

Counting publications - Journals vs. Conferences in Computer Science

John Markus Bjørndalen

Department of Computer Science, University of Tromsø, Norway
jmb@cs.uit.no

Abstract

The Norwegian ranking system for publications operates with two main levels for publications in journals: level 1 for normal quality and level 2 for high-level journals. These levels are then used to award publication points to authors, and the points are increasingly used to evaluate scientists in various situations. One of the weaknesses of the system is that conference publications, which are more commonly used in some fields, are not scored on equal terms with journals. This paper highlights some of the issues with the current system and uses several metrics to compare a set of computer science conferences with journals at level 1 and 2 in the Norwegian ranking system. The comparison shows that, using these metrics, several of the conferences are at equal levels to good or high quality journals, but authors that publish at these conferences get lower scores due to weaknesses in the ranking system.

1 Introduction

The main work behind this article was done in early 2011 to compare the level of our publication venues to international and national levels. The motivation behind this comparison stems from experiences with the last national evaluation of the Computer Science departments in Norway and with other evaluations where the ranking system was used.

My main focus is within systems research, where it is normal to go for good or very good international conferences and workshops. There is often significant work behind each paper, and the number of authors can also be higher than in some other fields. Drushel et al. [1] describes the field as follows:

Even more so than other branches of Informatics, Systems research involves substantial human investment; it involves the construction of an experimental apparatus or a research prototype, requiring a significant development effort. As a result, the rate of publication is lower than in other areas: two full-length publications in a leading venue per year is considered a good rate of publication.

This paper was presented at the NIK-2013 conference; see <http://www.nik.no/>.

Moreover, the preferred venues of publication are highly competitive conferences such as SOSP [2] or OSDI [24]. A publication in a leading conference in the Systems area is more prestigious than several in a secondary journal. The visibility of the publication venue, as well as the quality and the impact of the individual publication should be taken into account.

One of the challenges with regards to comparing and ranking of venues and publications is that available tools tend to include only journals, or only have partial indexes for conferences.

The national ranking system¹ in Norway does not include conferences and workshops, making it difficult to compare these venues with the national levels (1 and 2). In 2009 and 2010 Nasjonalt fagråd for Informatikk (the national council for computer science education and research) tried to get conferences included in the same system as the one used for journals[2, 3], but was only partially successful as “Universitets- og høyskolerådet” (UHR) insisted on requiring ISSN numbers for the venues. This meant that highly regarded international conferences, such as SOSP, could not be included in the system. International rankings were also very limited when it came to direct comparison of different types of venues, e.g. ISI Web of Knowledge that only partially indexed a few conferences.

Based on the level and type of venues, publication points are awarded per article²: for level 1 and 2 journals, 1 and 3 points are currently awarded. For level 1 and 2 conferences³ the respective numbers are 0.7 and 1. The risk is that these points will increasingly be used as a method of ranking researchers in ways that points were not intended to be used. The points may also determine other things than ranking and funding. An example from the University of Tromsø is that a certain number of publication points over a 4-year period is a requirement for sabbaticals.

If points are not awarded fairly, it may influence what fields researchers are able to work within as funding, research time and promotions may be significantly influenced by point production.

This paper reports on an attempt at a fair comparison of conference and journal levels, using the venues where I published from 2004 to 2009 as representative for conferences. The main reasons for this selection was that 1) this was originally done as a comparison of my own publication venues to the national ranking for journals, 2) I have better access to information, such as reviews, for conferences where I have published.

Hopefully, this paper will be useful for my colleagues in Norway. It may also contribute to discussions about whether we are biasing the system in Norway towards a “Norwegian system for quality” that is oriented towards easily counted and indexed works instead of international levels of quality.

This paper compares several conferences to journals, however it's also not that easy to compare quality when publishing in journals [4]. Fake journals and conferences, that only give the impression of proper reviewing and selection, complicates the matter even further. This is a minefield, particularly for young scientists, that I will not cover in this paper.

¹<http://dbh.nsd.uib.no/kanaler/>

²Other scientific production, such as books, is not covered in this paper.

³Some conference publications can be registered at level 2 if the *publishing house* is registered at level 2. An example is MIT Press.

2 Ranking of conferences and journals

A problem within computer science, and in particular within systems research, is to find good ranking mechanisms that include both journals and conferences [5].

To address this, the following review uses several tools and methods to evaluate the conferences against journals at level 1 and 2 in Norway. The focus is on journals within the field of computer science, but the methods and tools should be applicable in other fields as well.

3 Reviews and acceptance rates

At the conferences my papers have been published in, it is normal with three or more reviewers of the entire paper and one or several rounds of adjusting and changing the paper based on the reviews. After this, the papers are published by publishing houses and treated similarly to journals with regards to archiving.

The papers are typically 8-14 pages. One of the exceptions to this is CPA, where there is no page limit. CPA and some other conferences have also practiced shepherding of papers in addition to normal reviews. The publication process at conferences within systems research is therefore perhaps closer to journals than in other fields, even within computer science.

Assessing the quality of reviews is difficult as it may vary significantly, even within the same conference or journal. Assessing the qualifications of reviewers for a large set of conferences and journals would be difficult for this paper, and probably close to impossible for a national level system.

In my experience, the amount of feedback from the reviewers on a single paper can vary from short reviews that assess the quality with a few suggestions about improvement, to thorough reviews that span several pages. Using more than one reviewer on a paper normally offsets some of this variation, there are also more eyes to spot weaknesses in the paper.

The following table shows the number of reviews our papers got at different conferences from 2004 to 2009. I have used accept-emails to find the number of reviews, but the table is not complete as I do not have a complete archive. I have found the reviews for 27 of 31 papers. The number of reviews is indicated per year. The acceptance rate is included in brackets where the e-mails indicated the rate. Other sources of acceptance rate have been included as footnotes. For explanation of the acronyms, see Table 5.

Venue	Year : reviews (and acceptance rate where available)
ACHI	2008 : 2 (30% accept ⁴)
Artificial Life	2008 : MISSING
CPA	2004 : 3, 2005 : 3, 2007 :3 , 2008 : 3, 2009 : 4 and 5
CEC	2009 : 3
EDT	2007 : MISSING
Euro-Par	2004 : 4 (34% accept ⁵)
HeteroPar	2004 : 3
HCI	2007 : 3 (15% accept)
ICDCS/MNSA	2008 : 3

⁴<http://www.iaria.org/conferences2008/StatsACHI08.html>. They indicate an acceptance rate of 30% for 2008.

⁵<http://onlinelibrary.wiley.com/doi/10.1002/cpe.1451/full>.

ICPP	2005 : 6 (28% accept)
ICPP Workshops	2006 : MISSING
INFOSCALE	2009 : 3 (37% accept ⁶)
JVRB	2008 : 4
NIK	2004 : 3 (51% accept), 2005 : 3, 2007 : 2 (35% accept), 2008 : 4
PARA	2006 : 1,1,2 ⁷ , 2008 : 2, 2010 : 2
ParCo	2007 : 3
PerGames	2007 : 2 (50% accept)
PAWI	2007 : MISSING
PMEA	2009 : 2 (55% accept)

The conferences typically provide 3-6 reviews per paper, with the exception of 4 that only used 2 (ACHI, PARA, PerGames, PMEA). PerGames indicates that the papers get 2-4 reviewers, but our paper only got 2. NIK also had 2 reviews in 2007, but 3 or 4 the other years.

IEEE states the following about their journals⁸:

The IEEE Computer Society has a rigorous peer review process in place to ensure the high quality of its technical material.

Consistent with the IEEE Computer Society's policies and procedures, all scientific papers published in its journals and technical magazines are reviewed by at least two referees who are experienced in the paper's subject area and independent of the periodical's Editorial Board. (Departments and columns are not subject to this peer review process.) Referees are formal reviewers whose comments and opinions form the basis upon which the Editor in Chief decides whether or not to publish the paper, and with what changes. The IEEE Computer Society requires that referees treat the contents of papers under review as privileged information, not to be disclosed to others before publication. Everything within this review process must be done openly, except that the referees' names are withheld. The Editor in Chief's decision is always based on all reviews received, but mixed reviews present the need for the exercise of editorial judgment. Thus, the final decision for acceptance or rejection lies with the Editor in Chief. The review process ensures that all authors have equal opportunity for publication of their papers.

(text adapted from the IEEE; see <http://www.ieee.org/documents/opsmanual.pdf>)

From this, it is clear that IEEE regards two peer reviewers as acceptable quality control for their journals. All of the above conferences have at least two, which suggests that this part of the quality control is covered with the same or higher number of reviewers.

4 ISI Web of Knowledge

ISI Web of Knowledge is a well-known tool for ranking journals. It has recently begun to index conferences, but as per 2011-02-13, there was no Impact Factor (IF) for the conferences evaluated in this paper. For conferences papers that it indexed, it missed

⁶<http://www.springer.com/computer/communication+networks/book/978-3-642-10484-8>

⁷not sure if I found all of the reviews for the first two papers as I only found one review per paper

⁸Retrieved 2011-08-01 from <http://www.computer.org/portal/web/csdl/peerreview>.

several known citations and reported citation counts that were too low. This indicates that the indexing still has a way to go for conferences and workshops and that it is not complete enough to be used to compare the venues.

5 ArnetMiner

ArnetMiner provides a list of conferences and journals⁹ ranked on IF. The description of the index indicates that they use the same algorithm for calculating IF as ISI Web of Knowledge¹⁰. The level 2 journals found in the ArnetMiner list are all among the first 1000 of 1578 ranked venues (see Table 2).

As for my venues, I could find the following in ArnetMiner:

Venue	Rank
Artificial Life ¹¹	145
Euro-Par	239
ICDCSW	399
ICPP	466
PARA	756
ICPPW	793
ParCo	913
HeteroPar	1081
CEC	1216

Using the rank of the level 2 journals as a basis, it seems like most of the venues are of good quality with several close to, or at, level 2.

6 Publish or Perish

Publish or perish (POP) [6] uses Google Scholar to calculate several indexes. It is possible to search both on authors and on journals and conferences. The following review is based on the h-index as reported from POP.

The h-index has been criticized for being unfair against young scientists as it can often take several years before publications are referenced and indexed [7]. The same problem will also be apparent with young conferences (such as ACHI which was first arranged in 2008). Another problem for conferences that print proceedings as book series (for example CPA) is that they operate with both ISBN and the ISSN numbers. A paper can then be referenced in multiple ways, which could potentially confuse the h-index ranking of the papers in the conference, as they may be interpreted as different papers. This could reduce the total citation count of the paper.

The h-index was retrieved both for the name of the conferences and for the ISSN number of the proceedings for conferences. These two were then compared to determine whether they differed much. To avoid making things too complicated, there was no attempt to combine the two methods of retrieving h-indexes. For comparisons between venues, the h-index retrieved for the ISSN number was preferred. This can lead to lower h-indexes for some of the conferences than what they should have had.

Table 3 summarizes the h-index for all journals ranked as level 2 in Norway, sorted by h-index. The h-index was calculated by searching for the ISSN number (as was suggested

⁹<http://www.arnetminer.org/page/conference-rank/html/All-in-one.html>

¹⁰A simple description of the algorithm is available at http://en.wikipedia.org/wiki/Impact_factor

in the help text of POP). False positives were removed for every search, but this did not influence the h-index much. The h-indexes for the level 2 journals are typically between 11 and 276, where two thirds have an index below 100.

Table 4 summarizes the h-index for a random selection of journals ranked as level 1 in Norway, sorted by h-index. Summarizing all of the 419 level 1 journals would have taken too much time. Instead a selection was made by taking a list of the level 1 journals from UHR and making a random selection of 25 of them using a Python script. Then the h-index was calculated for each of the journals and the list sorted by h-index.

The following Python script was used to make the random selection:

```
import random
# Random selection of 419 journals numbered 1 to 419.
print sorted(random.sample(list(range(1,420)), 25))
```

The list shows that journals at level 1 typically have an h-index between 0 and 60, where about half of them have an h-index under 11.

Comparing the levels in Table 3 and 4 shows that there is a reasonably good correlation between journal levels in Norway and the h-index.

Looking at my own publication venues, I use a scale with three levels:

- 0-10, corresponding to the lower half of the level 1 journals.
- 11-24 corresponding to the upper half of the level 1 journals.
- 25 and up corresponding to level 2 journals.

For my own publication venues (Table 5), I end up with the following channels between 11 and 24: CPA, HCI, ICDCSW and ParCo. The channels from h-index 25 and up are Artificial Life, CEC, Euro-Par, ICPP and ICPP Workshops.

Some venues are listed in the “uncertain” category as more time is needed to investigate them in particular. PARA is difficult to search for as it uses the ISSN number from LNCS for the proceedings, and since the name triggers many false positives both on the name PARA and the keywords in the conference title.

Some of the venues (as EDT, JVRB and HeteroPar) appear to have too low h-indexes. I have not found out why yet, but I suspect that I have not found the right search criteria since I got very few papers for some of the searches.

7 Summary of ranking

The following channels end up at high levels (similar to level 2 journals) when using Arnetminer or h-index ranking: Artificial Life, Euro-Par, ICPP, PARA, ICPPW, ParCo and CEC.

The following channels end up with a good level (similar to the upper half of level 1 journals) in one or both of the rankings: HeteroPar, CPA, HCI and ICDCSW.

This documents that most of the conferences examined in this paper are at similar levels to journals at level 1 and 2. This suggests that some of these conferences should be considered for ranking as level 2 venues, but due to the current ranking system, this is not possible unless the conferences start publishing proceedings with unique ISSN numbers for each conference. It is not realistic to expect that international conferences will start doing this based solely on problems with the ranking system in a small country.

Out of my conference papers published from 2004 to 2009, only one of the papers is ranked as level 2 in the national system: the paper in Artificial Life. The reason for this is that the paper was published by MIT Press.

8 Conclusions

As shown in this paper, the examined venues are at good levels compared to national rankings, but the ranking system does not capture this. This is problematic when comparing researchers and contributions within e.g. systems research with researchers from other fields, where journal publications are the norm. Systems researchers get fewer publications at level 2 because the ranking system doesn't handle conferences well. Conference publications are also given fewer publication points than journals ranked at the same level. The ranking system is thus biased towards fields where journals are the norm.

A simple solution to this is to make sure that conference proceedings are published with ISSN numbers. This is the case with, for instance, conferences that use LNCS (Lecture Notes in Computer Science) to publish their proceedings. LNCS, however, cannot be raised to level 2 based on a single high-level conference using LNCS for their proceedings as this would unfairly raise other conferences to level 2. It is not reasonable to expect international venues to start using ISSN numbers to adapt to a Norwegian system, so this is not a good solution. The more feasible alternative is to modify the Norwegian system.

Another point for discussion is the dilution of points when collaborating: the points are divided equally among each of the authors of the paper. If you collaborate with people outside the department, your department receives a smaller share of the points. In practice, we punish scientists for collaboration. I have already experienced researchers that are reluctant to cooperate with others because it would reduce their own relative contribution to papers. This is a sad, but understandable development.

This conference, NIK, also publishes proceedings with ISSN numbers, with the end result of giving me a full publication point for this paper since I'm the only author. Interestingly, this is a nationally published paper outside my main field, and gives me more points than the 5 papers that I have published internationally¹² with my colleagues during the first 5 months of 2013. Those papers will give me less than a full point in total.

When the ranking and publication point system is increasingly used for purposes it was not designed for, it may force researchers to change their focus into optimizing publication point production, which can force some researchers to move to fields where it is easier to get points.

References

- [1] Peter Druschel, Rebecca Isaacs, Thomas Gross, and Marc Shapiro. Fostering Systems Research in Europe. Available as pdf from <http://www.eurosys.org/whitepaper-2006/>.
- [2] Letter dated 30.04.2009, "Nominering av konferanser som nivå 2 publiseringskanaler, fra Nasjonalt fagråd for informatikk" from NFFI/Jan Høiberg to "Universitets- og høyskolerådet" (UHR).
- [3] Letter dated 09.11.2010 "Ang. Godkjenning av utvalgte unformatikk-konferanser som nivå 2 publikasjonskanaler", from NFFI/Jan Høiberg to "Universitets og Høyskolerådet".
- [4] Curt Rice. Science research: three problems that point to a communications crisis. The Guardian, February 2013. <http://www.guardian.co.uk/higher-education-network/blog/2013/feb/11/science-research-crisis-retraction-replicability>.

¹²One of them was awarded "best paper" at the conference.

- [5] Jill Freyne, Lorcan Coyle, Barry Smyth, and Paradraig Cunningham. Relative Status of Journal and Conference Publications in Computer Science. *Communications of the ACM*, November 2010, Vol 53, No 11.
- [6] A. W. Harzig. Publish or Perish, 2007. available from <http://www.harzing.com/pop.htm>.
- [7] Kumar M J. Evaluating Scientists: Citations, Impact Factor, h-Index, Online Page Hits and What Else?, 2009. IETE Tech Rev 2009;26:165-8. Available from <http://tr.ietejournals.org/text.asp?2009/26/3/165/50699>.

A Tables

Table 2: Level 2 journals, sorted on index in Arnetminer

ISSN	Title	Arnetminer
0734-2071	ACM Transactions on Computer Systems	22
1532-4435	Journal of machine learning research	27
0730-0301	ACM Transactions on Graphics	34
1076-9757	The journal of artificial intelligence research	46
0164-0925	ACM Transactions on Programming Languages and Systems	48
1077-2626	IEEE Transactions on Visualization and Computer Graphics	63
0920-5691	International Journal of Computer Vision	84
1384-5810	Data mining and knowledge discovery	86
1367-4803	Bioinformatics	116
0001-0782	Communications of the ACM	152
0167-6423	Science of Computer Programming	157
0925-9856	Formal methods in system design	163
0022-0000	Journal of computer and system sciences (Print)	173
1089-7801	IEEE Internet Computing	193
1384-6175	Geoinformatica	201
0018-9162	Computer	204
0304-3975	Theoretical Computer Science	211
0899-7667	Neural Computation	241
0743-7315	Journal of Parallel and Distributed Computing	260
0272-1732	IEEE Micro	271
0018-9448	IEEE Transactions on Information Theory	343
0740-7459	IEEE Software	514
1381-1231	Journal of Heuristics	532
0888-613X	International Journal of Approximate Reasoning	561
0169-023X	Data & Knowledge Engineering	604
1389-1286	Computer Networks	754
0272-1716	IEEE Computer Graphics and Applications	829
0166-5316	Performance evaluation (Print)	849
0953-5438	Interacting with computers	852
0164-1212	Journal of Systems and Software	872
0168-7433	Journal of automated reasoning	892
0890-5401	Information and Computation	1221?
0004-3702	Artificial Intelligence	68?

Table 3: Level 2 journals, sorted on h-index

ISSN	Title	Arnetminer	h-index
0921-5034	Language and Computers		11
1040-550X	Journal of Software Maintenance: Research and Practice		26
0167-7055	Computer graphics forum (Print)		29
1567-8326	Journal of Logic and Algebraic Programming		35
1384-6175	Geoinformatica	201	39
1040-3108	Concurrency		42

1381-1231	Journal of Heuristics	532	52
0269-8889	Knowledge engineering review (Print)		55
1094-3420	The international journal of high performance computing applications		55
1076-9757	The journal of artificial intelligence research	46	55
0953-5438	Interacting with computers	852	58
0924-1868	User modeling and user-adapted interaction		59
0925-9856	Formal methods in system design	163	61
0888-613X	International Journal of Approximate Reasoning	561	64
0166-5316	Performance evaluation (Print)	849	65
0360-1315	Computers and education		67
0178-2770	Distributed computing		68
0006-3835	BIT Numerical Mathematics		71
1384-5810	Data mining and knowledge discovery	86	71
0169-023X	Data & Knowledge Engineering	604	72
0167-6423	Science of Computer Programming	157	73
0168-7433	Journal of automated reasoning	892	77
1063-6560	Evolutionary Computation		80
0167-8191	Parallel Computing		80
0164-1212	Journal of Systems and Software	872	81
0045-7949	Computers & structures		84
1089-7801	IEEE Internet Computing	193	89
0167-9236	Decision Support Systems		90
0737-0024	Human-Computer Interaction		90
0743-7315	Journal of Parallel and Distributed Computing	260	90
1077-2626	IEEE Transactions on Visualization and Computer Graphics	63	92
0890-5401	Information and Computation	1221?	93
0272-1732	IEEE Micro	271	96
1532-4435	Journal of machine learning research	27	97
0010-4485	Computer-Aided Design		104
1389-1286	Computer Networks	754	107
0272-1716	IEEE Computer Graphics and Applications	829	113
0740-7459	IEEE Software	514	121
0734-2071	ACM Transactions on Computer Systems	22	128
0893-6080	Neural Networks		128
0304-3975	Theoretical Computer Science	211	129
0164-0925	ACM Transactions on Programming Languages and Systems	48	140
0022-0000	Journal of computer and system sciences (Print)	173	140
0730-0301	ACM Transactions on Graphics Systems	34	144
0899-7667	Neural Computation	241	154
0018-9162	Computer	204	176
0920-5691	International Journal of Computer Vision	84	178
0360-0300	ACM Computing Surveys		182
1367-4803	Bioinformatics	116	208
0004-3702	Artificial Intelligence	68?	228
0018-9448	IEEE Transactions on Information Theory	343	229

Table 4: Random selection of 25 level 1 journals

ISSN	Title	h-index
2153-0653	Intelligent Control and Automation	0
1948-5026	International Journal of Green Computing	0
2075-2180	Electronic Proceedings in Theoretical Computer Science	1
1976-7587	International Journal of Principles and Applications in Information Science and Technology	1
1793-5253	Journal of Topology and Analysis (JTA)	1
1865-0929	Communications in Computer and Information Science	2
1550-4646	Journal of Mobile Multimedia	2
1807-1775	Journal of Information Systems and Technology Management	3
0743-8826	Journal of System Safety	3
1877-0509	Procedia Computer Science	3
1860-4862	Signals and Communication Technology	4
1751-911X	International Journal of Electronic Security and Digital Forensics	6
1743-8225	International Journal of Ad Hoc and Ubiquitous Computing	11
1744-5485	International Journal of Bioinformatics Research and Applications	11
1540-9589	Journal of Web Engineering	11
1476-8186	International Journal of Automation and Computing	12
1058-6180	IEEE Annals of the History of Computing	23
0252-9742	Bulletin of the European Association for Theoretical Computer Science	27
0065-2458	Advances in Computers	30
0924-6495	Minds and Machines	32
0920-5489	Computer Standards & Interfaces	33
1077-2014	Real-time imaging	34
1091-9856	INFORMS journal on computing	39
0308-1079	International Journal of General Systems	44
0885-7458	International journal of parallel programming	60

Table 5: h-index of my publication venues

Venue	ISSN	h-index
Index above 25		
Artificial Life, filtered to remove the ISSN number for the journal with the same name		46
CEC – IEEE Congress on Evolutionary Computation		71
Euro-Par		50
ICPP		37
ICPP with ISSN	0190-3918	44
ICPP workshops with ISSN	1530-2016	29

Index between 11 and 25

CPA — Communicating Process Architectures		17
CPA - ISSN	1383-7575	11
CPA — searched for concurrent system engineering series, which is the name of the series		18
HCI		11
HCI - IEEE International Workshop on Human-Computer Interaction (search too narrow and excluded too many papers)		2
ICDCSW — Searched for ISSN	1545-0678	20
ParCo		12

Index under 11

ACHI — International Conference on Advances in Computer-Human Interaction		4
Emerging Display Technologies		2
HeteroPar		3
Infoscale		3
Journal of Virtual Reality and Broadcasting		9
Journal of Virtual Reality and Broadcasting, ISSN	1860-2037	9
NIK (only the short name, filtered)		8
NIK (only the name)		4
PerGames		5

Uncertain

IJIPM — International Journal of Information Processing and Management – not sure if the search is correct for this one.	2093-4009	8
International workshop on personalized access to web information (PAWI), LNCS proceedings	0302-9743	39
PARA — difficult to search for the conference name PARA with ISSN, LNCS proceedings	0302-9743	39

Counting publications - Journals vs. Conferences in Computer Science John Markus Bj rndalen Department of Computer Science, University of Troms , Norway Abstract The Norwegian ranking system for publications operates with two main levels for publications in journals: level 1 for normal quality and level 2 for high-level journals. These levels are then used to award publication points to authors, and the points are increasingly used to evaluate scientists in various situations. One of the weaknesses of the system is that conference publications, which are more commonly used in