A Python based Regression Approach on Reliable Journal Parameters to Assess Few Scientific Impact Measures

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ABSTRACT
The growing use of bibliometrics among researchers has showcased the emergence of various evaluators of scientific research at the author front as well as journal publishers. Several indices has been put forward since the importance of scientific evaluators has gained prominence. Among any such indices, h-index, g-index etc., has been widely used in literature. The regression analysis presented here focus on the citation parameters such as total docs, citable docs, references per doc etc., reported in SCIMago database to evaluate the dependence of these parameters on various indices such as h-index, a-index, m-index, q2 index, r-index, a-r index and e-index respectively. The regression analysis was performed to delineate the dependence of various citation features on index values. From the analysis, it is understood that in all cases except a-index, an increase in SJR value is suggested which means that SJR contributes positively to enhance index factor of journals.

Keywords
SCIMago, bibliometrics, indexvalue, python

1. INTRODUCTION
Bibliometric indicators are intended to quantify the significance of individual journals and the scholarly publication in which research is published [1]. The increasing importance of the scientific impact of journals as independent measures of quality or impact of any scientific publication has triggered the evolution of many bibliometric indices [2] [3]. The impact of a scientific publication is measured by the number of times the article gets cited in other journals [4]. Bibliometric indicators quantify the pertinent citation and use of bibliographic information and are being used extensively in the assessment of research performance. Publication counts serve as an indicator of the amount of new scientific knowledge produced by researchers. The impact of this new knowledge can be measured by the number of times publications have been cited by other scientists in subsequent work. Evaluation of quality and quantity of publications can be done using a set of statistical and mathematical indices called bibliometric indicators [4]. Indicators such as Quantitative indicators measure the productivity of the researcher and performance indicators measure the quality of the journal or researcher.

The validity of bibliometric indicators is much greater at research groups, university departments and research institutes and should be applied with extreme caution when measuring or comparing the performance of individual scientists.Bibliometric analysis of scientific activity is based on the assumption that carrying out research and communicating the results go hand in hand. Scientific progress is attained by researchers getting together to study specific research topics. Publications are regarded as the definitive statements of the results of research projects. This can be quantified and analysed to determine the size and nature of the research carried out. The need for a relatively quick and easy alternative to peer review for evaluating research performance led to the discovery of bibliometrics. [5].

The knowledge of research indices started when Hirsh proposed the h-index, designed to measure the impact of research publications to estimate the author influence [6]. H-index has been regarded as the most reliable, robust and easily computed [7][8][9]. H-index assesses both the quantity and importance or relevance of publications [10]. H-index has some limitations, and hence to overcome and provide enhancements to H-index, Egghe proposed the g-index [11]. Based on properties of h and g indices, Kosmulski [12] proposed the H(2)-index which concentrates on highly cited research publications. Other indices were proposed which concentrated on the publications that were located at (H-core) in its calculations [13] such as A-index proposed by Jin [14] where, the average number of citations for those publications in the H-core is evaluated. As a variation of A-index, Bornmann et al proposed m-index where, instead of arithmetic average, median is employed as the measure of central tendency [14]. m-index calculated by dividing the *h* index by the number of years of that journal's publication [15].In order to increase the index value of a journal or researcher, several policies can be adopted to improve citations, such as publishing more review articles, as well as inviting papers and request authors to cite work published. Therefore, here we present a methodology to assess the bibliometric index on a journal and important parameters that might influence a high index value.

2. MATERIALS AND METHODS

2.1 SCIMago
[16]Database includes journals from the information contained in Scopus database [17].SCImago database searched for 'computer science journals' and are listed. The journal parameters such Sci Journal Ranking (SJR), h-index, Total Docs, Total References, Total cites, citable docs, cites/doc and references/doc etc., are calculated by SCImago and are used.

2.2 Regression
Regression analysis is the method of correlating parameters with dependent variable. A python program was written to perform linear regression analysis. Bibliometrics indices were regarded as dependent variable

and all other citation parameters are considered as independent variables. To obtain reliable and robust regression, it is desirable to consider a large dataset that covers reasonable diversity.

2.3 Dataset

SCImago site was searched for all categories of computer science journals and from the search result, nearly 142 journal data (Table 1) was selected as independent variables and various indices are presented as dependent variables. The relationship between dependent variable (bibliometric indices) and independent variables (citation parameters) was established by linear regression analysis. The generated equation was judged based on the parameters like correlation coefficient (r), $r^2$and adjusted r^2.

2.4 Bibliometric indices

In recent years, several research and publications related indices were proposed to assess the quality of the academic research publications. Each one of those indices has its own strengths and weaknesses. Here, we considered indices such as h-index, a-index, m-index, q2 index, r-index, a-r index and e-index respectively. The regression analysis was performed to delineate the dependence of various citation features on index values.

Table 1: Citation parameters from SCIMago and various bibliometric indices selected in analysis.

Title	TD3	TR3	TC3	CD3	CD2	RD	SJR	H index	A index	m index	q2 index	r index	a-r index	e index
Archives of Computational Methods in Engineering	42	1383	312	40	4.82	98.79	6.284	32	9.75	10.67	18.48	99.92	57.69	16.73
MIS Quarterly: Management Information	151	5571	1771	149	9.88	81.93	6.251	132	13.42	44	76.21	483.5	279.15	40.48
Swarm and Evolutionary Computation	46	1696	557	45	12.38	41.37	5.631	13	42.85	4.33	7.51	85.09	49.13	23.32
Proceedings of the Annual ACM Symposium on Theory of Computing	260	3195	737	253	2.57	31.63	4.479	40	18.43	13.33	23.09	171.7	99.13	26.4
IEEE Wireless Communications	238	1368	1693	211	7.16	12.11	3.83	98	17.28	32.67	56.58	407.33	235.17	39.94
IEEE Transactions on Information Theory	1565	17006	6546	1544	3.77	30.31	3.397	192	34.09	64	110.85	1121.09	647.26	79.71
Journal of the ACM	92	1967	396	81	5.18	43.71	3.351	88	4.5	29.33	50.81	186.68	107.78	17.55
IEEE Journal on Selected Areas in Communications	534	8569	3107	502	6	29.15	3.335	165	18.83	55	95.26	716	413.38	54.24
IEEE Communications Magazine	829	2874	4817	643	7.3	9.94	3.196	144	33.45	48	83.14	832.86	480.85	68.36
Journal of Strategic Information Systems	85	1715	334	72	4.39	57.17	2.903	50	6.68	16.67	28.87	129.23	74.61	16.85
IEEE Transactions on Wireless Communications	1354	16437	6025	1324	4.09	27.53	2.722	118	51.06	39.33	68.13	843.18	486.81	76.86
Foundations and Trends in Information	10	574	93	10	5.83	191.33	2.714	15	6.2	5	8.66	37.35	21.56	8.83
IEEE Transactions on Industrial Informatics	243	8691	2221	227	11.13	35.91	2.666	39	56.95	13	22.52	294.31	169.92	46.71
Information Sciences	1147	25733	6125	1125	5.34	39.77	2.606	91	67.31	30.33	52.54	746.58	431.04	77.68
Information and Organization	37	1267	138	36	4.23	70.39	2.534	34	4.06	11.33	19.63	68.5	39.55	10.2
Web Semantics	132	902	437	104	4.61	32.21	2.131	49	8.92	16.33	28.29	146.33	84.48	19.7

IEEE/ACM Transactions on Networking	446	4733	1691	415	3.63	17.93	2.042	124	13.64	41.33	71.59	457.91	264.38	39.59
Enterprise Information Systems	69	2296	351	65	6	45.02	1.994	21	16.71	7	12.12	85.85	49.57	18.17
Journal of Management Information	138	2513	445	122	2.94	57.11	1.969	90	4.94	30	51.96	200.12	115.54	18.84
Journal of Computer-Mediated	86	1416	262	81	3.12	50.57	1.958	64	4.09	21.33	36.95	129.49	74.76	14.07
Communications of the ACM	1017	2013	2955	650	3.57	7.51	1.822	131	22.56	43.67	75.63	622.18	359.21	53.14
Decision Support Systems	481	9942	1590	469	3.14	43.8	1.814	76	20.92	25.33	43.88	347.62	200.7	38.91
Information Systems Journal	82	1817	229	63	2.43	50.47	1.798	52	4.4	17.33	30.02	109.12	63	13.3
IEEE Network	152	806	775	119	6.07	12.03	1.796	80	9.69	26.67	46.19	249	143.76	26.36
Journal of the American Society for Information	602	11055	1867	534	3.3	43.87	1.745	83	22.49	27.67	47.92	393.65	227.27	42.24
Journal of Information Technology	110	1760	264	67	2.49	73.33	1.659	43	6.14	14.33	24.83	106.55	61.51	14.87
Journal of the Association of Information	103	2386	331	103	2.46	95.44	1.625	31	10.68	10.33	17.9	101.3	58.48	17.32
Knowledge and Information Systems	294	8431	902	279	3.02	46.32	1.616	31	29.1	10.33	17.9	167.22	96.54	29.51
ACM Transactions on the Web	56	1551	255	54	4.68	51.7	1.563	26	9.81	8.67	15.01	81.42	47.01	15.13
Information Systems	180	2950	596	158	3.4	33.52	1.529	53	11.25	17.67	30.6	177.73	102.61	23.3
European Journal of Information Systems	150	3347	428	143	2.76	77.84	1.515	58	7.38	19.33	33.49	157.56	90.97	19.24
ACM Transactions on Programming Languages and	59	799	148	54	2.86	57.07	1.492	51	2.9	17	29.44	86.88	50.16	9.85
IEEE Communications Letters	1378	6866	3030	1370	2.18	11.27	1.19	96	31.56	32	55.43	539.33	311.38	54.17
IEEE Transactions on Services Computing	104	1577	491	90	4.36	34.28	1.176	27	18.19	9	15.59	115.14	66.48	21.54
Journal of Information Systems	46	1434	121	43	2.36	55.15	1.157	11	11	3.67	6.35	36.48	21.06	10.49
ACM Transactions on Management Information	49	1352	109	48	2.31	56.33	1.085	7	15.57	2.33	4.04	27.62	15.95	10.1
Information and Software Technology	288	7370	915	267	3.07	54.19	1.072	54	16.94	18	31.18	222.28	128.34	29.34
Software and Systems Modelling	128	5182	234	83	2.2	40.48	1.055	28	8.36	9.33	16.17	80.94	46.73	14.35
IEEE Internet Computing	298	759	809	278	2.62	8.34	1.044	79	10.24	26.33	45.61	252.81	145.96	27.02
Journal of Computational Science	135	1361	320	123	2.6	16.6	1.038	11	29.09	3.67	6.35	59.33	34.25	17.58

Information and Computation	230	3216	275	220	1.2	20.35	1.029	50	5.5	16.67	28.87	117.26	67.7	15
Soft Computing	485	9584	951	462	2.02	36.3	1.019	36	26.42	12	20.78	185.03	106.83	30.25
Interacting with Computers	154	1683	421	147	2.03	36.59	0.989	47	8.96	15.67	27.14	140.67	81.21	19.34
International Journal of Human Computer Studies	192	3961	505	186	1.94	50.14	0.988	76	6.64	25.33	43.88	195.91	113.11	20.71
Journal of Computer Security	98	1220	183	84	2	42.07	0.971	40	4.58	13.33	23.09	85.56	49.4	11.96
Journal of Educational Computing	128	1747	166	128	0.99	43.68	0.84	35	4.74	11.67	20.21	76.22	44.01	11.45
Computers and Security	210	3667	505	182	2.41	37.8	0.838	51	9.9	17	29.44	160.48	92.66	21.31
Information Systems Research	184	4437	853	174	3.99	70.43	3.632	99	8.62	33	57.16	290.6	167.78	27.46
Journal of Operations Management	141	2808	916	130	5.32	75.89	5.872	108	8.48	36	62.35	314.53	181.59	28.43
IEEE Transactions on Fuzzy Systems	285	4301	2487	281	8.42	45.76	3.59	119	20.9	39.67	68.7	544.02	314.09	48.66
Mathematical Programming Computation	36	495	157	36	4.12	38.08	3.335	11	14.27	3.67	6.35	41.56	23.99	12.08
International Journal of Robotics Research	307	4035	1586	286	5.46	44.34	3.33	89	17.82	29.67	51.38	375.7	216.91	38.69
IEEE Transactions on Automatic Control	1073	9995	5450	1056	4.58	27.46	2.992	175	31.14	58.33	101.04	976.6	563.84	72.63
Computers and Operations Research	721	9080	2518	698	3.03	28.73	2.97	84	29.98	28	48.5	459.9	265.53	49.34
IEEE Transactions on Signal Processing	1709	16701	8058	1690	4.45	34.15	2.817	162	49.74	54	93.53	1142.54	659.65	88.86
IEEE Journal on Selected Topics in Signal Processing	312	2508	1771	288	5.32	30.96	2.705	45	39.36	15	25.98	282.3	162.99	41.55
IEEE Transactions on Robotics	330	4613	1845	329	5.03	37.5	2.626	77	23.96	25.67	44.46	376.92	217.61	42.05
IEEE Transactions on Image Processing	973	15876	5752	965	5.01	38.07	1.98	169	34.04	56.33	97.57	985.95	569.24	74.72
Medical Image Analysis	251	4984	1381	243	5.23	50.34	1.977	76	18.17	25.33	43.88	323.97	187.04	36.12
Computers and Structures	497	7475	1481	483	2.84	34.61	1.919	75	19.75	25	43.3	333.28	192.42	37.5
ACM Transactions on Database Systems	88	1192	227	84	2.52	42.57	1.837	59	3.85	19.67	34.06	115.73	66.82	12.96
IEEE Signal Processing Magazine	334	3058	1507	280	5.26	25.48	1.831	106	14.22	35.33	61.2	399.68	230.75	37.43
Journal of Field Robotics	146	1781	555	136	3.88	37.89	1.765	52	10.67	17.33	30.02	169.88	98.08	22.43
IEEE Transactions on Knowledge and Data Engineering	423	8304	1858	408	3.84	38.62	1.763	103	18.04	34.33	59.47	437.46	252.57	41.89

Mechanical Systems and Signal Processing	640	9342	2363	618	3.74	29.56	1.713	79	29.91	26.33	45.61	432.06	249.45	47.79
IEEE Transactions on Software Engineering	194	5253	996	180	5.29	53.6	1.674	111	8.97	37	64.09	332.5	191.97	29.75
Pattern Recognition	964	11668	4210	956	4.03	38.64	1.653	121	34.79	40.33	69.86	713.73	412.07	63.95
Machine Learning	174	4044	563	161	3.37	43.96	1.651	103	5.47	34.33	59.47	240.81	139.03	21.45
Journal of Computer and System Sciences	277	2556	538	245	2.21	28.4	1.605	56	9.61	18.67	32.33	173.57	100.21	21.95
Fuzzy Sets and Systems	566	5404	1403	541	2.42	23.09	1.558	110	12.75	36.67	63.51	392.85	226.81	35.96
Data Mining and Knowledge Discovery	124	1717	414	113	3.54	40.88	1.558	62	6.68	20.67	35.8	160.21	92.5	18.76
ACM Transactions on Information and System Security	72	730	233	66	3.08	45.63	1.55	41	5.68	13.67	23.67	97.74	56.43	13.86
Computational Statistics and Data Analysis	938	7299	1245	872	1.25	26.07	1.399	57	21.84	19	32.91	266.39	153.8	34.47
Networks	187	1487	223	176	1.03	27.54	1.364	38	5.87	12.67	21.94	92.05	53.15	13.6
Mathematics of Operations Research	126	1166	195	126	1.05	30.68	1.329	50	3.9	16.67	28.87	98.74	57.01	12.04
IEEE Transactions on Neural Networks and Learning Systems	179	6852	917	178	5.15	30.59	1.309	16	57.31	5.33	9.24	121.13	69.93	30.02
IEEE Robotics and Automation Magazine	237	980	559	160	3.85	12.56	1.09	51	10.96	17	29.44	168.85	97.48	22.54
Information and Computation	230	3216	275	220	1.2	20.35	1.029	50	5.5	16.67	28.87	117.26	67.7	15
Topics in Cognitive Science	176	2553	331	152	1.68	41.85	1.028	19	17.42	6.33	10.97	79.3	45.79	17.66
ACM Transactions on Knowledge Discovery from Data	63	844	188	58	2.62	42.2	1.023	21	8.95	7	12.12	62.83	36.28	12.92
Robotics and Computer-Integrated Manufacturing	268	3218	788	263	3.16	30.94	1.272	51	15.45	17	29.44	200.47	115.74	27.15
Signal Processing	899	11026	2717	881	3.02	31.87	1.111	77	35.29	25.67	44.46	457.39	264.08	51.38
Computational Geosciences	175	2924	356	170	2.21	37.49	1.094	34	10.47	11.33	19.63	110.02	63.52	17.94
IEEE Robotics and Automation Magazine	237	980	559	160	3.85	12.56	1.09	51	10.96	17	29.44	168.85	97.48	22.54
Computational Materials Science	1521	19448	3193	1496	2.11	35.75	1.086	59	54.12	19.67	34.06	434.04	250.59	55.98
Nano Communication Networks	84	610	232	77	2.48	29.05	1.082	11	21.09	3.67	6.35	50.52	29.17	14.87

ACM Transactions on Knowledge Discovery from Data	63	844	188	58	2.62	42.2	1.023	21	8.95	7	12.12	62.83	36.28	12.92
IEEE Signal Processing Letters	585	4047	1573	577	2.46	14.15	1.016	82	19.18	27.33	47.34	359.15	207.35	38.61
Pattern Recognition Letters	832	8082	2273	800	2.36	27.03	0.995	92	24.71	30.67	53.12	457.29	264.02	46.7
Journal of Discrete Algorithms	177	1034	167	166	0.94	18.46	0.99	19	8.79	6.33	10.97	56.33	32.52	12.17
Journal of Information Hiding and Multimedia	88	539	223	88	2.77	21.56	0.984	14	15.93	4.67	8.08	55.87	32.26	14.46
Robotics and Autonomous Systems	373	5754	1007	347	2.61	33.45	0.954	70	14.39	23.33	40.41	265.5	153.29	30.61
IEEE Software	341	629	505	305	1.57	6.05	0.842	72	7.01	24	41.57	190.68	110.09	20.81
International Journal of Sensor Networks	118	1254	394	117	3.24	26.13	0.81	20	19.7	6.67	11.55	88.77	51.25	19.34
Foundations and Trends in Machine Learning	10	467	281	10	8.14	155.67	12.076	11	25.55	3.67	6.35	55.6	32.1	16.43
IEEE Transactions on Pattern Analysis and Machine	584	10325	6273	556	9.69	45.69	6.594	221	28.38	73.67	127.59	1177.43	679.79	77.79
Computer Methods in Applied Mechanics and Engineering	764	11137	2614	754	2.93	44.37	3.252	120	21.78	40	69.28	560.07	323.36	49.94
ACM Computing Surveys	84	8460	876	84	9.91	119.15	3.113	90	9.73	30	51.96	280.78	162.11	28.04
IEEE Transactions on Evolutionary Computation	159	2709	1363	153	9.21	52.1	3.102	111	12.28	37	64.09	388.96	224.57	35.38
SIAM Journal on Computing	227	3087	450	221	1.92	32.49	2.643	68	6.62	22.67	39.26	174.93	101	19.54
Computers and Education	757	14482	3724	744	4.52	50.64	2.558	77	48.36	25.67	44.46	535.49	309.16	60.39
Mathematical Programming	285	5880	670	272	2.43	30	2.542	75	8.93	25	43.3	224.17	129.42	24.39
ACM Transactions on Mathematical Software	83	976	282	82	4	32.53	2.323	54	5.22	18	31.18	123.4	71.25	15.1
IEEE Transactions on Mobile Computing	414	6393	2034	401	4.75	33.12	2.258	80	25.43	26.67	46.19	403.39	232.89	44.2
Computers and Geotechnics	329	4736	812	316	2.5	33.35	2.244	48	16.92	16	27.71	197.42	113.98	27.64
Journal of Machine Learning Research	756	5817	2379	739	2.51	33.82	2.186	94	25.31	31.33	54.27	472.89	273.02	47.8
Foundations of Computational Mathematics	78	1286	204	73	2.45	29.91	2.183	29	7.03	9.67	16.74	76.92	44.41	13.23
Artificial Intelligence	203	3603	799	196	3.91	51.47	2.174	101	7.91	33.67	58.31	284.08	164.01	26.42
Computational Intelligence and Neuroscience	110	954	419	103	5.16	50.21	2.17	23	18.22	7.67	13.28	98.17	56.68	19.9

Journal of Computer Assisted Learning	138	2404	485	129	2.52	46.23	2.144	48	10.1	16	27.71	152.58	88.09	20.9
Proceedings of the Annual IEEE Conference on Computational Complexity	99	738	128	93	1.43	23.81	2.113	21	6.1	7	12.12	51.85	29.93	10.34
IEEE Computational Intelligence	117	769	313	82	3.2	16.72	2.066	26	12.04	8.67	15.01	90.21	52.08	16.94
INFORMS Journal on Computing	146	1682	240	139	1.29	28.03	2.034	48	5	16	27.71	107.33	61.97	13.86
Statistics and Computing	181	3681	325	177	1.71	31.19	1.983	41	7.93	13.67	23.67	115.43	66.65	16.85
IEEE Transactions on Affective Computing	76	2275	533	70	6.79	59.87	1.824	16	33.31	5.33	9.24	92.35	53.32	22.74
Journal of Scientific Computing	303	6087	613	259	2.08	34.39	1.771	42	14.6	14	24.25	160.46	92.64	23.9
International Journal of Machine Learning and Cybernetics	67	2330	330	65	4.9	35.3	1.673	15	22	5	8.66	70.36	40.62	17.75
IEEE/ASME Transactions on Mechatronics	356	5990	1738	350	4.63	22.1	1.671	74	23.49	24.67	42.72	358.63	207.05	40.79
Automated Software Engineering	50	1306	131	40	2.46	39.58	1.596	29	4.52	9.67	16.74	61.64	35.59	10.1
Computational Geometry: Theory and Applications	195	1233	180	141	1.21	18.4	1.419	35	5.14	11.67	20.21	79.37	45.83	12.04
Journal of Graph Algorithms and Applications	62	779	76	56	1.35	24.34	1.417	24	3.17	8	13.86	42.71	24.66	7.21
Advanced Engineering Informatics	194	2529	638	177	3.58	45.98	1.405	43	14.84	14.33	24.83	165.63	95.63	24.39
Artificial Intelligence and Law	44	799	65	40	1.41	44.39	1.39	22	2.95	7.33	12.7	37.82	21.83	6.56
Theory and Practice of Logic Programming	116	1301	222	112	2.1	28.91	1.385	26	8.54	8.67	15.01	75.97	43.86	14
Fuzzy Optimization and Decision Making	66	721	150	63	2	21.21	1.373	29	5.17	9.67	16.74	65.95	38.08	11
Computers and Mathematics with Applications	2108	10216	5600	2048	2.39	28.54	1.343	69	81.16	23	39.84	621.61	358.89	74.37
International Journal of Artificial	24	640	62	23	2.09	53.33	1.329	10	6.2	3.33	5.77	24.9	14.38	7.21
Journal of Artificial Intelligence	160	3497	495	160	2.23	58.28	1.312	76	6.51	25.33	43.88	193.96	111.98	20.47
Mechanism and Machine Theory	433	3757	992	421	2.08	25.39	1.303	60	16.53	20	34.64	243.97	140.85	30.53
Empirical Software Engineering	90	4046	303	74	3.76	51.87	1.285	39	7.77	13	22.52	108.71	62.76	16.25
Algorithmica	393	5117	433	330	1.21	26.51	1.283	50	8.66	16.67	28.87	147.14	84.95	19.57
International Journal of Intelligent Systems	176	1918	463	169	2	27.4	1.268	46	10.07	15.33	26.56	145.94	84.26	20.42
IEEE Transactions on Parallel and Distributed	558	7007	1969	517	3.75	31	1.252	78	25.24	26	45.03	391.9	226.26	43.49

Control Engineering Practice	405	5040	1372	393	3.12	28.64	1.245	67	20.48	22.33	38.68	303.19	175.05	36.12
Artificial Intelligence Review	161	3956	449	109	2.95	51.38	1.242	40	11.23	13.33	23.09	134.01	77.37	20.22
Mathematics of Control, Signals, and Systems	45	908	63	39	1.53	31.31	1.206	26	2.42	8.67	15.01	40.47	23.37	6.08
ACM Transactions on Software Engineering and	51	1771	207	49	4.33	49.19	1.197	53	3.91	17.67	30.6	104.74	60.47	12.41
Engineering Applications of Artificial	430	8962	1336	422	2.95	36.58	1.186	54	24.74	18	31.18	268.6	155.07	35.81
Mathematical and Computer Modelling	1171	12257	2517	1114	2.27	24.81	1.157	59	42.66	19.67	34.06	385.36	222.49	49.58
Integrated Computer-Aided Engineering	89	1276	327	81	4.3	45.57	1.119	25	13.08	8.33	14.43	90.42	52.2	17.38
Artificial Intelligence in Medicine	172	2487	426	158	2.35	40.77	0.865	53	8.04	17.67	30.6	150.26	86.75	19.31
Advances in Engineering Software	342	372	760	332	2.23	46.5	0.85	39	19.49	13	22.52	172.16	99.4	26.85

where,
TD3: Total Docs.; TC3: Total Cites; CD3: Citable Docs.; CD2: Cites / Doc.; RD: Ref. / Doc.; SJR: SciJournal Rank

3. RESULTS AND DISCUSSION

Regression analysis implemented to assess the improvement of several index values for all computer science journals and the objective is to identify the important citation parameters and how they behave in a dataset. This is based on the fact that a high index value attracts more number of papers to that particular journal. The outcome of the program is prediction of dependent variables and several validation parameters are analysed such as r2, adjusted r2, F-statistic etc. The obtained equations were given below.

h-index = 0.0858*TD3-0.0001*TR3+

0.0268*TC3-0.1234*CD3-0.5905*CD2-
0.1207*RD+3.2732*SJR+40.6617

r2 = 0.632, adjusted r2 = 0.613,

F-statistic = 32.90 (Eq.1)

a-index = -0.0034*TD3+0.0009*TR3-
0.0026*TC3+0.0324*CD3+3.1280*CD2-

0.0581*RD-0.5664*SJR-0.4094

r2 = 0.718, adjusted r2 = 0.703,

F-statistic = 48.78 (Eq.2)

m-index = 0.0286*TD3-0.0003*TR3+

0.0089*TC3-0.0411*CD3-0.1969*CD2-
0.0403*RD+1.0916*SJR+13.5543

r2 = 0.632, adjusted r2 = 0.613,

F-statistic = 32.90 (Eq.3)

q2-index = 0.0495*TD3-0.0006*TR3+

0.0155*TC3-0.0712*CD3-0.3406*CD2-
0.0697*RD+1.8895*SJR+23.4749

r2 = 0.632, adjusted r2 = 0.613,

F-statistic = 32.90 (Eq.4)

r-index = 0.2652*TD3+0.0007*TR3+

0.1640*TC3-0.3636*CD3+0.0598*CD2-
0.4406*RD+8.7870*SJR+84.0066

r2 = 0.936, adjusted r2 = 0.932,

F-statistic = 278.3 (Eq.5)

a-r index = 0.1531*TD3+0.0004*TR3+

0.0947*TC3-0.2099*CD3+0.0344*CD2-
0.2544*RD+5.0732*SJR+48.5020

r2 = 0.936, adjusted r2 = 0.932,

F-statistic = 278.3 (Eq.6)

e-index = 0.0272*TD3+0.0007*TR3+

0.0067*TC3-0.0167*CD3+1.5634*CD2-
0.0656*RD+0.1544*SJR+10.6136

r2 = 0.962, adjusted r2 = 0.960,

F-statistic = 478.3 (Eq.7)

Considering h-index as dependent variable, from the linear regression analysis it is observed that an increase in SJR, TD3 and TC3 with a decrease in remaining parameters is essential for a high h-index value. It is understood that in all cases except a-index, an increase in SJR value is suggested which means that SJR contributes positively to enhance index factor of journals. A similar observation was made with TD3, except a-index, this parameter showed a nominal increase in this value might favour better index values. From equation-2, it is evidenced that CD2 should be increased to more extent when compared to remaining parameters to produce high a-index. Moreover, decrease in RD in all cases suggest that RD has negative effect on all indices. Therefore a decrease in references per document would favour better index values. Overall data on TC3 suggested that this parameter is not of much importance. Finally it can be stated that all computer science journal selected in the study emphasized the role of citation parameters to increase index values. In all cases, a

negative value represents that parameter value should be reduced in order to gain increase in a particular value and a positive contribution to index value is ascertained for positive coefficient values.

4. CONCLUSION

In this paper, an attempt has been made to study the relationship between citation parameters such as Total Docs.; Total Cites; Citable Docs.; Cites / Doc.; Ref. / Doc.; SciJournal Rank etc., and bibliometric indices such as h-index, a-index, m-index, q2 index, r-index, a-r index and e-index respectively. A linear regression program written in python suggested that an increase in TD3 and SJR for all computer science journals would enhance index values except a-index. Therefore, considering the positivity and negative contribution of citation parameters on journals is deemed necessary to increase likelihood of paper submission to journals.

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