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TECHNOLOGY

The Race Is On to Control Artificial Intelligence, and Tech's Future

By JOHN MARKOFF and STEVE LOHR MARCH 25, 2016

SAN FRANCISCO — The resounding win by a Google artificial intelligence program over a champion in the complex board game Go this month was a statement — not so much to professional game players as to Google's competitors.

Many of the tech industry's biggest companies, like Amazon, Google, IBM and Microsoft, are jockeying to become the go-to company for A.I. In the industry's lingo, the companies are engaged in a "platform war."

A platform, in technology, is essentially a piece of software that other companies build on and that consumers cannot do without. Become the platform and huge profits will follow. Microsoft dominated personal computers because its Windows software became the center of the consumer software world. Google has come to dominate the Internet through its ubiquitous search bar.

If true believers in A.I. are correct that this long-promised technology is ready for the mainstream, the company that controls A.I. could steer the tech industry for years to come.

"Whoever wins this race will dominate the next stage of the information

age," said Pedro Domingos, a machine learning specialist and the author of "The Master Algorithm," a 2015 book that contends that A.I. and big-data technology will remake the world.

In this fight — no doubt in its early stages — the big tech companies are engaged in tit-for-tat publicity stunts, circling the same start-ups that could provide the technology pieces they are missing and, perhaps most important, trying to hire the same brains.

Fei-Fei Li, a Stanford University professor who is an expert in computer vision, said one of her Ph.D. candidates had an offer for a job paying more than $1 million a year, and that was only one of four from big and small companies. On the candidate's list, one of the biggest technology companies was ranked lowest, in terms of both money and excitement, she noted dryly.

At the University of Toronto, IBM pursued a start-up called Ross Intelligence that makes a smart legal assistant, and extended a free offer to use its A.I. software, called Watson. For IBM, the financial payoff would come if start-ups like Ross generated sales, followed by a revenue-sharing arrangement. "No upfront costs at all," said Andrew Arruda, chief executive of the start-up, which moved last year to Silicon Valley.

For years, tech companies have used man-versus-machine competitions to show they are making progress on A.I. In 1997, an IBM computer beat the chess champion Garry Kasparov. Five years ago, IBM went even further when its Watson system won a three-day match on the television trivia show "Jeopardy!" Today, Watson is the centerpiece of IBM's A.I. efforts.

Now, Google's A.I. program is drawing additional attention and pointing to a consolidation among tech's biggest companies.

By 2020, the market for machine learning applications will reach $40 billion, IDC, a market research firm, estimates. And 60 percent of those applications, the firm predicts, will run on the platform software of four

companies — Amazon, Google, IBM and Microsoft.

In January, before the Google software's latest Go victory, the scientific journal Nature published an article describing how the program had beaten a European Go champion in five consecutive matches, overshadowing an effort by another tech giant, Facebook, to promote its own powerful Go-playing A.I. software. Google's software went on to beat the Go grandmaster Lee Se-dol 4-1 in South Korea this month.

IBM is making the broadest entry into A.I. Its Watson unit, set up as a separate division in early 2014, is both a software and a services business, with technology tailored to specific industries. More than 80,000 developers have downloaded and tried out the software, and the Watson division has 500 industry partners, including big companies and start-ups.

"It's early days, but the long-term goal is to have hundreds of millions of people use Watson as self-service A.I.," said David Kenny, general manager of the Watson division.

In 2015, Amazon and Microsoft both added machine learning capabilities to their cloud software platforms, Amazon Web Services and Microsoft Azure. The companies are using machine learning software to help customers spot patterns and make predictions in vast amounts of data.

Microsoft offers 18 machine learning services, including face recognition, text analysis and product recommendations. More A.I. capabilities, analysts say, should be announced at the end of the month, when Microsoft hosts a large conference for software developers in San Francisco.

Google is opening its A.I. technology to outsiders, seeking to attract developers. Last November, Google made the core of the machine learning technology its engineers use, called TensorFlow, available as free-to-use open-source software.

This week at a conference in San Francisco, Google showed off a new speech-to-text transcription service. The company also said its recently introduced vision software for identifying images would be broadly available soon, and it introduced new tools and training aids to help developers build machine-learning applications more easily.

Intelligent software applications will become commonplace, said Jeff Dean, a computer scientist who oversees Google's A.I. development. "And machine learning will touch every industry."

At Facebook, the A.I. vision is, at least for now, limited to its products.

Mike Schroepfer, the chief technology officer, noted that Facebook's image-recognition software was now used to select what pictures or videos to show in a user's news feed, based on a person's friend network and interests.

"Before, the photo was a black box to us," he said. "And that's the most likely form this takes — a lot of things that add up to make the service steadily better on Facebook."

If products come first, a platform strategy typically takes shape later for the big consumer web companies. There are millions of Facebook app developers worldwide. Today, only about 1 percent of all software apps have A.I. features, IDC estimates. By 2018, IDC predicts, at least 50 percent of developers will include A.I. features in what they create.

"It's where the market is headed," said David Schubmehl, an IDC analyst.

The question remains, how quickly? To some, the rush to build platforms is taking place long before the technology has matured. What is more, they are still focusing on niches, said David B. Yoffie, a Harvard Business School professor. "None of them have the opportunity to be as ubiquitous as an operating system became in the PC era, " Mr. Yoffie said.

Some start-ups, like Diffbot in Palo Alto, Calif., are willing to jump into

the fray with industry giants under the assumption that there is still plenty to figure out.

The company, which was founded by Mike Tung, a Stanford computer science graduate student, in 2008, recently raised $10 million to compete directly with Google. Even though Diffbot is still being run out of a home near the Stanford campus, Mr. Tung is thinking big.

"Our goal is to capture all human knowledge," he said. "I would like for Diffbot to build an iconic company around data. There are companies focusing on computing, but there is no Amazon of data."

John Markoff reported from San Francisco and Steve Lohr from New York.

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