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David Karger · What Does/Did X Think of Y? · Artificial Intelligence · +4

What does David Karger think about the future of machine learning?

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2 Answers

**David Karger**, I am David Karger

Updated Feb 15, 2015 · Featured in Forbes · Upvoted by Alberto Bietti, PhD student in machine learning. Former ML engineer and Nikhil Garg, I lead a team of Quora engineers working on ML/NLP problems

I thought it would be fun to see what others answer, but I guess I should add my own. I think that the long-term future of machine learning is very bright (and that we will ultimately solve AI, although that's a separate issue from ML). Machine learning is already an incredibly powerful tool that can do a surprisingly good job of solving really hard classification problems.

But, as a research area it doesn't really appeal to me. As a theoretician (and as Joe rightly points out in his answer), I tend to be drawn to (i) solving specific problems rather than coming up with general paradigms and (ii) devising solutions that may be tricky to think up, but that are intuitive and easy to understand and explain. So if you see my (limited) past work on machine learning, you'll see I've tackled problems like "how do we set parameters of a simple weighted-linear classifier in order to retrieve relevant documents". The field of machine learning has moved way beyond that kind of question, developing incredibly powerful and general algorithms that rely on deep and sophisticated math. I'm not so interested in doing that kind of abstract work.

Another turn-off for me is that with these incredibly powerful algorithms, you can solve really hard problems, but while the computer knows the answer it just works like magic. You don't really know *why* that's the answer. A concrete example of this is the difference between so-called "generative" and "discriminative" models. Generative models in machine learning posit that there is some underlying (generally random) process that is generating the data you are observing, and aim to use the data to infer the parameters of that underlying process, which then lets you classify the data. Discriminative models don't care how the data is being generated; they just figure out a formula that effectively distinguishes the different classes of data. In my mind, if you succeed in solving a generative model, you have "understood" the data and the problem. If you succeed using a discriminative model, you may be getting great answers, but you don't understand why---only the computer does---and that's really dissatisfying. Unfortunately for me, discriminative models tend to work better than generative models to solve lots of machine learning problems, so I get turned off.

As a practitioner, I'm very happy to use machine learning. Again, I really like simplicity, so I tend to go for super-simple machine learning algorithms like Naive Bayes. My experience has been that for many problems, these simple algorithms

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rarely give you dramatically better performance, and the improvement isn't worth the effort for the rese

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As Joe again rightly observes, I'm sensitive to the fact that *all* machine learning algorithms tend to have errors, and am very interested in how we can keep humans in the loop in order to ameliorate the consequences of those errors. This reflects a more general aspect of my research: I'm more interested in the computer as a tool that can help people be better at what they do, rather than as a tool that can replace people.

One of my personal favorite research projects that reflects this perspective was Feedme (<http://people.csail.mit.edu/marc...>) a system I worked on with Michael Bernstein and Adam Marcus. Feedme helps you share content with your friends. As you're reading stuff on the web, it pops up a little toolbar with a list of specific friends of yours who might be interested in reading what you're reading. You can click on their names, and Feedme will send them a link to the web page. Feedme uses a super-simple machine learning algorithm to learn what *kind* of content you share with each of your friends, and uses that to guess which friends it should recommend you to share a given piece of content with. Note the human in the machine learning loop: Feedme suggests you share stuff with specific people, but you are the one who decides whether to do the actual sharing---so your friends only get stuff they really like (assuming you are good at sharing). Contrast this with something like reddit, which just shows you whatever everyone else is upvoting---so you end up reading lots of stuff that you then decide was a waste of time.

Feedme is down right now because of a change to our server infrastructure. But I'm hoping to get it back up soon because I used it every day. When back in service it will be at <http://feedme.csail.mit.edu/>

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Joe Mc Swiney, Electronics Engineer

Written Jan 24, 2015

I am not an expert on either machine learning or on David Karger, but was asked to answer. So for the hell of it, I took a cursory glance this publications list <http://people.csail.mit.edu/karg...> and thereby inferred the following about David Karger's thoughts on Machine Learning:

- Machine learning is most usefully applied to narrow domains as opposed to trying to discover a generalized fully versatile paradigm. This could be interpreted to mean that David is not be a believer in the medium term feasibility of artificial general intelligence, or hard AI. History would support him on this (and is wrong ;-)).
- Greater productivity in machine learning tasks can be achieved if humans are included as differentiators in the system, maybe for the foreseeable future.
- At the risk of gross extrapolation, David may support a view of future machine learning that includes wetware in addition to hardware / software.

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scheduling and operations management. Initially, starting in the 60s, computer scientists though

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world operations. However, following millions (a lot in those days) of dollars of investment and failures they realized that a far more feasible solution is to create an iterative interactive process for operations control whereby a human supervisor works in concert with the program. The human provides the top level evaluation and scenario planning with the program generating iterative predictions and suggestions. David's latest approach to machine learning is like this, except the program is in charge and the humans are components. Dystopian future, here we come :-).

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