The Race for Artificial Intelligence

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Abstract

As witnessed in the 1927 film *Metropolis* and in numerous novels before, the concept of the Artificial Intelligence threat is not new. However, the threat of Artificial Intelligence has not changed dramatically throughout the decades. Instead, it is becoming a greater reality. In 2016, developers from Google created an advancement that changed the world. Upon showcasing their Artificial Intelligence name 'DeepMind' in a public expo, governments and corporations around the world instantly became interested in the effects that this creation can bring. However, this zero-sum race to develop the first "strong AI" will have immense ramifications throughout the world. This paper will explore the geopolitical impact of Artificial Intelligence at both, the domestic and international, levels. Furthermore, the paper explores the various nations leading in Artificial development and the potential they have in their quest for Artificial Intelligence dominance. More specifically, as the United States and China are the current leaders in Artificial Intelligence research and development, the majority of this paper will analyze the effect Artificial Intelligence will have in the future between and within these two nations.

Introduction

"Artificial intelligence is the future... for all humankind. It comes with colossal opportunities, but also threats that are difficult to predict. Whoever becomes the leader in this sphere will become the ruler of the world." - Russian President Vladimir Putin

In 2016, Google engineers pioneered the beginnings of modern artificial intelligence development. Under the company called "DeepMind", the engineers constructed "AlphaGo" to showcase the power Artificial intelligence can have. Through a process of machine learning, AlphaGo was fed many Go games and was able to compete at a competitive level. This was showcased in 2016 in the Google DeepMind Challenge Match where AlphaGo won against 18 time world champion Lee Sodel. Unlike former computers, AlphaGo's use of neural networks meant that it "learned" how the game was played and was able to out compute a human (Xu). This testament began a shift in the global mindset towards Artificial intelligence.

The Google DeepMind Challenge Match became a landmark in Artificial Intelligence development. Soon afterwards, many governments and corporations became interested in how such computational power can be put to use. Thus began the race for Artificial Intelligence dominance.

At the time of this paper, there are two clear leaders in Artificial Intelligence development, the first being the United States and the second China. These two counties have dedicated a significant amount of resources to develop Artificial Intelligence. This has fostered a new great-power competition that pits two very diverse ideologies against one another. With China posed to become an Artificial Intelligence superpower by 2030, the timeline is short between these two world powers (Goujon). This will be explored in the later sections.

Potential for Artificial Intelligence within Industries

The race for completing the first real AI is a critical point in humanity's societal and technological evolution, as it has the potential to redefine the structure of modern society by streamlining nearly every factor associated with modern society and governance. Among the most recent developments of civilization stands mass surveillance, which currently revolves around networks of cameras and programs that collect keywords from calls, tweets, messages, and other forms of communications data. However, this data is normally analyzed by people to identify real and potential threats. AI promises to cut out the middle man, and bridges the gap between surveillance and action. Already, corporations are pursuing the means towards minimizing costs through automation, but one company, Anduril Industries, promises AI for federal government use. Anduril is currently working on numerous projects, but perhaps the most ambitious one is their virtual border wall.

The virtual border wall is a project that has been in development since June, 2020, in cooperation between Anduril and US Customs and Border Protection. It is a project that has received bipartisan support, which only lends to its feasibility and efficiency. The project intends to create a large network of solar powered sensor towers that are managed by their proprietary Lattice Platform, a software that approaches true AI by utilizing a fusion of sensors, machine learning and a massive mesh network between all operating instances in order to create a single autonomous operating system capable not only of collecting surrounding thermal signatures, but also using its machine learning functions to differentiate between wildlife and people. With this

network established, the United States will be able to drastically reduce the operating cost of border protection, which will allow funds to be allocated elsewhere.

Furthermore, Anduril has been contracted by the US Air Force and the UK Royal Navy to create automated surveillance mechanisms capable of maintaining constant watch over battlefield conditions and hostile territories 24/7, which frees up a great deal of already limited manpower that would have been wasted on patrolling vast quantities of land. Already, "the artificial intelligence and ISR systems from Anduril are game changing technologies for the Royal Marines Future Commando Force. Anduril is now part of the UK NavyX accelerator program to get battle winning technology straight into the hands of our warfighters," said Colonel Dan Cheeseman, Royal Navy Chief Technology Officer (Allison). AI promises to deliver war changing tactical information to deployed units in a matter of minutes, which allows whichever force that controls a suitable AI to counter any attempted hostile maneuvers. True AI systems could scout an entire country and map out ambushes, IEDs, and hostile bases at rates faster than any human-only force could ever attain, which will reduce casualties and will make guerilla warfare almost obsolete

In addition to the socio-political effects of Artificial Intelligence, AI has the potential to change the health and science sectors as well. In the biotech industry, Artificial Intelligence could be harnessed to detect various diseases. Research done under Cardiff University found that the potential for AI in detection can provide better risk assessments to patients and prolong patient lives. Aside from the diagnosis and prognosis benefits, AI can help reduce hospital costs and reduce medicare costs (Cardiff University). In addition, Artificial Intelligence can be uniquely used for disease mapping. This can help track a pandemic and provide essential data at hyper-speeds. Artificial Intelligence can also transform the process of how to fight pandemics too. Instead of a passive approach, AI can predict future models for disease spread and analyze the effectiveness of various counter-measures (Mahmoud AAF and Pray LA).

With the ease of data mapping explained earlier, AI has the potential to revolutionize current climate sciences. Machine learning can help understand the current state of the environment and predict weather patterns. This will provide effect tools necessary to stall the current climate trajectory. Furthermore, the possibility of new products and services that AI brings to the table can help minimize humanity's climate footprint and potentially reverse climate trajectories (Marr).

United States

The United States has been seen as a forerunner in developing innovative technologies for a long time. In the context of Artificial Intelligence, it is no different. Recent data shows that the United States still has the largest amount of AI startups in the world and is considered to have a far more nurturing economy for growth in AI development (Barhat) (Chun). Furthermore, a recent Stanford report recognized that the United States has more conference papers in Artificial Intelligence. In addition, a majority of AI Ph.D. graduates in the United States are from abroad (Zhang et al.). This creates an interesting dynamic of outside influence in AI development within the United States.

In regards to social and political views about Artificial Intelligence, the United States has similar (if not the same) views about AI and AI development as other western nations. In terms of military capabilities, the United States primarily views AI as an enabler and as a means of data analysis. Many reports on AI being used in the US military have been on tracking targets and

generally reconnaissance activities (Siddiqui). Furthermore, the current ecosystem of the United States economy fosters open dialogue and communication. This ecosystem not only provides clarity in AI development, but it also promotes discussion in AI ethics (Kania). This is valuable because it can promote healthy AI development.

During the Trump Administration, there were significant pushes for AI development. Specifically, under a massive initiative by the administration, AI funding and development became more streamlined under the creation of the National Artificial Intelligence Initiative Office under the National Defense Authorization Act for Fiscal Year 2021. The administration pushed to create a coalition between the private, public and academic sectors in order to develop AI faster. Furthermore, under the administration, there was a large push for allocating more research and development spending towards AI (Cordell). However, as mentioned earlier, most of the research done on AI has been by foreign graduates. Given the administration's harsh rhetoric and actions on immigration policy, the administration potentially reduced its potential in achieving effective AI development by dissuading or barring potential experts from entering the nation and contributing to the United States' intellectual capital.

With the new administration illustrating new goals in regards to AI, a few steps would be beneficial for keeping the US at the forefront of AI development. The utmost priority should be on further development of AI ethics domestically and abroad. This could counter potentially unethical uses of Artificial Intelligence, such as mass surveillance that infringes on civil liberties or espionage against other nations, and promote safe development of AI. Given the United States's standing in international law and various multilateral institutions, the United States should promote its engagement in various institutions to enforce ethical uses of artificial intelligence. Furthermore, developing pathlines to foster more domestic graduates can help the United States to be sustainable in this endeavour. The other option would be to ease immigration policy for these individuals. A streamlined and more attainable path to citizenship would provide a large incentive for attracting more of these high-skilled workers from abroad. However, the large dependency of foreign graduates puts the US in a dependent position in future AI development. In addition, the writing above indicates that the main aspect of the United States in being ahead in this race is because of its relatively democratic ecosystem. Promoting that ecosystem can help promote further AI start-ups.

Also, it is paramount that the United States employs a massive effort to strengthen its cybersecurity capabilities. Over the last decade, cyber attacks have steadily been rising internationally from nearly every direction. Between Russian hackers constantly probing and striking at US systems, terrorist groups attacking telecom companies, and Chinese corporate espionage (CSIS), US research is far from safe. If the United States is to maintain its lead in AI, it needs to create active measures for monitoring any breaches in cybersecurity as the consequences of detecting them too late could be severe. Some have put forward the idea of utilizing AI research to create automated defenses against cyberattacks; using AI to protect current AI research as well as the rest of the nation, which will strengthen current cybersecurity protocols if implemented correctly, but achieving a functional and secure implementation, especially while the US still has yet to develop a true AI, will be a great challenge. Among the most glaring flaws of making a totally automated cybersecurity system is that the program will become a very clear target for hackers, and even one successful attack could cripple the nation's cybersecurity capabilities, leaving a wealth of data and research unprotected. At the moment, the US has yet to create any meaningful solutions to this critical issue, with the National Security

Commision on Artificial Intelligence saying that AI processes, functions, and parameters need to be properly documented in a transparent and standardized manner so that all AIs may be properly audited, however they have yet to indicate how this documentation should actually be used in order to improve cybersecurity. While the NSCAI has not elaborated on how detailed documentation aids in maintaining security, proper documentation is still key to maintaining the integrity of AI and preventing hacking. The best use of this documentation would be to pursue a policy of accountability where AI developers make the details of their programs readily available so as to facilitate third party stress testing and vulnerability probing (Wolff). Only if the US maintains a free and innovative sphere where AI security may constantly be challenged and advanced will it be able to preserve its lead in the current AI race.

More physical threats also exist to the United States' AI lead. History has shown that research that can be stolen in order to bolster the capabilities of a foreign actor. The most notable and pervasive threat of this comes from both the Chinese government and their tech giants. For example, in 2019, the US Justice Department charged the company Huawei with deliberately incentivising theft of foreign technology by offering employees a substantial bonus if they were able to procure foreign technologies; in this case the theft was of telecommunications technology from T-Mobile. Later, in 2020, it was found that Charles Lieber, head of Harvard University's chemistry department, lied about receiving money from the Chinese government while receiving a federal grant. As a pioneer in the field of nanotechnology, Lieber is the most prominent individual to date that the CCP has managed to buy out onto their side of the tech rivalry (Holt). While there are not any known instances of AI espionage by the Chinese government, their "whole of society" espionage strategy, as well as their dedication to rapid AI development and dominance, are strong indicators that the Chinese government is attempting to to infiltrate and subvert US research programs. The "whole of society" approach focuses on accepting anyone as a field agent towards the goal of having an overwhelmingly high volume of implanted people throughout all strata of a target country pursuing their ends (Eftimiades) In order to counter this program, the US government needs to either attempt its own infiltration of Chinese intelligence operations in order to root out agents and compromised individuals, or closely monitor anyone across both the public and private sectors that is involved in critical AI research. Also, a strong working relationship between the public and private sector is necessary to ensure that corporate entities do not misuse AI data. However, the US should take caution, as witch hunts and paranoia against researchers may prevent espionage but will ultimately hamper both the speed and quality of AI research, in a similar way to how McCarthyism led to a period of paranoia and ideological conformity that shook people's ability to cooperate.

China

The Chinese Communist Party rules with a focus on driving the nation forward in one direction, without deviation, that will ultimately result in the nation's dominance of the international geopolitical stage. The CCP has historically viewed AI as a tool towards consolidating their power and as a weapon, where other nations focus on the benefits to scientific development. Among the many tools of the CCP's arsenal is the system of civil-military relations(CMR), which is based on the joint focus and cooperation of civilian and defense industries in order to advance one goal. This system is dangerous, as it promotes China's development of an aggressive AI (Allen). The CMR system also makes Chinese AI development

unpredictable, because "[the] same facility might support testing of a luxury self-driving car one week, and a self-driving tank the next" (Allen).

In theory, all of Chinese society operating towards one goal, in this case the development of a true AI, is a scientific and industrial machine that is poised to overtake the US in AI development within the next decade, should they meet the goals outlined in their 2017 AI Development Plan (AIDP). That goal is to surpass the United States by 2025, and to become the uncontested primary center of AI innovation in the world by 2030.

In the pursuit of this goal, China has taken several steps towards advancing their interests. First, the CCP adopted a "wish list" of AI technologies and functions that prompted 15 of 31 local provincial governments in China to establish their AI plans following the AIDP's announcement. This has created a massive flow of both local and national government funding towards AI. They have also created a "national team" of tech giants (Baidu, Alibaba, Tencent) and innovative startups (iFlytek) in 2017, with facial recognition startup Sensetime being included in 2018 and 10 companies in 2019, including tech titans (Huawei, JD.com, Xiaomi and other) in order to coordinate AI development across China's largest and most innovative hybrid firms (Dai). While these companies still compete with each other in numerous fields, the CCP's ownership of portions of these companies will ensure that they are still able to make joint headway in the future.

Second, the Chinese government has opted to learn from past mistakes, such as their 2014 semiconductor plan, and has made the standardization of AI research a priority within the nation. On page six of the 2018 AI Standardization White Paper, a Chinese document outlining standardized guidelines for domestic AI development, it states that "AI standardization is still in its infancy, and this white paper only serves as an initial link connecting AI technologies, AI industries, and standardization. It will be revised constantly in the future based on the developing requirements of technologies, industries, and standardization" (CESI), which illustrates the forward thinking and innovative approach that China is taking towards AI development, as they were already laying the groundwork for their coordinated development in 2018, while remaining cognizant of the constantly shifting demands and dilemmas that arise over the course of any project. This flexible approach stands in sharp contrast to the US which has yet to take any definitive steps towards creating a focused AI policy.

Third, China has recognized the human capital necessary to maintain pace with the US and has taken proactive steps to recruit and train AI specialists both domestically and abroad. The AIDP focuses on both "gathering" manpower by establishing international research centers abroad in order to recruit foreign specialists that could spur innovation, while also establishing a "training" approach in the long term, which begins at the creation of the "Intelligent Science and Technology major" that has been adopted by over 50 universities with the goal of cultivating environments that will eventually allow China to have a massive, highly skilled pool of domestic AI experts, which they currently severely lack (Ding).

These programs are already bearing fruit From 2017 to 2020, China surpassed the US in quantity of academic journals being published in regards to AI technologies (Zhang). While some will be quick to point out that the quality of these journals is sub par, given that these papers are rarely cited while US papers are some of the most cited in the world, the Chinese government is already trying to rectify this issue through their "gathering and training" approach. China is building a very large foundational infrastructure for future AI research that is ready to accommodate any experts they may recruit or train in the future.

The Chinese government has pursued AI development vigorously, though in their efforts towards being the first to develop AI, they have neglected dialogues on the ethical questions associated with AI development. The West has for the most part committed to avoiding the development of AI weaponry and promoting testing AI in a safe manner, while also thinking about the potential of AI sentience. No such dialogue has been popularized in China. Its disregard for the ethical components of AI development has the potential for many unintended side effects. Among these side effects is the threat of rogue AI, or an AI which has deviated from its directives and is instead a potential threat to all computerized systems, which would have the capabilities of compromising entire systems internationally due to the interconnected nature of the internet (The Economist).

In the past, China's large technological projects have run into many pitfalls. As shown by their 2014 semiconductor fund, the CCP is more than capable of setting ambitious goals, though delivering on them has proven more difficult. The 2014 plan illustrated that the politicized nature of Chinese research has prevented real progress, as fundings were typically allocated towards politically connected research institutions rather than those that have shown merit in R&D. Also, they failed to allocate the promised funds towards research institutes, giving only a fraction of the $150 billion promised. Finally, the local governments were also associated with this project, and the local projects often resulted in duplicates and shoddy works (Ding).

In order to succeed this time, the CCP will need to maintain accountability while also cracking down on local corruption. Furthermore, they will need to deliver on the promised funds while also allocating the money to institutions that show the most potential, rewarding skill and innovation over party connections. Also, a rogue AI could cripple a nation if they are incapable of containing it, so the CCP needs to ensure that ethical and safety questions are asked and answered throughout the entire development process. Above all, the Chinese government needs to be cautious about their "wishlist", as groups rushing to curry favor will rush out these projects without proper testing. If the CCP could properly foster the cooperation that they are trying to build through the national team, it may avoid the issues of duplication and politically motivated rushed projects, which would set them on a steady path towards properly harnessing the powers of AI.

Areas of Escalation

As the race for creating artificial intelligence becomes the new cold war, this competition creates the situations for various potentials of conflict escalation to occur. Four primary issues with the current race for AI supremacy are: Hyper-war, Nuclear deterrence, Unipolarity, and Rogue AI.

As explained previously, China's current vision of Artificial intelligence is a view towards an integration of civilian and militaristic technology. This push changes how AI will be viewed. This push towards civil-military fusion changes warfare from informatized warfare to what PLA thinkers call "intelligentized" warfare. Not only would this type of artificial intelligence promote authoritarianism by offering AI as a means of militaristic control, but it also changes how future AI will be developed. By viewing AI as a militaristic tool, other nations will promote its use as the same. That would change AI from a tool of peaceful change to an offensive weapon (Kania). This causes issues because the change in how other nations view AI can lead to full scale arms-race similar to the ColdWar. Only by disentangling military applications from AI and clearly separating those two can AI be developed safely. Furthermore,

opening dialogues and providing deep engagement can provide engagements on the risks towards security applications that AI poses. However, this is not the case in the status-quo. As AI becomes more dual-use and entangled with militaristic applications, it risks sparking a new arms-race dynamic (Kania). The issue of a strong militaristic approach towards Artificial Intelligence is that it risks removing the human factor in warfare and pushes for rapid response without evaluating consequences. This hyper-speed can accelerate war into a hyper-war. Not only will this risk miscalculations that can lead to annihilation, but it also risks a world where there is no human safeguard as a fail safe. Only by promoting safe democratic development of artificial intelligence can it be possible to slowly integrate its power to provide stability in the future (Siddiqui).

Aside from the possibilities of hyper-war, Artificial intelligence has the potential to change current nuclear deterrence policies and has the possibility to create shifts with the current unipolar system. In the aspect of nuclear deterrence, AI provides the chance for other nations to circumvent traditional modes of nuclear deterrence due to the diverse applications it can provide from automation to cybersecurity. AI cyberweapons can cripple key infrastructure through its fast computation and rapid response times. Due to the effectiveness that AI provides, it may be possible that AI can guarantee nuclear and non-nuclear retaliation, and strengthen a nation's deterrent capabilities (Straub). This change in deterrence policy might shift how great-powers view each other and provide the rise of other powers.

In addition to the change in deterrence policies, Artificial intelligence has the potential to change the current unipolar order. Not only through the economic means as explained earlier, but also through the militaristic means as well. AI is considered by many to be a conflict enabler, since it allows conflict to happen with increased effectiveness. By shifting through data at hyper-speeds, AI can provide speed and accuracy to planning wars. This can provide sustainability for military overreach for a Unipole. By providing effective decision-making, this can help reduce costs and allow shifting resources to hotspots. Furthermore, it allows change in command and control centers to exercise real time control and transform electronic warfare. However, this means of control and military power can disrupt the global order. If another nation develops AI first, it can disrupt and potentially upend the current United States military supremacy (Horowitz) (Valantin).

Another issue that might arise during the race for AI supremacy is the potential for rogue AI development to occur. The current lack of strict ethics in the current state of artificial intelligence development poses a risk for other nations to unintentionally create a rogue system that can develop ungoverned. This poses a risk to the global system. One scenario can potentially become a Terminator-like plot (Siddiqui).

Conclusion

Artificial intelligence will soon shift the international balance of power in favor of whichever nation is able to properly harness it first. It has the potential to revolutionize daily life if handled properly, however the advances that will likely develop in surveillance technology are vulnerable to being misused. In addition, the potential in data analysis by AI can reshape current biotech industries by developing solutions and promoting hospital efficiencies. The current status-quo showcases a race of AI supremacy between the United States and China. Both nations have the same drive to develop AI, but they have different views of it. While the United States views AI primarily as a means of data processing, the current view of the Chinese AI industry is

the militaristic fusion of AI. This race can pose significant effects in the future. Focused development of civil-military fused AI systems can spark a new arms-race for autonomous weapons, which can cause “hyper-war”. It can also shift the current unipolar system by upending traditional modes of deterrence and disrupting current United States military superiority. Conversely, it can also strengthen the current geopolitical order and allow the United States a path to a sustainable hegemony. All in all, artificial intelligence will change the geopolitical landscape in the future. Without a strong base for ethics, the race for AI runs the possibility of posing an existential risk. Strong efforts need to be maintained among all parties interested in AI development in order to maintain the stable and safe growth of AI technology so that it may be used for humanity’s advancement in the future, instead of its regression.

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