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Ce dossier comporte 9 pages (page de garde non comprise).

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SUJET : A l'aide du dossier ci-joint, quels sont les apports et les risques découlant du développement de l'intelligence artificielle dans notre société ?

China's Artificial-Intelligence Boom

The country's universities and tech giants are starting to surpass American ones when it comes to researching and implementing AI

SARAH ZHAANG FEB 16, 2017 THE ATLANTIC

Each winter, hundreds of AI researchers from around the world convene at the annual meeting of the Association of the Advancement of Artificial Intelligence. Last year, a minor crisis erupted over the schedule, when AAAI announced that 2017's meeting would take place in New Orleans in late January. The location was fine. The dates happened to conflict with Chinese New Year.

The holiday might not have been a deal breaker in the past, but Chinese researchers have become so integral to the meeting, it could not go on without them. They had to reschedule. "Nobody would have put AAAI on Christmas day," says current AAAI president Subbarao Kambhampati. "Our organization had to almost turn on a dime and change the conference venue to hold it a week later."

The 2017 AAAI meeting—which ultimately relocated to San Francisco—wrapped up just last week. And as expected, Chinese researchers had a strong showing in the historically U.S.-dominated conference. A nearly equal number of accepted papers came from researchers based in China and the U.S. "This is pretty surprising and impressive given how different it was even three, four years back," says Rao.

China's rapid rise up the ranks of AI research has people taking notice. In October, the Obama White House released a "strategic plan" for AI research, which noted that the U.S. no longer leads the world in journal articles on "deep learning," a particularly hot subset of AI research right now. The country that had overtaken the U.S.? China, of course.

It's not just academic research. Chinese tech companies are betting on AI, too. Baidu (a Chinese search-engine company often likened to Google), Didi (often likened to Uber), and Tencent (maker of the mega-popular messaging app WeChat) have all set up their own AI research labs. With millions of customers, these companies have access to the huge amount of data that training AI to detect patterns requires.

Like the Microsofts and Googles of the world, Chinese tech companies see enormous potential in AI. It could undergird a whole set of transformative technologies in the coming decades, from facial recognition to autonomous cars."I have a hard time thinking of an industry we cannot transform with AI," says Andrew Ng, chief scientist at Baidu. Ng previously cofounded Coursera and Google Brain, the company's deep learning project. Now he directs Baidu's AI research out of Sunnyvale, California, right in Silicon Valley.

China's success in AI has been partly fueled by the government's overall investment in scientific research at its universities. Over the past decade, government spending on research has grown by double digits on average every year. Funding of science and technology research continues to be a major priority, as outlined by the the Five-Year Plan unveiled this past March.

When Rao first started seeing Chinese researchers at international AI meetings, he recalls they were usually from Tsinghua and Peking University, considered the MIT and Harvard of China. Now, he sees papers from researchers all over the country, not just the most elite schools. Machine learning—which

includes deep learning—has been an especially popular topic lately. "The number of people who got interested in applied machine learning has tremendously increased across China," says Rao. This is the same uptick that the White House noticed in its report on a strategic plan for AI research.

Chinese tech companies are part of the infusion of research dollars to universities, too. At Hong Kong University of Science and Technology, computer scientist Qiang Yang collaborates with Tencent, which sponsors scholarships for students in his lab.

The students get access to mountains of data from WeChat, the messaging app from Tencent that is akin to Facebook, iMessage, and Venmo all rolled into one. ("With AI, they can't do it without a lot of data and a platform to test it on," says Yang, which is why industry collaboration is so key.) In return, Tencent gets a direct line to some of the most innovative research coming out of academic labs. And of course, some of these students end up working at Tencent when they graduate.

The quantity of Chinese AI research has grown dramatically, but researchers in the U.S. are still responsible for a lot of the most fundamental groundbreaking work. "The very clever ideas on changing network architecture, I see those in the U.S.," says Ng. What Chinese researchers have been very good at doing is seizing on an idea—like machine learning—and cranking out papers on its different applications.

Yet as the research matures in China, Ng says, it is also becoming its own distinct community. After a recent international meeting in Barcelona, he recalls seeing Chinese language write-ups of the talks circulate right way. He never found any in English. The language issue creates a kind of asymmetry: Chinese researchers usually speak English so they have the benefit of access to all the work disseminated in English. The English-speaking community, on the other hand, is much less likely to have access to work within the Chinese AI community.

"China has a fairly deep awareness of what's happening in the English-speaking world, but the opposite is not true," says Ng. He points out that Baidu has rolled out neural network-based machine translation and achieved speech recognition accuracy that surpassed humans—but when Google and Microsoft, respectively, did so, the American companies got a lot more publicity.

And when it comes to actually shipping new features, China companies can move more quickly. "The velocity of work is much faster in China than in most of Silicon Valley," says Ng. "When you spot a business opportunity in China, the window of time you have to respond usually very short—shorter in China than the United States."

Yang chalks it up to China's highly competitive ecosystem. WeChat, for example, has built a set of features around QR codes chat, payments, and friend discovery that make it indispensable to daily life in China. American social media companies only wish they had that kind of loyalty. "Product managers at Tencent have good sense of what customers want, and they can can quickly turn technology into reality," says Yang. "This cycle is very short." And to stay competitive, they're primed to integrate AI to improve their products. Whether Chinese tech companies use the AI wave to break into the international market remains to be seen—but they're already using AI to compete for customers in China.

Elon Musk and AI experts urge U.N. to ban artificial intelligence in weapons

Telsa and SpaceX chief Elon Musk, along with CEOs of artificial intelligence companies, warn the United Nations about dangers of AI-powered weapons.

Tracey Lien Aug. 21, 2017 Los Angeles Times

Tesla and SpaceX Chief Executive Elon Musk has joined dozens of CEOs of artificial intelligence companies in signing an open letter urging the United Nations to ban the use of AI in weapons before the technology gets out of hand.

The letter was published Monday — the same day the U.N.'s Group of Governmental Experts on Lethal Autonomous Weapons Systems was to discuss ways to protect civilians from the misuse of automated weapons. That meeting, however, has been postponed until November.

"Lethal autonomous weapons threaten to become the third revolution in warfare," read the letter, which was also signed by the chief executives of companies such as Cafe X Technologies (which built the autonomous barista) and PlusOne Robotics (whose robots automate manual labor). "Once this Pandora's box is opened, it will be hard to close. Therefore we implore the High Contracting Parties to find a way to protect us all from these dangers."

The letter's sentiments echo those in another open letter that Musk — along with more than 3,000 AI and robotics researchers, plus others such as physicist Stephen Hawking and Apple co-founder Steve Wozniak — signed nearly two years ago. In the 2015 letter, the signatories warned of the dangers of artificial intelligence in weapons, which could be used in "assassinations, destabilizing nations, subduing populations and selectively killing a particular ethnic group."

Many nations are already familiar with drone warfare, in which human-piloted drones are deployed in lieu of putting soldiers on site. Lower costs, as well as the fact that they don't risk the lives of military personnel, have contributed to their rising popularity. Future capabilities for unmanned aerial vehicles could include autonomous takeoffs and landings, while underwater drones could eventually roam the seas for weeks or months to collect data to send back to human crews on land or on ships.

Automated weapons would take things a step further, removing human intervention entirely, and potentially improving efficiency. But they could also open a whole new can of worms, according to the 2015 letter, "lowering the threshold for going to battle" and creating a global arms race in which lethal technology can be mass-produced, deployed, hacked and misused.

For example, the letter says, there could be armed quadcopters that search for and eliminate people who meet pre-defined criteria.

"Artificial intelligence technology has reached a point where the deployment of such systems is — practically, if not legally — feasible within years, not decades, and the stakes are high," the 2015 letter read. "It will only be a matter of time until they appear on the black market and in the hands of terrorists, dictators wishing to better control their populace, warlords wishing to perpetrate ethnic cleansing, etc."

Philip Finnegan, director of corporate analysis at the Teal Group, said there has been "no appetite" in the U.S. military for removing the human decision-maker from the equation and allowing robots to target foes autonomously. "The U.S. military has stressed it's not interested," he said.

Musk has long been wary of the proliferation of artificial intelligence, warning of its potential dangers as far back as 2014 when he drew a comparison between the future of AI and the film "The Terminator." Musk is also a sponsor of OpenAI, a nonprofit he co-founded with entrepreneurs such as Peter Thiel and Reid Hoffman to research and build "safe" artificial intelligence, whose benefits are "as widely and evenly distributed as possible."

Earlier this year, Musk unveiled details about his new venture Neuralink, a California company that plans to develop a device that can be implanted into the brain and help people who have certain brain injuries, such as strokes. The device would enable a person's brain to connect wirelessly with the cloud, as well as with computers and with other brains that have the implant. The end goal of the device, Musk said, is to fight potentially dangerous applications of artificial intelligence.

"We're going to have the choice of either being left behind and being effectively useless or like a pet — you know, like a house cat or something — or eventually figuring out some way to be symbiotic and merge with AI," Musk said in a story on the website Wait But Why.

Musk's views of the risks of artificial intelligence have clashed with those of Facebook's Mark Zuckerberg as well as others researching artificial intelligence. Last month, Zuckerberg called Musk's warnings overblown and described himself as "optimistic."

Legal firms unleash office automatons

Artificial intelligence is relieving junior lawyers of time-consuming tasks

MAY 16, 2016 by Jane Croft - Financial Times

Linklaters and Pinsent Masons have become the latest law firms to invest in artificial intelligence, as the legal profession tries to automate the mundane tasks that have traditionally been the preserve of junior lawyers.Linklaters has developed Verifi, a computer program that can sift through 14 UK and European regulatory registers to check client names for banks. The company said it could process thousands of names overnight.

Edward Chan, banking partner at Linklaters, said: "Previously it would have taken a trained junior lawyer an average of 12 minutes to search a single customer name. "AI is an indispensible tool for coping with the ever-growing amounts of data which lawyers have to handle in running complex matters. Our lawyers are not engineers or data scientists. Good solid legal skills remain what we look for in our lawyers."

Pinsent Masons has developed a program that reads and analyses clauses in loan agreements. Its TermFrame system also helps guide lawyers through transactions and point them towards the correct precedents at each stage of a process.

Another law firm, Dentons, has set up NextLaw Labs, a virtual company which looks at the application of technology with the law. It has invested in ROSS, an IBM Watson-powered legal adviser app that streamlines legal research, saving lawyers' time and clients' money. ROSS is currently being pilot-tested at Dentons and approximately 20 other law firms.

Professor Richard Susskind, a technology adviser to the Lord Chief Justice, has predicted radical change in the legal sector, pointing out that intelligent search systems could now outperform junior lawyers and paralegals in reviewing large sets of documents and selecting the most relevant. He told a legal conference last month that the legal profession had five years to reinvent itself from being legal advisers to legal technologists and criticised law schools for "churning out 20th-century lawyers".

A recent study by Deloitte suggested that technology has already contributed to a reduction of about 31,000 jobs in the legal sector, including roles such as legal secretaries and a further 39 per cent of jobs were at "high risk" of being made redundant by machines in the next two decades.

Many believe that AI will simply automate more routine parts of legal work so that lawyers focus on more complex, high value areas of client work. "I would liken it to mathematicians calculating sums on slide rulers before computers. Computers didn't do away with mathematicians who are probably more highly valued now than they were before," said Orlando Conetta, a computer scientist and head of research and development at Pinsents.

Robots can reverse UK state pension age rise — TUC

Unions say technology is a chance to raise standard of living for working people

SEPTEMBER 4, 2017 by Josephine Cumbo, Financial Times

The economic gains from the spread of robots in the workforce should be used to reverse planned rises in the state pension age for millions in their forties, according to the UK's biggest trade union body. The Trades Union Congress, which represents 5.6m workers in 50 unions, made the call in a new report which suggested that artificial intelligence, digitisation and robotics be used to help tackle the challenges of an ageing population.

During a period of "profound and rapid" technological change, robots on assembly lines or self-service checkouts were "very visible manifestations of this new industrial revolution", the report said. It added that there was also growing evidence that new technology would also change the way we work, in sectors where human interaction is key, such as education, health and social care.

But rather than viewing robots and artificial intelligence as a threat, the TUC said the productivity and economic gains that new technology bring could be used to lengthen retirement for workers. "Robots and AI [artifical intelligence] could let us produce more for less, boosting national prosperity," said Frances O'Grady, general secretary of the TUC. "But we need a debate about who benefits from this wealth, and how workers get a fair share. We should look on the changes ahead as an opportunity to improve the lives of working people and their families."

In its report, "Shaping our digital future", the TUC said the gains to the economy from technological change should be used to reverse policies to increase the state pension age. In July, the government announced that Britons born between 1970 and 1978 will have to wait until they are 68, up from 67, to claim their state pension. This rise, to take place between 2037 and 2039, comes seven years faster than previously planned and will affect about 7m people now aged in their late thirties to later forties.

"At present, government is suggesting saving 0.3 per cent of gross domestic product in 2066/67 by bringing forward increases in the state pension age to 68 for workers now in their forties," said the TUC. "Estimates of the productivity gain from artificial intelligence dwarf that figure, with PwC [the professional services group] suggesting a 10 per cent boost to GDP by 2030 as a result of artificial intelligence. If we do see those benefits arrive, reversing increases in the state pension age and enabling more people to enjoy a decent retirement should be a priority."

The government has said the timetable for the state pension age rise from 67 to 68 will be confirmed in 2023, when the next pension age review is completed. Kate Smith, head of pensions with Aegon, the pension provider, said greater use of technology should allow people to remain economically active, working in less stressful and physically demanding jobs for longer. "This may give people more flexibility when they wish to retire," said Ms Smith. "Technology (also) has the potential to create greater workforce productivity, which has been a continual sticking point in recent years. Greater productivity is typically associated with higher wages that should be shared across society and enable greater long-term saving by individuals."

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Robots could destabilise world through war and unemployment, says UN

United Nations opens new centre in Netherlands to monitor artificial intelligence and predict possible threats

Daniel Boffey in Brussels 27 September 2017 The Guardian

The UN has warned that robots could destabilise the world ahead of the opening of a headquarters in The Hague to monitor developments in artificial intelligence. From the risk of mass unemployment to the deployment of autonomous robotics by criminal organisations or rogue states, the new Centre for Artificial Intelligence and Robotics has been set the goal of second-guessing the possible threats.

It is estimated that 30% of jobs in Britain are potentially under threat from breakthroughs in artificial intelligence, according to the consultancy firm PwC. In some sectors half the jobs could go. A recent study by the International Bar Association claimed robotics could force governments to legislate for quotas of human workers.

Meanwhile nations seeking to develop autonomous weapons technology, with the capability to independently determine their courses of action without the need for human control, include the US, China, Russia and Israel.

Irakli Beridze, senior strategic adviser at the United Nations Interregional Crime and Justice Research Institute, said the new team based in the Netherlands would also seek to come up with ideas as to how advances in the field could be exploited to help achieve the UN's targets. He also said there were great risks associated with developments in the technology that needed to be addressed.

"If societies do not adapt quickly enough, this can cause instability," Beridze told the Dutch newspaper de Telegraaf. "One of our most important tasks is to set up a network of experts from business, knowledge institutes, civil society organisations and governments. We certainly do not want to plead for a ban or a brake on technologies. We will also explore how new technology can contribute to the sustainable development goals of the UN. For this we want to start concrete projects. We will not be a talking club."

In August more than 100 robotics and artificial intelligence leaders, including the billionaire head of Tesla, Elon Musk, urged the UN to take action against the dangers of the use of artificial intelligence in weaponry, sometimes referred to as "killer robots". They wrote: "Lethal autonomous weapons threaten to become the third revolution in warfare. Once developed, they will permit armed conflict to be fought at a scale greater than ever, and at time scales faster than humans can comprehend. These can be weapons of terror, weapons that despots and terrorists use against innocent populations, and weapons hacked to behave in undesirable ways." Last year Prof Stephen Hawking warned that powerful artificial intelligence would prove to be "either the best or the worst thing ever to happen to humanity".

An agreement was sealed with the Dutch government earlier this year for the UN office, which will have a small staff in its early stages, to be based in The Hague. Beridze said: "Various UN organisations have projects on robotic and artificial intelligence research, such as the expert group on autonomous military robots of the convention on conventional weapons. These are temporary initiatives."Our centre is the first permanent UN office for this theme. We look at both the risks and the benefits."

Using AI to detect cancer, not just cats

May 11, 2017 Wired

SHAOKANG WANG AND his startup, Infervision, build algorithms that read X-ray images and identify early signs of lung cancer. The company's technology, Wang says, is already running inside four of the largest hospitals in China. Two are merely running tests, but according to Wang, the two others—Shanghai Changzheng and Tongji, both in Shanghai—are installing the technology across their operations. "It's installed on every doctor's machine," he says.

To what extent these doctors are actually using the technology is another question. In the world of health care, artificial intelligence is still in its infancy. But the idea is spreading.

At two hospitals in India, Google is now testing technology that can identify signs of diabetic blindness in eye scans. And just last week, the data science competition site Kaggle announced the winners of a $1 million contest in which more than 10,000 researchers competed to build machine learning models that could detect lung cancer from CT scans. The winning algorithms will feed work at the National Cancer Institute to more rapidly and effectively diagnose lung cancer, the leading cancerous killer in the US among both men and women. "We want to take these solutions further," says Keyvan Farahani, a program director at the institute.

Deploying such AI on a large scale—across hospitals, for instance—is still enormously difficult, says Dr. George Shih, a physician and professor at Weill Cornell Graduate School of Medical Sciences, and the co-founder of MD.ai, a company that participated in the Kaggle contest. Aggregating all the necessary data is enormously complicated, not to mention the difficulty that comes with just trying to plug this technology into existing systems and day-to-day operations. But Shih believes that today's best algorithms are already accurate enough to drive commercial products. "We're probably only a few years away from more massive deployments," he says.

The rise of these systems is powered by the rise of deep neural networks, complex mathematical systems that can learn tasks on their own by analyzing vast amounts of data. This is an old idea, dating back to the 1950s, but now that operations like Google and Facebook have access to such enormous amounts of data and computing power, neural networks can achieve far more than they could in the past. Among other things, they can accurately recognize faces and objects in photos. And they can identify signs of disease and illness in medical scans.

Just as a neural network can identify a cat in a snapshot of your living room, it can identify tiny aneurysms in eye scans or pinpoint nodules in CT scans of the lungs. Basically, after analyzing thousands of images that contain such nodules, it can learn to identify them on its own. Through the Kaggle contest, run in tandem with the tech-minded consultancy Booz Allen, thousands of data scientists competed to build the most accurate neural networks for the task.

Before a neural network can start learning the task from a collection of images, trained doctors must label them—that is, use their human intelligence and knowledge to identify the images that show signs of lung cancer. But once that's done, building these systems is more computer science than medicine.

Case in point: The winners of the Kaggle prize—Liao Fangzhou and Zhe Li, two researchers at Tsinghua University in China—have no formal medical training.

Physician's Assistant

Still, these AI technologies won't completely replace trained doctors. "This is still only a small part of what radiologists or doctors do," Shih says. "There are dozens of other pathologies that we are still responsible for." New AI systems will examine scans faster and with greater accuracy before doctors explore the patient's situation in more detail. These AI assistants will ideally reduce health care costs, since screenings require so much time from doctors, who may also make mistakes.

According to Shih and others, doctors don't make many false negative diagnoses—failing to identify signs of cancer in a scan. But false positives are a problem. Hospitals often end up spending time and money tracking the progress of patients who don't need such close care. "The issue with lung cancer screening is that it's very expensive," Shih says. "The big goal is: How do you minimize that?"

Shih's company aims to build services for collecting and labeling data that researchers and companies can then use to train neural networks, not just for cancer detection but for many other tasks as well. He acknowledges that this kind of AI is only just getting started. But he believes it will fundamentally change the field of health care, particularly in the developing world, where trained doctors aren't as prevalent. Over the next few years, he says, researchers aren't likely to build an AI that's better at detecting lung cancer than the very best doctors. But even if machines can top the performance of even some of them, that could change the way hospitals operate, one scan at a time.