

Ask the AI experts: What's driving today's progress in AI?

July 2017

While the deep-learning technology behind many of today's AI advances seems new to most, it has been around for decades—simply needing the data and power available today to fuel it.

Artificial-intelligence technology has begun to hit its stride, springing from research labs into real business and consumer applications. But why now? Earlier this year at the AI Frontiers conference in Santa Clara, California, we sat down with AI experts from some of the world's leading technology-first organizations to find out. An edited version of the experts' remarks follows the video.

This video is one in a five-part Ask the AI Experts series that answers top-of-mind questions about the technology:

- What are the applications of AI?
- Should we be afraid of AI?
- What will take AI capabilities to the next level?
- What advice would you give to executives about AI?

Interview transcript

Li Deng, *chief AI officer, Citadel*: There are a few factors that really propelled AI to this current state—what many people call “the third wave.” The first wave died because people were probably too naive. They overestimated the future. And at that time, of course, even into the second wave, the computing power wasn't there, and there wasn't even the concept of big data. So when AI evolved, maybe 20 years ago, into something called machine learning, where data became the key to AI, that was a big advancement—people understood the importance of data.

Gary Bradski, *chief technology officer, Arrai*: The compute power has become cheap and powerful. The Internet happened. Mobile happened. And suddenly we had a ton of people collecting data—voice and image data, and trajectory and behavioral data. Deep nets [deep neural networks, also known as deep learning] are so expressive, if you don't have a lot of data

to pin them down, they actually do worse with a small amount of training. So people turned to other techniques. So basically this is a confluence of those factors and some improvements on the algorithm, but not all that much, really.

Adam Coates, *director, Baidu Research Silicon Valley AI Lab*: It's a little bit striking if you're looking at the community from the outside. It looks like AI was just asleep for a long time and then one day it just exploded. If you're actually working on this from the research side, there's actually a very slow ramp-up. It's the bottom of that exponential curve where people from the inside could see that this was happening. But for a very long time, the things that we could build with deep learning, which is the technology that's powering a lot of progress right now, were just not as good as the hand-engineered systems businesses and companies were actually using.

And then what happened, around maybe 2012 or so, is that these systems hit the sort of crossover point where suddenly the things that we could build with this deep-learning technology became much, much more powerful and really overtook all the systems we could build before. And it sort of looked like a big surprise, like it came out of nowhere. And it's actually been a very long process that you're just seeing the output of right now.

Mohak Shah, *lead expert, data science, Bosch Research and Technology Center, North America*: Machine learning has come up as a huge enabler. But at the same time, I think now we are in a position where we have enough empirical data to support our research and enough compute power to essentially take it to the next level. And I think that is an exciting phase now, where deep learning has become an enabler of what we have always thought cognitive systems or AI were engineered to achieve. I think that brought us one step closer to going toward what we like to think is AI.

In terms of the things that we are doing now, we are still solving very basic problems. We are not really solving very complicated problems, except that all these basic problems are becoming building blocks of achieving something much bigger. □

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