	0.15
Graduate School Of Engineering, Hiroshima University	10	0.15
Graduate School Of Information, Production And Systems, Waseda University	10	0.15
Faculty Of Mathematics And Information Science, Warsaw University Of Technology	10	0.15
School Of Electrical And Electronic Engineering, Nanyang Technological University	10	0.15
Silesian University Of Technology	10	0.15

Publisher wise distribution of publications

Soft Computing research publications are distributed world wise leading publishers which indexed by Engineering village database. The researcher has given the preference to publish their publication with leading publishers such as 2484 (37.05%) Publications in Speringer Verlag, 1735 Publications in IEEE Computing Society and followed by the below publishers.

Table 6 shows that Publisher wise distribution of publications

Publishers	Publications	%
Springer Verlag	2484	37.05
IEEE Computer Society	1735	25.88
Japan Society For Fuzzy Theory And Intelligent Informatics	302	4.50
Elsevier Ltd	298	4.44
ACTA Press	295	4.40
Institute Of Electrical And Electronics Engineers Inc.	188	2.80
Inst. Of Elec. And Elec. Eng. Computer Society	165	2.46
Civil-Comp Press	132	1.97
Association For Computing Machinery	131	1.95
Elsevier	83	1.24
SPIE	40	0.60
IOS Press	37	0.55
Elsevier Inc.	36	0.54
Taylor And Francis Ltd.	30	0.45
Springer Netherlands	27	0.40
World Scientific Publishing Co. Pte. Ltd	20	0.30
Atlantis Press	20	0.30
Sun Site Central Europe Ceur-Ws	20	0.30
World Scientific And Engineering Academy And Society	19	0.28
Springer London	18	0.27
Trans Tech Publications Ltd	17	0.25
Taylor And Francis Inc.	16	0.24

Control vocabulary wise distribution of publications

The researchers are published 6705 publications in the field of soft computing and catered in different vocabulary control terms according to Engineering village database. Artificial Intelligence with 1226 publications, Neural Networks with 1142, Intelligent Systems with 872 and followed by Fuzzy Logi, Genetic Algorithms, Algorithms, Software Engineering and so on.

Table 7 shows that Control vocabulary wise distribution of publications

Control vocabulary wise	Publications	%
Artificial Intelligence	1226	18.28
Neural Networks	1142	17.03
Intelligent Systems	872	13.01
Fuzzy Logic	619	9.23
Genetic Algorithms	577	8.61
Algorithms	560	8.35
Software Engineering	510	7.61
Fuzzy Systems	505	7.53
Optimization	505	7.53
Fuzzy Sets	456	6.80
Problem Solving	351	5.23
Pattern Recognition	348	5.19
Industrial Engineering	306	4.56
Forecasting	290	4.33
Evolutionary Algorithms	279	4.16
Bioinformatics	237	3.53
Particle Swarm Optimization (Pso)	214	3.19
Decision Making	214	3.19
Feature Extraction	209	3.12
Learning Algorithms	207	3.09
Computer Simulation	206	3.07

Control vocabulary wise	Publications	%
Mathematical Models	205	3.06
Computer Science	204	3.04
Learning Systems	201	3.00
Data Mining	201	3.00
Fuzzy Neural Networks	175	2.61
Fuzzy Inference	171	2.55
Image Processing	168	2.51
Support Vector Machines	158	2.36
Fuzzy Rules	156	2.33
Information Technology	151	2.25
Clustering Algorithms	150	2.24

Conclusion

The paradigm shift over the period is a gradual increase in the study period but good response is observed in the year 2009-2014. This study has highlighted quantitatively the contributions made by the researchers during 1997-2014 as reflected in Engineering Village database. During 18 years period contribution in terms of number of publications is significant for Indian level compare with United States. A compare with china output in relation to the publications are less and its help in understanding the contribution in a better angle. Hence, author contributions have to be encouraged and this will certainly help for more publications. Overall, at the global level Universities and technical Institution researchers should be encouraged.

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