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Research Post your articles in ArXiv

Math and CoRR!

On a business level, the concept of printed scientific journals is becoming outdated. The often small circulation numbers forces publishers to increase the prices to unreasonable levels, while almost all of the work on the content, from writing and editing articles, reviewing them, to looking after publicity, is done for free by the scientific staff of universities or other institutes. Moreover, articles in journals are often written years before their publication. For these reasons it seems natural, certainly in high-tech environments such as a scientific department, that authors embrace electronic publication. The preprint server www.arxiv.org already exists some sixteen years. In this short article, Krzysztof Apt reacts enthusiastically to the call from Tom Koornwinder to use this archive more often.

In [3] Ton Koornwinder convincingly addressed several prejudices researchers use in order not to post their preprints in the e-Print archive www.arxiv.org. By means of this short note I would like to provide a different perspective on the matter by providing a number of reasons for posting there one's preprints.

The e-Print archive www.arxiv.org started in 1991 as Los Alamos National Laboratory e-Print archive (LANL) by the physicist Paul Ginsparg. At present ArXiv contains more than 402,000 e-prints in Physics, Mathematics (Math) Computer Science (CoRR), Nonlinear Sciences and Quantitative Biology. It is a fully automated electronic archive and distribution server for research papers.

The Math archive, www.arxiv.org/archive/math, started in 1991, while the Computing Research Repository CoRR, www.arxiv.org/corr, in 1998. CoRR is sponsored by a number of organizations including two main computer science organizations, the Association for Computing Machinery (ACM) and the American Association for Artificial Intelligence (AAAI).

Many mathematicians and computer scientists in the Netherlands do post their articles in ArXiv:Math and CoRR. I hope that this note will encourage others to do it, as well.

Why ArXiv?

Now we will give six good reasons to post your articles in ArXiv.

You can get famous.

Grisha Perelman, who received last year the Fields medal in Mathematics for solving the Poincaré conjecture published his three articles on this subject only in arxiv.org, see e.g., www.arxiv.org/abs/math.DG/0211159. After the award was announced the ArXiv came under such a heavy load that it asked people to use its mirror sites instead.

By subscribing to the corresponding section of ArXiv you get automatically in your mailbox the articles you want

In contrast, you can't keep track of new articles of your colleagues. You may ask them to email them to you but with more of such requests they surely will forget. And nobody browses peoples' homepages regularly.

By posting your articles in ArXiv you can get in touch with people who work on similar topics

A short story on this that spans a period of fifty years below.

You can also publish electronic proceedings in ArXiv

We all get these announcements of call for papers for various workshops but where to look afterwards for the proceedings? We can do better. Here are for example the Proceedings of the 6th Annual Workshop of the ERCIM Working Group on Constraints that we organized in 2001 and published in CoRR:

www.arxiv.org/abs/cs.PL/0110012.

You can easily search in the ArXiv
For example, last year 132 articles were posted in CoRR that contain the word 'constraint' in the abstract.

You can also publish journals laid over ArXiv
The first such journal (called an overlay journal) was the Advances in Theoretical and Mathematical Physics (ATMP), founded in 1997 by the 1982 Fields medal winner S.T. Yau. In the meantime it moved to the International Press but remained an open access journal. One of the most recent overlay journals is Logical Methods in Computer Science, www.lmcs-online.org. Its articles are just entries in CoRR. Reader interested in other, often impressive, initiatives in open access publishing in Mathematics is encouraged to consult our earlier articles [1] and [2].

If the publisher does not mind, one can also create a mirror image of a journal with the entries in CoRR. This is what we did with the Theory and Practice of Logic Programming (TPLP) journal published by the Cambridge University Press for the Association for Logic Programming, see www.cs.kuleuven.ac.be/~dtai/projects/ALP/TPLP. The advantage is of course that the information about these articles automatically lands in the mailboxes of the subscribers to the relevant section of CoRR and that these articles are covered by the search through CoRR.

But nowadays you can find everything on the Internet

Well, is it really true? For example, I looked during the 2005 Xmas recess for a paper of Helmut Simonis, titled *Sudoku as a constraint problem*, that was presented during a workshop at a conference in 2005. But Helmut just changed jobs, his home page was not reachable anymore and his email address became obsolete. It took me more than two weeks to get in touch with him and get the paper.

Further, many authors forget to put their articles on their homepages or the repositories of their institutions and these articles can then be found only behind the iron wall of paid electronic access to commercial journals.

And occasionally people suddenly pass away. My ex-postdoc Kees Vermeulen passed untimely in 2004 at the age of 39. His most recent papers can be found in CoRR and will remain there for a long time. In contrast, Gilles Kahn, while being the Chairman of INRIA's Board of Directors, passed away in February last year. It is not easy to find his papers.

Finally, we keep moving and so do our homepages, especially if we are young. If you post the papers in ArXiv and link to them from your homepage, you can move the homepage at a really minor cost.

Conclusion: start by subscribing to the section of ArXiv you are interested in, for example www.arxiv.org/corr/subscribehelp for CoRR. It requires one trivial email. You can judge then for yourself if you also want others to receive the announcements with your articles.

The Three Gap Theorem

Here is the story I promised you. A friend of mine, Stas Swierczkowski, a prominent mathematician aged 74 proved in his thesis in 1956 a beautiful result called the Three Gap Theorem. Soon after I learned about it from his autobiography, I got in September 2006 a posting of the article, www.arxiv.org/abs/cs.LO/0609124, devoted to a mechanical proof of this theorem in the Coq system. I alerted Stas who, fifty years after he proved this result, started to exchange emails with the author about a possible generalization of this result. Here is how Stas describes this result.

"Still as a graduate student I was fortunate to solve one of his [Hugo Steinhaus] problems. Let me describe it. Imagine somebody walking along a path which has the shape of a circle, leaving clear footprints. Idealizing the situation, let us view footprints as points (as if the person were walking on very pointed stilts). So now by a footprint we mean a point marked on the circle precisely at the place where the tip of the stilt was placed during the walk. We assume that all steps of this person have exactly the same length. After a while the person gets tired, and stops walking. Let us now cut up the circle, using each footprint (which in our idealized version is a point) as a cutting place. We get lots of curved bits, each of these being an arc of the original circle. Some of these are longer, some shorter. Let us measure the lengths of these arcs quite precisely. How many possible results could we get? Oh, well — the reader might say — who can tell? The circle might have been very big or rather small, the steps might have been very long or very short and the person might have walked a hundred million times around the circle or not even once. Unless he was stepping into his own footprints (which is not that likely, as these are merely points) — the arcs obtained from cutting up the circle could be of very many different lengths. Given the size of the circle, the lengths of the steps and the amount of footprints, an engineer could calculate all the possible sizes of the small arcs into which the circle falls apart, after it is cut at the footprint points. But calculating these from some given numerical data (size of circle, etc.) was not the problem. The problem was: how many different results would such calculation provide? The Steinhaus conjecture was: at most three. Surprised? Yes, we all were, but it is true! The reader may take a compass, draw a circle and then, setting the compass to any width smaller than the diameter of the circle, start "walking" around the circle, marking each step. It will be seen that then there are at most three sizes of arcs joining consecutive "footsteps"! Needless to say, I was delighted when I found a general proof of this fact."

Referenties

1 K.R. Apt, 'One more revolution to make: free scientific publishing', *Communications of the ACM* **44**(5) (2001), pp.25–28.

2 K.R. Apt, 'Towards free access to scientific literature', *Nieuw Archief voor Wiskunde* **5**(2) (2001), pp.251–255.

3 T.H. Koornwinder, 'Hou uw preprints openbaar en up-to-date, bijv. op ArXiv:math.', *Nieuw Archief voor Wiskunde* **5**(6) (2005), pp.324–325.