Do No Evil in Research

In the last issue's letter, we took time to stop and reflect upon the impact computing technology is making on the world—think drones, Uber, Google Glass and 3-D printers. In this issue's letter we're again aiming closer to home and considering the impacts of our methods, conducts, and daily research practices as students and researchers. One of the most popular graduate courses at Stanford and many other top universities is a course in optimization (some versions like the one taught by Stanford Professor

Stephen Boyd are also available as MOOCs). An optimization problem may be expressed generically as:

Maximize $f(x)$
subject to x in S .

The function f is called the objective function and is part of the problem description, as is the set S ; what we need to do to solve the problem is to find an x that maximizes the objective, subject to the constraint that x should belong to the set S .

As a student or young researcher,

the objective you're working hard to maximize is (for the most part) to produce high-quality, high-impact research results. Trying to maximize that objective can sometimes (OK, often) feel like trying to navigate to the peak of a mountain in pitch darkness. Your advisor (assuming she/he is doing a decent job) can be a beacon of light guiding you along the way. However, while at least the goal is now more or less clearly marked, an additional hurdle is that the constraints along the way may not be clear. Metaphorically speaking, these constraints would be fences on the way to the top, which perhaps stop you from reaching as high as you'd like as fast as you'd like, but also protect you from plummeting down into a deep pit, arms flailing, a draft of your paper clutched tightly in one hand.

One type of fence that is relatively clearly marked, and so often crossed only by conscious (but not conscientious) decision, is of the legal sort. It almost goes without saying that a researcher's problem is really:

Maximize $QUALITY[RESEARCH]$
subject to $RESEARCH$ in $LEGAL$.

Even here, lines can get blurry—what if to make important research progress, you need really expensive software? Luckily, many companies like Wolfram offer student editions for relatively affordable prices. The same is not always true for books you may need to advance your research—books can cost hundreds of dollars, tempting students to download illegal copies.

A second fence that has recently received a lot of media attention following the Facebook internet study controversy is the ethical one:

Maximize $QUALITY[RESEARCH]$
subject to $RESEARCH$ in $LEGAL$ and $ETHICAL$.

In the Facebook study,¹ researchers set out to understand how emotion spreads in social media. They proceeded to manipulate the news feeds of more

UPCOMING ISSUES

Spring 2015

[March issue]

Computational Biology

Article deadline: January 16, 2015

Summer 2015

[June issue]

Virtual Reality

Article deadline: April 17, 2015

1 Kramer, Guillory, and Hancock, Experimental Evidence of Massive-scale Emotional Contagion through Social Networks. *PNAS* 111, 24 (2014). Subject to Verma, Editorial Expression of Concern and Correction. *PNAS* 111, 29 (2014).

Association for
Computing Machinery

**ACM Conference
Proceedings
Now Available via
Print-on-Demand!**

*Did you know that you can
now order many popular
ACM conference proceedings
via print-on-demand?*

Institutions, libraries and individuals can choose from more than 100 titles on a continually updated list through Amazon, Barnes & Noble, Baker & Taylor, Ingram and NACSCORP: CHI, KDD, Multimedia, SIGIR, SIGCOMM, SIGCSE, SIGMOD/PODS, and many more.

**For available titles and
ordering info, visit:
librarians.acm.org/pod**

**As a student or
young researcher,
the objective
you're working hard
to maximize is
(for the most part)
to produce
high-quality,
high-impact
research results.**

than half a million randomly selected users, changing the number of positive and negative posts they saw. Facebook argues its conduct is legal, since users implicitly consented to this kind of manipulation when they accepted its terms of service. But the big question is: What research conducts are ethical for studies on large scale web systems?

Ethical questions are hard; they involve working through the benefits and costs of a research act, a process that, say, a law student would probably be comfortable with, but an engineering student is often unprepared for. An approval from the IRB (Institutional Review Board) is of course important but cannot replace critical thinking on part of the researchers themselves (for more on this see danah boyd's "What Does the Facebook Experiment Teach Us?" on medium.com). The trickiness of ethical questions in research is amplified by the fact that research groups from different institutions and cultural backgrounds often compete with one another for funding and academic attention, while applying heterogeneous moral and ethical standards that could amount to an uneven playing field.

Last but not least, what about simply playing nice? Do we want our optimization problem to become:

Maximize QUALITY[RESEARCH]
subject to RESEARCH in LEGAL and
ETHICAL and NICE?

Or should students strive to become lean, mean research machines? Here are a few examples—would you say the following are welcome, acceptable,

or at least unavoidable behavior in a research community? Which if any of these cross the line in your book?

► Alice tells Bob about a research idea, and asks his opinion. Several months later, Alice still hasn't published anything. Bob develops the idea into a paper.

► Bob reviews a paper for a conference, and has an idea how to greatly improve upon the original results. He immediately begins developing his ideas and publishes before the original paper is accepted for publication.

► Alice, a renowned researcher, submits a paper to a conference with double-blind review. Alice believes the methods in the paper could benefit other researchers. While the review process is still ongoing, she puts a prominent link to the paper on her website.

► Alice and Bob have collaborated for several years on research projects, alternately taking a leading role and a more supportive role in every project. In one project, Alice ends up doing next to nothing. The paper is published with her as a co-author.

Technology changes the world; research practices change our world, affecting not only the image of the field but also the incentives of all those who operate within it, and ultimately circling back to the quality of research. "Love thy neighbor" is always a good rule of thumb, but deciding whether a certain conduct "feels right" is hard when you're distanced from those it affects, whether by the anonymity of random Facebook users or automated conference review platforms. Especially when you're on your way to the top, paper draft in hand.

We'd love to end this letter with some solid, foolproof advice for our readers, but it's not easy to advise on how to resolve ethical questions or how to optimize for niceness (after all, even for figuring out legal questions a whole profession seems necessary...). One thing we can say is these are issues you will have to face, and decisions you will have to make throughout your entire career, so it's worthwhile to find your inner compass now and start off in the right direction.

*—Inbal Talgam-Cohen
and Sean Follmer*