China challenging US dominance in Machine Learning and Artificial Intelligence

Every year AI is creating new milestones. In March 206, Google's AlphaGo scored a 4-1 victory over Korean Go master Lee Se-dol last year, marking a milestone in artificial intelligence. The winning computer program, created by researchers at Google DeepMind in London, used an artificial neural network that took advantage of what's known as deep learning, a strategy by which neural networks involving many layers of processing are configured in an automated fashion to solve the problem at hand.

As the world itself becomes more complex, AI will become the defining technology of the twenty-first century, just as the microprocessor was in the twentieth century, wrote Albert Einstein. In an article for the World Economic Forum, Marc Benioff, chairman and CEO of Salesforce, explains that the convergence of big data, machine learning and increased computing power will soon make artificial intelligence "ubiquitous".

AI race has ensued between countries like US, China and Russia to take a lead in this strategic technology. US has launched third Offset strategy to leverage technologies such as artificial intelligence, autonomous systems and human-machine networks to equalise advances made by the nations opponents in recent years. Under this one of the important initiatives is Autonomous "deep learning" machines and systems, which the Pentagon wants to use to improve early warning of events. As an example, Deputy Secretary of Defense Bob Work pointed to the influx of "little green men" from Russia into Ukraine as simply a big data problem that could be crunched to predict what was about to happen.

IN JULY 2017, CHINA'S government issued a sweeping new strategy with a striking aim: draw level with the US in artificial intelligence technology within three years, and become the world leader by 2030. China aims to dominate the next generation of "intelligentized" warfare, relying on "long-range, precise, smart, stealthy and unmanned weapons platforms."

China has overtaken the United States to become the world leader in deep learning research, a branch of artificial intelligence (AI) inspired by the human brain, according to White House reports that aim to help prepare the US for the growing role of artificial intelligence in society.

A new Harvard Kennedy School study concludes AI could revolutionize war as much as nuclear weapons have done. China and Russia have also reached effective technological-military parity with the U.S. But, America does not have a roadmap like China, which plans to dominate AI by 2030, while Russia will make 30% of its military equipment robotic by 2025.

Putin warns: "Artificial intelligence is the future, not only for Russia but for all of humankind. Whoever becomes the leader in this sphere will become the ruler of the world." The Russian military is also developing robots, anti-drone systems, and cruise missiles that would be able to analyze radars and make decisions on the altitude, speed and direction of their flight, according to state media.

The National Artificial Intelligence Research and Development Strategic Plan lays out the strategy for AI funding and development in the US. The report says the US will need to step up investment: "Current levels of R&D spending are half to one-quarter of the level of R&D investment that would produce the optimal level of economic growth.

AI enabling smart and autonomous

Military Weapons and Systems

RAND report has also suggested several possible AI applications for the military. Replacing frozen software with systems that do not need to be refreshed periodically creates a broad potential for creating more nimble systems, possibly at lower cost. Again, AI could be used in training systems. For example, it could provide unpredictable and adaptive adversaries for training fighter pilots. Computer vision, the ability of software to understand photos and videos, could greatly help in processing the mountains of data from surveillance systems or for "pattern-of-life" surveillance.

Other suggested applications might include: using AIs to solve logistics challenges; to support war games; to automate combat in so-called manned-unmanned operations; to speed weapon development and optimization, and for identifying targets (as well as non-combatants).

AI is has also entering into military weapons and systems. US navy is developing new weapon, called the Long Range Anti-Ship Missile, or L.R.A.S.M, a collaborative effort between Lockheed, the Office of Naval Research and the Defense Advanced Project Research Agency, or DARPA. With a range of at least 200 nautical miles, LRASM is designed to use next-generation guidance technology to help track and eliminate targets such as enemy ships, shallow submarines, drones, aircraft and land-based targets. According to the Pentagon, this means that though targets are chosen by human soldiers, the missile uses artificial intelligence technology to avoid defenses and make final targeting decisions.

China is looking to create a new generation of cruise missiles, which will have a high level of artificial intelligence, will be multifunctional and reconfigurable based on modular design according to a senior designer from China's Aerospace and Industry Corp. "They will allow commanders to control them in a real-time manner, or to use a fire-and-

forget mode, or even to add more tasks to in-flight missiles.”

The new Chinese weapon typifies a strategy known as “remote warfare,” said John Arquilla, a military strategist at the Naval Post Graduate School in Monterey, Calif. The idea is to build large fleets of small ships that deploy missiles, to attack an enemy with larger ships, like aircraft carriers. “They are making their machines more creative,” he said. “A little bit of automation gives the machines a tremendous boost.”

China outlines plans become world leader in AI, challenges U.S. dominance

China has outlined plans to become a world-leader in artificial intelligence by 2025, laying down a challenge to U.S. dominance in the sector amid heightened international tensions over military applications of the technology. China released a national AI development plan, aiming to grow the country’s core AI industries to over 150 billion yuan ($22.15 billion) by 2020 and 400 billion yuan ($59.07 billion) by 2025, the State Council said.

With this major push into AI, China is looking to rival U.S. market leaders such as Alphabet Inc’s Google and Microsoft Corp, as it is keen not to be left behind in a technology that is increasingly key from smart cars to energy.

China has unveiled first national laboratory for brain-like artificial intelligence (AI) technology in Hefei, capital of east China’s Anhui Province, to pool the country’s top research talent and boost the technology. Approved by the National Development and Reform Commission in January, the lab, based in China University of Science and Technology (USTC), aims to develop a brain-like computing paradigm and applications.

The lab will carry out research to guide machine learning such as recognizing messages and using visual neural networks to solve problems. It will also focus on developing new applications with technological achievements. (Xinhua). Wan Lijun, president of USTC and chairman of the national lab, said the ability to mimic the human brain's ability in sorting out information will help build a complete AI technology development paradigm.

China, is making great strides in AI, " In China AI is set to take-off, driven by initiatives like Baidu Brain, which is developing a platform for third-party AI applications, investments in the development of autonomous vehicles, and the emergence of startups focused on developing machine learning applications and associated business models, write Christopher Thomas and Gang Liang, Phd in Rise of machines. Baidu has bagged third place in AI/ Machine learning after Google and IBM in the the Most Innovative Companies of 2017 list. Some Chinese companies are even winning prestigious global competitions in AI technology, such as iFlytek at NIST and HIK Vision at ImageNet.

China's state-run news agency Xinhua reported that the country's Academy of Sciences has allocated a whopping 10 million yuan (1.4 million US dollars) for the creation of a sophisticated artificial intelligence (AI) processor that is due to add to China's presence on the global chip market. The deep learning processor chip, the "Cambrian," is expected to be the world's first processor that simulates human nerve cells and synapses to conduct deep learning, according to a statement issued by CAS.

The Cambrian research team is led by Chen Yunji and Chen Tianshi from the CAS Institute of Computing Technology. Google's AI program AlphaGo needs huge power and large servers to operate, but the Cambrian aims to perform at the same level and use just one watt of power and be the size of a smartphone or a watch, according to Chen Yunji.

Baidu’s Strategy to compete with Google

Google is going a big way in AI technologies; recently it has acquired (AI) startup DeepMind, a London-based company the tech giant bought up for an estimated minimum of $400 million. It was its eight acquisition of a Robotics Company in the past few months. Other recent Google acquisitions include Flutter, which specializes in gesture recognition.

Earlier, it had acquired Boston Dynamics, which famous for its human like robots. Two of their bipedal robots named Atlas and Petman have a significant degree of freedom, which can only be matched by human beings. Boston Dynamics is also a leading provider of human simulation software. Its primary customers are the US Army, Navy and Marine Corps.

Google unveiled a number of new AI-driven products, including Google Home, a voice-activated product that allows users to manage appliances and entertainment systems with voice commands, and which draws on the speech recognition technology in its announced “Google Assistant” (the product is scheduled to be released later this year).

The Google Translate app, on iOS or Android, is the most powerful way to translate between 90 languages. You can speak or type in a phrase and get a translation on your desktop computer or mobile. ‘People use Google Translate a lot – we translate over 100 billion words a day,’ Aaron Babst, community program manager at Google Translate wrote in a blog post.

China’s Iflytek, is an artificial intelligence company that has focused on speech recognition and understanding natural language. The company has won international competitions both in speech synthesis and in translation between Chinese- and English-language texts. The company, which Chinese technologists said has a close relationship with the government for development of surveillance technology, said it

is working with the Ministry of Science and Technology on a "Humanoid Answering Robot."

Baidu, the dominant provider of online search services on the mainland, has already accelerated its efforts in AI, with its recruitment last year of former Google scientist Andrew Ng. Last year, Baidu also hired Zhang Yaquin, who helped build Microsoft's biggest technology research operation outside of the United States. He was appointed as Baidu's president for new business.

In 2016, Baidu's CEO Robin Li publicly stated that the company is actively integrating artificial intelligence technologies into all of Baidu's major businesses, including the search engine, as well as new businesses such as autonomous driving. In August, Baidu, Stanford, and the University of Washington released an academic study demonstrating that voice input is more accurate and three times faster than human typing on smartphones. Its Silicon Valley lab is dedicated to finding new uses for AI, and the speech recognition engine it created has been integrated into the company's mobile search tool, used by hundreds of millions of people in China.

Baidu, has developed a voice system that can recognize English and Mandarin speech better than people, in some cases.The new system, called Deep Speech 2, is especially significant in how it relies entirely on machine learning for translation.The Baidu app for smartphones lets users search by voice, and also includes a voice-controlled personal assistant called Duer (see "Baidu's Duer Joins the Personal Assistant Party").

When Deep Speech 2 was first released in December 2015, Andrew Ng, the chief scientist at Baidu, described Deep Speech 2's test run as surpassing Google Speech API, wit.ai, Microsoft's Bing Speech, and Apple's Dictation by more than 10 percent in word error rate.

In healthcare, the Baidu Doctor project is focused around

applying machine and deep learning to building a chat program that can reliably diagnose illness just like a human doctor, simply from the patient's voice input. The company has stated that it's long term goal is to create a "medical robot" – a concept familiar to science fiction fans which is now, thanks to advances in machine learning, tantalisingly close to becoming a reality.

Baidu plans to use its new Beijing lab AR Lab, as well as technology from its AI research – image recognition, object detection, and more – to build smartphone-based AR applications. "Our cell phone-based approach has enabled us to ship augmented reality experiences to a significant number of users in a very short amount of time," says Andrew Ng, chief scientist at Baidu, in a press release. "There is an appetite for this technology; we are seeing rapid adoption by our partners in a range of industries."

"Artificial intelligence technologies have gained a more and more solid presence in recent years, including programs in voice recognition, image recognition, multi-language translation, unpiloted vehicles and airplanes, robots and more. This is one of the peaks of world technology, and China is not lagging behind in this area, so I think we have an opportunity to do something big. "

"Whoever wins artificial intelligence will win the internet in China and around the world. Baidu has the best shot to make it work," Ng said in a Bloomberg report last October.

Google leader in Global search market, Baidu in China

Google continues to dominate the global search market with 54.7 percent of search ad revenues worldwide in 2014. Google effectively controls 90 percent of searches globally compared

to the Baidu’s 1 percent market share worldwide. Globally 1.17 billion People use Google for search queries in a given month; 293 million people use Baidu; 292 million use Yahoo Search & 267 million use Bing. Google also dominates mobile market,

Like Google, Baidu’s core service is also search – Baidu is said to account for 75% of search traffic in its homeland. Here, it has rolled out machine learning algorithms for voice and image recognition, as well as natural language processing, to help it return smarter, more useful and more personalized results

One key difference between Google and Baidu is the former’s presence in mobile software. Google’s establishment of the Android operating system has rapidly grown to the most widely used smartphone operating system in the world. Google controls 91.14% market in Mobile and Tablet search market while Bing has only 2.38%.

Driverless Cars

The Google Self-Driving Car project, involves developing technology for autonomous cars. In late May 2014, Google revealed a new prototype of its driverless car, which had no steering wheel, gas pedal, or brakes, being 100% autonomous. Google has updated its prototype self-driving vehicle to make it road worthy, adding headlights and manual steering and braking to comply with road rules, Google’s cars are now on the streets of California (and Texas).

Baidu has opened up its driverless car technology for auto makers to use as it aims to be the default platform for autonomous driving in a bid to challenge the likes of Google and Tesla. The Chinese internet giant said that the new project named Apollo, will provide the tools carmakers would need to make autonomous vehicles. There would be reference designs and a complete software solution that includes cloud

data services. Essentially, Baidu is trying to become to cars what Google's Android has become to smartphones – an operating system that will power a number of driverless vehicles.

The technology giant has been investing heavily in this area since 2015 and that same year tested fully autonomous cars on highways and roads in Beijing. But the company has also expanded to the U.S. where it received a driverless car test permit for California last year. The company has said that it is planning to begin mass production of driverless cars by 2021. "The A.I. technologies, including machine vision, sensor fusion, planning and control, on our car are completely home-brewed," Mr. Wu said. "We wrote every line by ourselves."

"An open, innovative industry ecosystem initiated by Baidu will accelerate the development of autonomous driving in the US and other developed automotive markets," Qi Lu, chief operating officer at Baidu, said in a press release.

In China, 'super brain' AI robot takes on humans in reality TV show

A robot is invading a popular reality TV show in China that tests people's brainpower. The smart, AI-powered bot, Xiaodu, will take on human competitors in complex trials involving face and voice recognition. The AI robot built by search engine giant Baidu is one of the contestants, facing off against four people and other clever computer programs.

Baidu is confident its AI bot has the savvy to do well in its tough TV test. The Beijing-based company, worth US$63 billion, has a lab in Silicon Valley devoted to artificial intelligence, natural language processing, intelligent interaction, as well as speech, image, and facial recognition.

National Level Plan for both military and civilian use

China News Agency, Beijing, February 15 Xinhua (reporter Zhang Su) 15 reporters from the Ministry of science and technology in China held a press conference was informed that the “scientific and technological innovation, 2030 major projects have been started 4 pilot, or the recent new” artificial intelligence 2. While various developed economies have stepped up their efforts in AI, the mainland has lagged behind in basic AI research and investment. There is no national-level plan in place that supports AI development.

Li is proposing that the mainland set up a state-level “China Brain” (□□□□) project. This would focus on specific research areas: human-machine interaction, so-called big data analysis, automated driving, smart medical diagnosis, smart drones, and robotics technologies for both military and civilian use.

“I hope China can mobilize the resources of the whole nation to develop the biggest AI development platform in the world.” He also hopes for funding from China’s national defense and military. “I expect that in the future, private companies, science research institutes and China’s national defense industry and military science department can form closer collaborations to do something that can put China on the frontlines of world innovation for 10 to 20 years and more.”

“The government should support capable companies in building an open platform offering AI-related basic resources and public services,” he said. “This platform will make its resources available to support research and integration with social resources to facilitate jointly-generated innovation.” In addition, Li proposed that this platform “be kept open and competitive, rather than being made only available to select research institutes”.

“A market mechanism should help transform AI-related research into actual results and products, and push forward integration and innovation in traditional industry, the service sector and in the military,” he said.

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