

Artificial intelligence

Million-dollar babies

As Silicon Valley fights for talent, universities struggle to hold on to their stars

Apr 2nd 2016 | SAN FRANCISCO | From the print edition

THAT a computer program can repeatedly beat the world champion at Go, a complex board game, is a coup for the fast-moving field of artificial intelligence (AI). Another high-stakes game, however, is taking place behind the scenes, as firms compete to hire the smartest AI experts. Technology giants, including Google, Facebook, Microsoft and Baidu, are racing to expand their AI activities. Last year they spent some \$8.5 billion on deals, says Quid, a data firm. That was four times more than in 2010.



In the past universities employed the world's best AI experts. Now tech firms are plundering departments of robotics and machine learning (where computers learn from data themselves) for the highest-flying faculty and students, luring them with big salaries similar to those fetched by professional athletes.

Last year Uber, a taxi-hailing firm, recruited 40 of the 140 staff of the National Robotics Engineering Centre at Carnegie Mellon University, and set up a unit to work on self-driving cars. That drew headlines because Uber had earlier promised to fund research at the centre before deciding instead to peel off its staff. Other firms seek talent more quietly but just as doggedly. The migration to the private sector startles many academics. "I cannot even hold onto my grad students," says Pedro Domingos, a professor at the University of Washington who specialises in machine learning and has himself had job offers from tech firms. "Companies are trying to hire them away before they graduate."

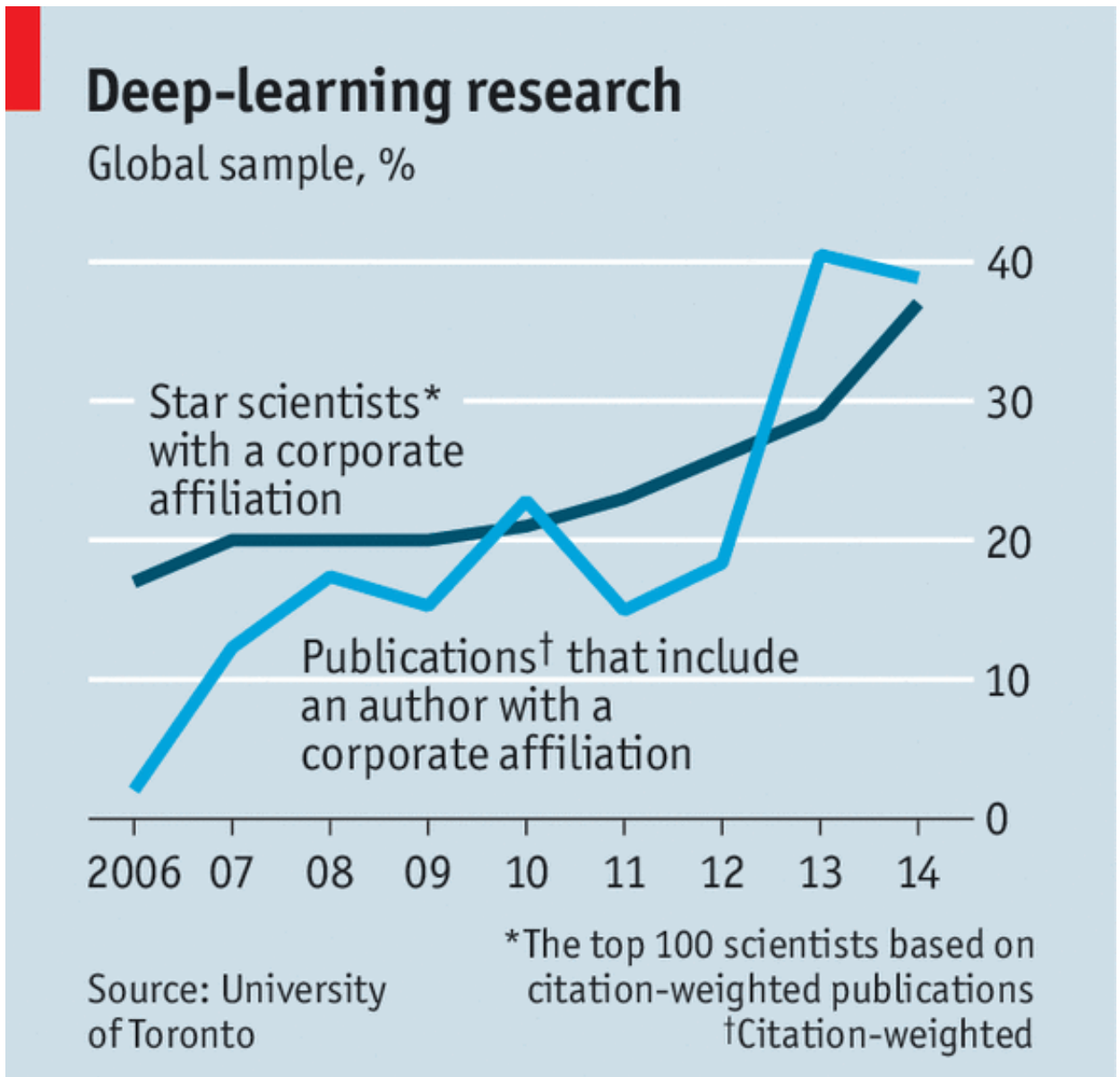
Experts in machine learning are most in demand. Big tech firms use it in many activities, from basic tasks such as spam-filtering and better targeting of online advertisements, to futuristic endeavours such as self-driving cars or scanning images to identify disease. As tech giants work

on features such as virtual personal-assistant technology, to help users organise their lives, or tools to make it easier to search through photographs, they rely on advances in machine learning.

Tech firms' investment in this area helps to explain how a once-arcane academic gathering, the Conference on Neural Information Processing Systems, held each December in Canada, has become the Davos of AI. Participants go to learn, be seen and get courted by bosses looking for talent. Attendance has tripled since 2010, reaching 3,800 last year.

No reliable statistics exist to show how many academics are joining tech companies. But indications exist. In the field of "deep learning", where computers draw insights from large data sets using methods similar to a human brain's neural networks, the share of papers written by authors with some corporate affiliation is up sharply (see chart).

Tech firms have not



Economist.com

always lavished such attention and resources on AI experts. The field was largely ignored and underfunded during the “AI winter” of the 1980s and 1990s, when fashionable approaches to AI failed to match their early promise. The present machine-learning boom began in earnest when Google started doing deals focused on AI. In 2014, for example, it bought DeepMind, the startup behind the computer’s victory in Go, from researchers in London. The price was rumoured to be around \$600m. Around then Facebook, which also reportedly hoped to buy DeepMind, started a lab focused on artificial intelligence and hired an academic from New York University, Yann LeCun, to run it.

The firms offer academics the chance to see their ideas reach markets quickly, which many like. Private-sector jobs can also free academics from the uncertainty of securing research grants. Andrew Ng, who leads AI research for the Chinese internet giant Baidu and used to teach full-time at Stanford, says tech firms offer two especially appealing things: lots of computing power and large data sets. Both are essential for modern machine learning.

All that is to the good, but the hiring spree could also impose costs. One is that universities, unable to offer competitive salaries, will be damaged if too many bright minds are either lured away permanently or distracted from the lecture hall by commitments to tech firms. Whole countries could suffer, too. Most big tech firms have their headquarters in America; places like Canada, whose universities have been at the forefront of AI development, could see little benefit if their brightest staff disappear to firms over the border, says Ajay Agrawal, a professor at the University of Toronto.

Another risk is if expertise in AI is concentrated disproportionately in a few firms. Tech companies make public some of their research through open sourcing. They also promise employees that they can write papers. In practice, however, many profitable findings are not shared. Some worry that Google, the leading firm in the field, could establish something close to an intellectual monopoly. Anthony Goldbloom of Kaggle, which runs data-science competitions that have resulted in promising academics being hired by firms, compares Google’s pre-eminence in AI to the concentration of talented scientists who laboured on the Manhattan Project, which produced America’s atom bomb.

Ready for the harvest?

The threat of any single firm having too much influence over the future of AI prompted several technology bosses, including Elon Musk of Tesla, to pledge in December to spend over \$1 billion on a not-for-profit initiative, OpenAI, which will make its research public. It is supposed to combine the research focus of a university with a company’s real-world aspirations. It hopes to attract researchers to produce original findings and papers.

Whether tech firms, rather than universities, are best placed to deliver general progress in AI is up for debate. Andrew Moore, the dean of Carnegie Mellon University's computer-science department, worries about the potential for a "seed corn" problem: that universities could one day lack sufficient staff to produce future crops of researchers. As bad, with fewer people doing pure academic research, sharing ideas openly or working on projects with decades-long time horizons, future breakthroughs could also be stunted.

But such risks will not necessarily materialise. The extra money on offer in AI has excited new students to enter the field. And tech firms could help to do even more to develop and replace talent, for example by endowing more professorships and offering more grants to researchers. Tech firms have the cash to do so, and the motivation. In Silicon Valley it is talent, not money, that is the scarcest resource.

Correction: This article has been amended to make clear that the \$8.5 billion spent by technology companies was on deals and did not include money spent on research and hiring.

From the print edition: Business