Understanding Factors Influencing the Citation Count of Networking Conference Papers

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Abstract—The impact of of a journal on the society is usually judged based on its impact factor. Researchers often aim to publish their research findings at journals with high impact factors. Conversely, researchers tend to judge the quality of a conference based on the its acceptance rate. However, it remains unknown if the low acceptance rate of a conference reflects a high impact on society compared to a conference with high acceptance rate. We performed an empirical study to analyze the influence of conference rankings on the number of citations a paper may receive over time. Our results show that papers published at highly reputed conferences tend to have more number of citations on average, than low ranked conferences. Additionally, we found that the title of the paper also influences the citation count. We believe our work would bring forth the opportunities for authors of the working papers to increase the number of citations of their papers as well increase the impact of their research towards the growth of the society.

Index Terms—citation count, conference rankings, paper title, publication year

I. INTRODUCTION

The research community has been publishing a number of research articles in computer networking related journals and conferences from last several decades. To ensure that the research gets published in a high quality journal and that the research has a significant influence on the growth of the society, researchers judge the quality of different journals based on their impact factors and tend to publish articles in journals with either high impact factors [12], [18], [21] or to journals where acceptance of an article is challenging, relative to other journals in the same field [10]. However, conferences do not have impact factors and therefore researchers tend to judge the quality of a conference based on the conference's acceptance rate. We argue that the acceptance rate of a conference may not reflect the impact of papers published in conferences on the growth of the society, similar to journals' impact factors. Therefore, it is important for researchers to understand whether publishing research papers in a conferences with low acceptance rates would result in higher impact on the society than publishing in conferences with low acceptance rates.

We performed an empirical study on a large data set to explore potential relationships between several factors (such as the reputation of the conference where the paper is accepted, the title of the paper, and the publication year of the paper) and the number of citations that a paper may receive over time. Our current data set consists of information about 63 networking conferences and about 39000 conference papers published

in these conferences during the years 2008 and 2012. We summarize the major findings of this study as follows:

- The reputation of the conference to which a paper is published may statistically influence the citation count of that paper by as much as 13%
- The choice of keywords in the paper title may statistically influence the number of citations that the paper may receive over time by as much as 9.3%
- The publication year may statistically influence the citation count of the paper by as much as 9.3%.
- Finally, the interactions between conference reputation, paper title, and publication year may statistically influence the citation count by as much as 45.7%

We argue that our conclusions, certainly not the last word, may assist authors to increase the number of citations their papers may get over time. Specifically, we hope that by using attractive keywords in the paper title, submitting to conferences with high reputation, and publishing research contributions at the appropriate time would potentially increase the citation count, which may also reflect an increase in the growth of the research. Finally, we make our data set and code publicly available at https://github.com/ugoel/ESOF522.

The rest of the paper is organized as follows. In Section II, we describe our experimental setup to collect data for different conferences and papers published from online conference ranking databases and Google Scholar. Section III describes our evaluation results. In Section IV, we offer a discussion of our approach for evaluating the impact of different factors on citation count. In Section V, we outline the related work. Finally, we conclude in Section VI, along with some research directions for our future work.

II. EXPERIMENTAL SETUP

Throughout our study, we consider the networking conferences listed at Prof. Kevin Almeroth's blog as the conferences that contribute the most in the field of computer networking [14]. For every conference listed in the blog, we collect the average number of papers submitted, average number of papers accepted, and the average acceptance rate for conferences conducted from 2008 to 2012. Our communication with Prof. Kevin Almeroth at University of California at Santa Barbara has revealed that the statistics of different networking conferences maintained by Prof. Kevin Almeroth are the most accurate, since general chairs of different networking conferences provide the conference statistics to Prof. Kevin Almeroth

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No.	Acronym	Conference Name	#Submitted	#Accepted	Acceptance (%)
1	Security & Privacy	IEEE Symposium on Security and Privacy	257	29	11.3
2	WWW World Wide Web Conference		779	93	11.9
3	Sigcomm ACM Sigcomm		258	32	12.4
4	Mobicom	ACM Mobicom	241	31	12.9
5	Security	USENIX Security Symposium	188	29	15.4
6	NDSS	Network and Distributed System Security	147	23	15.6
7	ICDCS	Conference on Distributed Computing Systems	552	87	15.8
8	Sigmetrics	ACM Sigmetrics	189	30	15.8
9	HiPC	IEEE Conference on High Performance Computing	243	40	16.5
10	CCS	ACM Computer and Communications Security	336	56	16.7
11	ATC	USENIX Annual Technical Conference	199	34	17.1
12	EuroSys			25	17.5
13	MobiHoc	ACM Symposium on Mobile Ad Hoc Networking and Computing.	143 176	31	17.6
14	CoNEXT	Conference on Emerging Networking Experiments and Technologies	164	29	17.7
15			135	24	17.7
	SenSys	ACM Conference on Embedded Networked Sensor Systems		30	17.7
16	NSDI	USENIX Symposium on Networked Systems Design and Implementation	168		
17	EWSN	European Conference on Wireless Sensor Networks	106	19	17.9
18	ICNP	Conference on Network Protocols	178	32	18.0
19	Infocom	IEEE Infocom	1508	273	18.1
20	MobiSys	ACM Conference on Mobile Systems, Applications, and Services	140	26	18.6
21	ACNS	Conference on Applied Cryptography and Network Security	165	31	18.8
22	IMC	ACM Internet Measurement Conference	196	41	20.9
23	CloudCom	International Conference on Cloud Computing Technology and Science	263	58	22.1
24	P2P	International Conference on Peer-to-Peer Computing	139	31	22.3
25	IPDPS	IEEE International Parallel & Distributed Processing Symposium	503	113	22.5
26	RTSS	IEEE Real-Time Systems Symposium	168	38	22.6
27	ICS	International Conference on Supercomputing	168	38	22.6
28	DEBS	ACM International Conference on Distributed Event-Based Systems	78	18	23.1
29	Mobiquitous	ACM International Conference on Mobile and Ubiquitous Systems: Computing, Networking and Services	104	24	23.1
30	RTAS	IEEE Real-time and Embedded Technology and Applications Symposium	136	32	23.5
31	SECON	IEEE International Conference on Sensing, Communication and Networking	299	71	23.7
32	ECRTS	Euromicro Conference on Real-Time Systems	110	27	24.5
33	ANCS	Symposium on Architectures for Networking and Communications Systems	68	17	25.0
34	WoWMoM	Symposium on a World of Wireless, Mobile and Multimedia Networks	166	42	25.3
35	MSWIM	Conference on Modeling, Analysis and Simulation of Wireless and Mobile Systems	170	44	25.9
36	CCGrid	IEEE/ACM International Symposium on Cluster, Cloud and Grid Computing	236	62	26.3
37	WiMOB	Conference on Wireless and Mobile Computing, Networking and Communications	262	69	26.3
38	ICPP	International Conference on Parallel Processing	267	74	27.7
39	IWQoS	IEEE/ACM International Symposium on Quality and Service	95	27	28.4
40	SASO	IEEE/ACM International Symposium on Quanty and Service IEEE International Conference on Self-Adaptive and Self-Organizing Systems	102	29	28.4
			59	17	
41	SAINT	International Symposium on Applications and the Internet			28.8
42	IPCCC	International Performance, Computing, and Communications Conference	131	38	29.0
43	ICCCN	International Conference on Computer Communications and Networks	326	96	29.4
44	PAM	Passive and Active Measurement Conference	73	23	31.5
45	SBAC-PAD	Symposium on Computer Architecture and High Performance Computing	88	28	31.8
46	Cluster	IEEE Cluster	128	41	32
47	LCN	Conference on Local Computer Networks	175	56	32.0
48	eScience	IEEE eScience Conference	158	51	32.3
49	EuroPar	Euro-Par	262	86	32.8
50	CCNC	IEEE Consumer Communications and Networking Conference	273	90	32.9
51	MASCOTS	Modeling, Analysis, and Simulation On Computer and Telecommunication Systems	125	43	34.4
52	DAIS	IFIP Conference on Distributed Applications and Interoperable Systems	51	18	35.3
53	WWIC	Conference on Wired & Wireless Internet Communications	50	18	36.0
54	GLOBECOM	IEEE GLOBECOM	3045	1101	36.2
55	NGMAST	Next Generation Mobile Applications, Services and Technologies	206	75	36.4
56	WD	Wireless Days Conference	195	71	36.4
57	WiOpt	International Symposium on Modeling and Optimization in Mobile, Ad Hoc and Wireless Networks	122	45	36.9
50	ICC	IEEE International Conference on Communications	2882	1064	36.9
58	ISCC		354	1064	
59		IEEE Symposium on Computers and Communications		148	41.8
	WCNC	IEEE Wireless Communications and Networking Conference	1332	560 40	42.0
60	LIDCD				
61	HPSR CNSR	International Conference on High Performance Switching and Routing Conference on Communication Networks and Services Research	83 130	63	48.2 48.5

No.	Position/Title	Affiliation	
1	Research Assistant Professor	IMDEA Networks	
2	Associated Professor	CTU in Prague	
3	Professor	University of Oklahoma	
4	Assistant Professor	Montana State University	
5	Ph.D Student	Georgia Tech	
6	Assistant Professor	University of Southern Cali- fornia	
7	Research Scientist	Lawrence Berkeley National Laboratory	
8	Assistant Professor	AGH University of Science and Technology	
9	Senior Research Fellow	University College London	
10	Assistant Professor	Indian Institute of Technology	
		Delhi	
11	Professor	Politecnico di Milano	
12	Associate Professor	KTH Stockholm	
13	PhD	RWTH Aachen University	
14	Assistant Professor TU Delft		
15	Associate Professor	Univ. Paris-Sud	
16	Senior Lecturer (equiv. to as-	Jerusalem College of Technol-	
	sociate professor)	ogy, israel	
17	Research Associate	University of Cambridge	
18	Senior Researcher	University of Bern	
19	Associate Professor	Telecom Bretagne, France	
20	Technical Director	NetApp	
21	Assistant Professor	Not Available	
22	Professor	Not Available	
23	Professor	University of La Rochelle	
24	Professor	University of Goettingen, Germany	
25	Associate Researcher	Telefonica I+D	
26	Research scientist	Telefonica Research	
27	Research Engineer	Bell Labs	
28	Associate Professor / PhD	Carlos III University of	
		Madrid	
29	Professor	University of Kaiserslautern	
30	PhD Student	Princeton University	
31	Ms.C	RWTH Aachen, Germany	
32	PhD student	University	
33	PhD student	St Andrews	
34	Professor	Osaka University	

TABLE II
POSITIONS AND AFFILIATIONS OF DIFFERENT RESPONDERS TO THE
CONFERENCE RANKING SURVEY.

after the conference concludes. Finally, we show the networking conference statistics collected for our study in Table I.

A. Classifying Conference Reputation

The goal for this empirical study is to characterize factors that may affect the citation count of conference papers published in networking conferences. We argue that the reputation of a conference to which the paper is submitted could be one of the major factors that impact the citation count of a paper. However, understanding the ground-truth about the reputations of different conferences is the first challenge. Several online conference ranking portals may vary in the way they classify reputations of different conferences [8], [9], [15], [16]. Further, the research community opinion about a conference reputation may differ from what is available from online conference portals [20]. Therefore, it is important to characterize the rankings given to different conferences by different online conference portals, as well as, by the research community.

To understand the classifications used by different conference ranking portals (Rank A, B, or C), we collected conference rankings, for each conference in our dataset, from

Acceptance Rate Scale (%)	Conference Rank	No. of Conferences	No. of Papers
11 to 20.9	High Quality (A)	22	8224
21 to 30.9	Medium Quality (B)	22	7134
31 to 40.9	Low Quality (C)	19	23537
	Total	63	38895

TABLE III
Breakdown of different conferences into rankings

the CORE Conference Portal (CCP), the ERA Conference Portal (ECP), and from the research community [1], [3], [20]. We collected conference rankings for years 2008, 2013, and 2014 from CCP, and for year 2010 from ECP.1 To understand the research community opinion on conference reputation, we conducted a survey to ask researchers and professors at different industries and institutions for their opinion on conference reputations in terms of ranks such as A, B, C, or no ranking [19]. We distributed the survey Web URL to 755 members (as of March 2015) of the Technical Committee on Computer Communications (TCCC) research community [13]. We configured the Google survey to randomize the order of conference names to prevent responders from guessing the conference rankings based on their position on the survey. We received a total of 47 responses from TCCC members indicating their opinions on reputations of different conferences [20]. Further, most of the responses we received were from researchers representing different positions at different industry research labs or academic institutions. We list the positions and affiliations of the people who responded to our survey in the order we received responses in Table II. Although we received responses from 47 people, only 34 opted to provide their titles and affiliations.

Based on the data collected from CCP, ECP, and the survey, we classify (only for the purpose of this study) the conferences in to different rankings based on their acceptance rates. We argue that deciding the reputation of a conference by its acceptance rate is ideal, since to maintain reputation, a highly reputed conference would accept lesser number of papers than a medium reputed conference. Therefore, we classify and show the conference rankings based on their acceptance rates in Table III and consider such classification as the Oracle of rankings throughout our study.

B. Collecting Citation Counts

We argue that factors such as conference rank, publication year, and the paper title may influence the the number of citations that the paper receives over time. Specifically, we argue that authors of working papers may consider the quality of conference, where the reference was published, to increase the strength of their reference. Next, authors may also consider the publication year of their reference as it may reflect the timeliness of the facts illustrated by the reference. Finally, authors may also consider finding references on Web Search tools (such as Bing [2], Google [5], and Yahoo! [6]) relevant to their manuscript. As a result, the choice of keywords used in the paper title may affect whether the paper is shown by a search tool, which may eventually

¹Neither CCP or ECP provides public access to conference ranking database for years 2009, 2011, and 2012.

affect whether the paper gets cited, when authors of working papers find papers relevant to their manuscript.

Therefore, to understand the significance of factors affecting the citation count of networking conference papers, we used Google Scholar as a publicly available online repository to collect information about different research articles published in various computer networking conferences [4]. Specifically, for each paper published at a given networking conference, we collected the paper title, the year when the paper was published, number of times the paper was cited (as of February 2015), and the conference name to which the paper was accepted.

C. Challenges in Collecting Data from Google Scholar

Although, Google Scholar is one of the most popular sources of getting the most up-to-date data for research articles, as of March 2015 the Google Scholar portal lacks a developer API to assist researchers to collect data. Therefore, we used an early implementation of Christian Kreibich's open source code as a template to collect publication data from the Google Scholar portal [7]. However, we encountered the several challenges during our data collection process from Google Scholar.

Hard limit on the number of Search queries: In order to protect servers resources and to ensure high availability of Scholar content, Google prevents automated queries from being processed by configuring a limit on the number of queries that can be sent from a client device in a day. Further, the maximum number of search results that Google Scholar provides for every query is 20. We sent a total of 1998 successful HTTP GET requests to Google servers to collect data for papers published in 63 conferences held in over a period of five years.

The data collection process took over a period of two weeks since the requests sent by our script were frequently being identified as a potential abuse to Google servers, because of which zero search results were being returned by Google servers. Therefore, to speed up the process of data collection and get appropriate responses, we distributed our data collection script on several computers in different IP networks. Our immediate goal was to minimize the number of automated requests sent by a single IP address, as seen by Google servers. In some cases, we spoofed HTTP headers in our script to include a valid cookie generated by Google Scholar servers on Mozilla Firefox browser. Our immediate goal here was to have the script pretend as if the requests sent by it were generated by the regular use of a Web browser.

Choice of search keyword: Although, we filtered the Google Scholar search results based on the conference name, Google Scholar oftentimes either did not provide information for all the papers published at the queried conference or included information for papers published at conferences similar to the queried conference name. Further, for a few of the conferences considered in our study, Google Scholar included the information for workshop and poster papers published at the conference in the search results, which increased the total

number of queries going to Google servers and alleviated the frequency of our search requests being denied by Google.

To eliminate the risk of Google Scholar returning search results for different conferences and/or papers published as workshop/poster papers, for each conference we manually refined the choice of our search keywords until we received information for papers published at the queried conference. Further for each conference, we also manually compared the paper information given by the Google Scholar with the paper information available at the conference official website.

III. RESULTS

We now show that the conference name, publication year, and the choice of keywords in the paper title may have a significant effect on the number of citations that a conference paper may receive over time. However, before investigating how much impact these factors may have on the citation count, lets look into the consistency of different online conference ranking databases and the community opinion.

A. Variation in Conference Rankings among the Community Opinion and Online Databases

We compare the conference reputations (rankings) as classified by our Oracle, CCP, ECP, and the community opinion survey in Figure 1. Specifically, we show the variation in conference rankings between Oracle and CCP, and Oracle and community opinion survey. We translate the reputation for each conference from ranks such as A, B, or C into numerical values such as 1.0, 2.0, and 3.0 respectively. The y-axis in Figure 1 shows the distribution of differences in conference rankings between Oracle and other tools. A positive value on y-axis indicates that a given tool considered a conference to have higher reputation than the Oracle. A negative value on y-axis indicates that a given tool considered a conference to have lower reputation than the Oracle. The x-axis shows different tools that provide conference rankings. We show that the rankings provided by both CCP and community opinion differ from the Oracle. Specifically, for 75 percentile of conferences, CCP classifies conferences to have higher reputation that the Oracle. However, for the same 75 percentile of conferences, the community opinion is same as that of Oracle. We therefore argue that CCP's approach to classify conferences may not be accurate and may not indicate the true reputation of different networking conferences. We further argue that the research community has a good understanding of the reputations of different networking conferences, most likely because the research community is actively involved in the conference program/steering committee and also publishes research ideas at different conferences.

Next, we investigate whether or not the online databases update their rankings for different conferences over time. In Figure 2, we show the number of conferences (in percentage) that were classified as rank A, B, or C over the period of 5 years. For the years 2008, 2013, and 2014, we collected conference rankings from the CCP tool [3]. For the year 2010, we collected the conference rankings from the ECP tool, available at the CCP website [1], [3]. Finally, for the year 2015, we

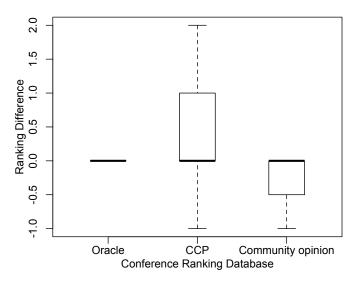


Fig. 1. Difference in the conference rankings among the Oracle and online databases/community opinion survey.

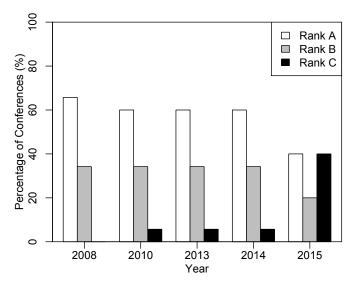


Fig. 2. Distribution of different networking conference rankings over the period of five years.

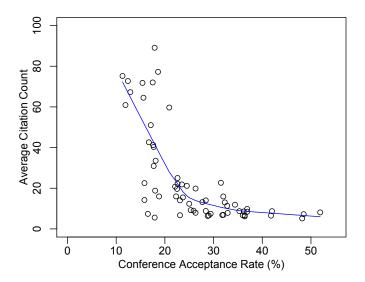


Fig. 3. Distribution of number of average citations with respect to conference acceptance rate.

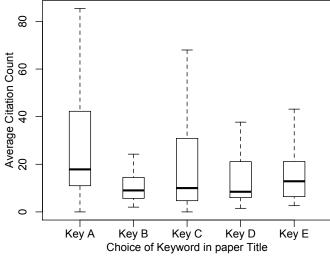


Fig. 4. Distribution of citation count with respect to keywords used in the paper title.

consider the conference rankings provided by our community opinion survey [20]. We show that the conference rankings over the year 2008 and 2010 did not change significantly. Specifically, classifications for only about 2% of the conferences that were classified as rank A and rank C changed from 2008 to 2010. Further, the rankings for different conferences in years 2010 to 2014 did not change. And finally, we show that in 2015, the number of conferences that were classified as rank A and rank C changed by about 20% and that the conferences classified as rank B were only changed by about 10%.

B. Impact of Conference Reputation on Citation Count

Next, we investigate the impact of publishing papers at conferences of different reputation on the citation count. In Figure 3, we show the average citations received (as of March 2015) by papers published at conferences with different accep-

tance rates.² In general, we show that the number of citations that a conference paper may receive over time decrease as the acceptance rate of the conference increases. Specifically, the average drop in number of citations for papers published in conference ranked as A and B is about 40. However, we see an exception to that conclusion, in that, the number of citations received by papers published in conferences with acceptance rates between 16% to 25% are very close. Therefore, we argue that some papers published at conferences that we classify as rank A (such as ACM SenSys, ACM Sigmetrics, IEEE ICNP, ACM ACNS, IEEE ICDCS, IEEE HiPC, and EWSN) may receive the same number of citations as the conferences that we classify as rank B (such as P2P, IEEE SECON, CloudCom, ACM DEBS, IEEE/ACM IWQoS, ICPP, ANCS, MSWIM, WoWMoM, IEEE SASO, WiMOB, IEEE ICCCN,

²Refer Table III for translating conference acceptance rates in to rankings.

IPCCC, ACM Mobiquitous, and IEEE SAINT). Finally, we show that for papers published in conferences with rank B and C receive relatively same number of citations over time.

C. Impact of Paper Title on Citation Count

We now investigate the impact of paper title on the number of citations that a paper may receive over time. For this part of our study, we consider five different keywords (also shown in Table IV) popular in the field of computer networking. Our selection of these five keywords is based on the popularity of these keywords over 2008 until 2012, according to Google Trends service [11]. While we ensured that the keywords used in our study had significantly high popularity during 2008 to 2012, we also ensured that the popularity of the keywords we selected did not increase or decrease significantly over the period of 2008 to 2012. Our immediate goal here was to mitigate the effect of keyword popularity rise and fall on the paper citation count.

Keyword Code	Keyword in Paper Title
Key A	Cloud
Key B	Distributed
Key C	Security
Key D	Mobile
Key E	Performance

TABLE IV
LIST OF KEYWORDS USED IN OUR STUDY

In Figure 4, we show the distribution of the number of average citations that conference papers may receive with different keywords in their titles. We show that on average, the choice of keywords in the paper title has significant impact on the citation count. Specifically, for 75 percentile of the papers with the keyword Cloud (Key A)' in their paper titles, the number of average citations received are much more than received by papers with keyword Distributed (Key B), though both the keywords reflect similar technologies to some extent. Further, keywords such as Mobile (Key D) and Performance (Key E) mostly represent technologies which may be independent of each other. Therefore, for 75 percentile of papers, we do not see much difference between the number of citations received by papers with either of those keywords in the title.

D. Impact of Publication Year on Citation Count

We now investigate the impact of publication year on the number of citations that a conference paper may receive over time. For this part of the study, we compare the number of citations received by papers published in years 2008, 2009, 2010, 2011, and 2012. In Figure 5, we show the distribution of the number of average citations received by papers published in different conference years as of March 2015. In general, we see that for 75 percentile of papers, more recent published papers have lower number of citations than papers published in older years. Specifically, the number of citations received by papers published in 2008 are more than papers published in 2010, 2011, and 2012. Similarly, the number of citations received by papers published in 2010 are more than papers published in 2011, and 2012. However, there is one exception

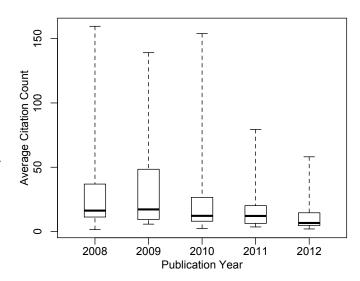


Fig. 5. Distribution of citation count with respect to publication year of the paper.

in our data, that is, the average number of citations for papers published in year 2009 are more than papers published in year 2008. We believe that a number of papers published in 2009 had significant research contributions, because of which those papers received higher citations than papers published in 2008.

IV. DISCUSSION

Although, our study may not have explored the impact of all possible factors on the citation count of conference papers, we argue that conference reputation, paper title, and publication year are the most important factors deciding citation count for conference papers. However, we acknowledge the fact that there may be other factors for which we could not collect data may also have impact on the citation count. For example, the popularity of the author of the published paper, awareness that a relevant paper was published, relevance of the paper to the published articles, timeliness of the published paper, the citation source of the published paper, public access to published papers through websites such as IEEE Xplore or ACM Digital Libraries.

We also acknowledge that there may be a few factors that may have influenced the ranking of a conference as represented by the survey we conducted. Specifically, the awareness of anonymous survey responder about different conference fields and reputation. For example, a responder with an expertise in Internet measurement may not have expertise and not be well-aware of conferences and their reputations in the field of computer security. Such a responder may not have provided a ranking or may have selected 'No Ranking' option in our survey for conferences not in her field of expertise. To deal with such cases, for each conference in our survey, we use the the ranking that received highest votes from different responders, as the community opinion for that conference. For conferences where we observed a tie between one or more rankings, we ensured that we exclude such conferences from our analysis in Section III-A.

Finally, we argue that our study investigates the effectiveness of conference reputation, paper title, and publication year for papers accepted to only computer networking conferences. Our findings do not impose conclusions for the citation counts that papers accepted to other Computer Science fields may receive over time.

V. RELATED WORK

A number of empirical studies have been conducted in the past to understand the factors that may affect the impact factor of journals in different fields [10], [12], [18]. However, to best of our knowledge, our work is the first large scale study to investigate the factors affecting citation counts of papers accepted to conference papers. Closest to our study is Beverly *et al.* work, where the authors discuss the factors that influence the acceptance of a paper submitted to a conference and the number of citations that a paper may receive [17]. However, this work is limited to papers submitted and accepted to only one networking conference (that we classify as Rank A) in the year 2010. Our work, however, advances their work and provides insights for a large number of conferences in the field computer networking.

VI. CONCLUSIONS AND FUTURE WORK

Research community has been publishing a number of research contributions in computer network related conferences from last several decades. However, the impact of papers published in conferences on the growth of the research community has not been well understood. Therefore, we conducted a large scale empirical study to find potential relationships between several factors (such as the reputation of conferences where the papers are accepted, the paper title, and the publication year of the paper) and the number of citations that a paper may receive over time. We show that the reputation of the conference, the paper title, and the publication year may impact the citation count of papers by as much as 13%, 9%, 9%, respectively. We also show that the interactions among these factors may influence the citation count by as much as 23%. Finally, we acknowledge that there are a several unknown factors (not considered as a part of our empirical study) that may influence the citation count of conference papers by as much as 46%.

We believe that a tool that may allow authors of working papers to predict the number of citations their papers may receive over time would be helpful in increasing awareness about published papers, which may eventually increase the citation count for conference papers. Therefore, as a part of our future work, we would like to develop a predictive mechanisms that authors may use to identify potential conferences and paper titles that may lead to high citation counts.

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REFERENCES

- ERA Conference Rankings Access. http://lamp.infosys.deakin.edu.au/ era/?page=cmain, Feb. 2010.
- [2] Bing Web Search. https://www.bing.com/, Feb. 2015.
- [3] CORE Conference Rankings. http://www.core.edu.au/index.php/ conference-rankings, Mar. 2015.
- [4] Google Scholar. https://scholar.google.com/, Apr. 2015.
- [5] Google Web Search. https://www.google.com/, Feb. 2015.
- [6] Yahoo Search Web Search. https://search.yahoo.com/, Feb. 2015.
- [7] Christian Kreibich. A parser for Google Scholar, written in Python. https://github.com/ckreibich/scholar.py, Feb. 2015.
- [8] Core Conference Ranking Portal. Computer Science Conference Rankings Descriptions. http://www.core.edu.au/documents/RankingDescriptions2014.pdf, Apr. 2015.
- [9] Database Systems Lab. Computer Science Conference Rankings. http://dsl.serc.iisc.ernet.in/publications/CS_ConfRank.htm, Apr. 2015.
- [10] Eugene Garfield. Journal impact factor: a brief review. Canadian Medical Association Journal, 161(8):979–980, 1999.
- [11] Google Trends. In 2014 we searched trillions of times. What do these searches say about us? https://www.google.com/trends/, Mar. 2010.
- [12] Paul J Haensly, Paul E Hodges, and Shirley A Davenport. Acceptance rates and journal quality: An analysis of journals in economics and finance. *Journal of Business & Finance Librarianship*, 14(1):2–31, 2008.
- [13] IEEE Communications Society. Technical Committee on Computer Communications (TCCC). http://committees.comsoc.org/tccc/, Feb. 2015.
- [14] Kevin Almeroth. Networking Conferences Statistics. https://www.cs. ucsb.edu/~almeroth/conf/stats/, Mar. 2015.
- [15] Nanyang Technological University. Computer Science Conference Rankings. http://www3.ntu.edu.sg/home/assourav/crank.htm, Apr. 2015.
- [16] Osmar R. Zaane. Computer Science Conference Rankings. https://webdocs.cs.ualberta.ca/~zaiane/htmldocs/ConfRanking.html, Oct. 2011.
- [17] Robert Beverly and Mark Allman. Findings and Implications from Data Mining the IMC Review Process. ACM SIGCOMM Computer Communication Review, 43(1), January 2013.
- [18] Somnath Saha, Sanjay Saint, and Dimitri A Christakis. Impact factor: a valid measure of journal quality? *Journal of the Medical Library Association*, 91(1):42, 2003.
- [19] Utkarsh Goel and Mike P. Wittie. Network Conference Ranking Survey Questionnaire. https://docs.google.com/forms/d/ 1ZxfFY18NAFgCtOqx5VCTqD-1_GerzWmbg8LDEnP3cLw/viewform? c=0&w=1, Mar. 2015.
- [20] Utkarsh Goel and Mike P. Wittie. Network Conference Ranking Survey Responses. https://docs.google.com/forms/ d/1ZxfFY18NAFgCtOqx5VCTqD-1_GerzWmbg8LDEnP3cLw/ viewanalytics, Mar. 2015.
- [21] Web of Science. The Thomson Reuters Impact Factor. http://wokinfo.com/essays/impact-factor/, Mar. 2015.