Mason McBride

14 March 2022

Professor Hannah Zeavin

HISTORY 182A

ArXiv eprint technology

ArXiv (arxiv) is a novel eprint technology; it is an open-access repository where scientific papers in mathematics, physics, computer science, engineering, etc. are uploaded in their “preprint” stage before they are (hopefully) published into academia. Beginning in 1991, arxiv is perhaps the first publicly accessible preprint server, making it first to apply the paradigm of open-source/open-access into the realm of research publication. This technology has been massively successful: mathematicians and computer scientists now regularly upload current papers feeding a healthy ecosystem of academic readers establishing a positive feedback loop to the benefit of scientific knowledge production. In a blog post 3 January 2022, Arxiv celebrated hosting over 2 million articles on its site–all available to read for free. Also in the blog post, a conversation is presented by arxiv to represent the scale to which this technology has changed science production:

If I ask the question, “Are all or most of your papers on arXiv?” to a mathematician in my field, they would look at me in disbelief and say, “Of course all of my papers are on arXiv.”

This means students and researchers have free access to a rich space of math publications. A major benefit comes from the large range of people that are called into the object.

Arxiv permits a wider range of accepted papers compared to traditional styles of journal publication, and includes the scientist, the student, and even the layperson in its reader-base.

Before the time of eprint, academic publishing was culturally and geographically bound by location: copies (sometimes even the orig. manuscript) circulated locally throughout universities or scientists sifted through postprints from published journals or conferences. This period was much less connected, since it was much harder to follow citation trails to different areas of research, and access to cutting-edge research was reserved for those 'in the know.' Methods of gate-keeping, although profitable in the short-term for the secret-holders,

Keeping in mind the quote from above, praising arxiv for its work in providing free math papers, there also exists something nefarious embedded into this design. In mathematics PhD Jade Master's blog post "The Lie of 'It's Just Math,'" she highlights, "In 2020, [DARPA] funded over 220 million dollars in Math and Computer Science Research." Applied category theory was one DARPA's best funded research programs, which is a subject rooted in discovering the purest foundations of mathematics. This condition paired with the fact that almost all category theory researchers publish their work on arxiv open-access, creates the perfect environment for eprint technology to exist as another way to boost the productivity of military science production. It's not a stretch to assume that DARPA researchers are digesting bleeding-edge research and using gained knowledge to further enhance destructive and devastating technology. One of NASA's recent technical publications, titled *Engineering Elegant Systems: Theory of Systems Engineering,* named category theory as the "mathematical basis of systems engineering" which we see reflected in increased academic attention to category theory.

Or, take the fact that the original file repository was stored at the Los Alamos National Laboratory, notable for its involvement in designing nuclear weapons for the Manhattan Project.

This fact shows how geographically and ideologically related military science development and the creation of arxiv really were to each other. At every level, it is impossible to separate the intrinsic relationship between science we (the people) produce and the science the military needs produced.

This all goes to show that despite the massive benefits to the public through public access preprint servers, at its core, the technology is built to accommodate scientific publication, and scientific publication lines the pockets of DARPA and the rest of military science. The public has free access to previously gatekept resources, and DARPA has an entire repository of data to process through their automatic parsing systems.

Even though arxiv's position as an open-access repository includes more groups under its umbrella, it is not an open-publishing site so there are still restrictions and approval processes that exclude groups from the technology. For example, it is theoretically possible for an outsider not trained in academia to get their paper uploaded to arxiv, but “irrelevant” research contributions may be hard to get uploaded because (military) science might be demanding a different area of research.

Ideally, I would like to see a science system that is free from military influence, where scientists are free to explore branches of knowledge that are fun(?) and rooted in the love of humanity. But war pays the bills.

Works Cited

ArXiv.org. “Two Million Articles and Counting!” *ArXiv.org Blog*, 3 Jan. 2022, https://blog.arxiv.org/2022/01/03/two-million-articles-and-counting/. Accessed 15 Mar. 2022.

Master, Jade Jadeedenstarmaster. “The Lie of ‘It's Just Math.’” *Cat Blog*, 14 Dec. 2020, https://jadeedenstarmaster.wordpress.com/2020/12/11/the-lie-of-its-just-math/.

Watson, M.D. NASA, Alabama, Huntsville, 2020, pp. 131–157, *Engineering Elegant Systems: Theory of Systems Engineering*.