ARTIFICIAL INTELLIGENCE ON THE BATTLEFIELD

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Abstract: AI is becoming omnipresent in day-to-day existence. An increasing number of robotic vehicles and autonomous weapons can operate in combat zones too hazardous for human combatants. Intelligent defensive systems are progressively ready to recognize, investigate, and answer attacks quicker and more successfully than human administrators can. Artificial intelligence has burst upon the national-security scene with suddenness and intensity. This spike of interest is driven to some extent by the individuals who view AI as a progressive innovation, comparable to the discovery of fire, electricity, or nuclear weapons. This paper discusses background of AI, the benefits, and risks of AI in warfare, how can AI help in battlefield health care, and a brief study of two prominent AI wars.There are some genuine qualms about the legal and ethical implications of military forces using AI in war or even to upgrade security in peacetime. The most obnoxious protests have spun around the possibilities of machines killing individuals without the direct endorsement of human operators and, possibly, even without their oversight or capacity to intercede assuming that weapons select some unacceptable targets. Intelligent defensive systems are progressively ready to recognize, investigate, and answer attacks quicker and more successfully than human administrators can.

IndexTerms: Artificial intelligence,Big data,Machine learning

I.INTRODUCTION

"Whoever rules the waves, rules the world"

-Alfred Mahan

The field of Artificial Intelligence has advanced at an ever-increasing pace over the last two decades. Accordingly, advances utilizing AI have already contacted numerous parts of our lifestyles. Smartphones, mobile mapping and navigation systems, natural language interaction with computers, targeted online marketing, and tailored information campaigns in social media are   a few of the many ways that AI is becoming omnipresent in day-to-day existence. The manifestation of AI is inspiring worldwide powers to set themselves up to control and maneuver trend-setting innovations. The prevalence of AI is the new paradigm in the middle between superpowers.

It ought to be no big surprise, then, that AI offers great promise for national defense. Furthermore, big data analysis and decision support systems offer the guarantee of processing volumes of data that no gathering of human analysts, but enormous, could consume and in this way assist military decision-makers with picking better game plans more quickly. Therefore, the United States, China, Russia, and other high-level military powers are creating military applications for AI [1]. This could change the very character of warfare in the coming years, actually, it already happened during the recent battle between Russia and Ukraine.
Repeating the nineteenth-century maritime specialist Alfred Mahan ("Whoever governs the waves manages the world"), Russian President Putin has stated that the country that guidelines in AI "will be the leader of the world" [2]. China's leader is less frank on this, however, has committed China to turning into the prevailing AI power by 2030 [3]. There are mounting fears of a "Sputnik moment," which could uncover many nations to tragically be underprepared to oversee new AI challenges.
But thoughtful people have communicated genuine qualms about the legal and ethical implications of military forces using AI in war or even to upgrade security in peacetime. The most obnoxious protests have spun around the possibilities of machines killing individuals without the direct endorsement of human operators and, possibly, even without their oversight or capacity to intercede assuming that weapons select some unacceptable targets.
The recent Russia Ukraine war is the muse of this paper. This paper discusses how AI technology used on the battlefield impacts our social and political environment. Are assumptions for progressive AI sound? Will the outcomes demonstrate positive, negative, or maybe both for national security and international stability? We can expect conclusive responses to these inquiries will come to fruition in the coming years, as we gain a superior enthusiasm for the possible military utilization of Artificial intelligence.

II. LITERATURE REVIEW

BACKGROUND

Many individuals attribute the introduction of AI to Alan Turing's 1950 article, "Computing Machinery and Intelligence." In it, Turing, a prominent mathematician, offered the conversation starter of whether machines could at any point have the option to think. Then, rapidly disposing of the inquiry as too obscure on definitional grounds — all things considered, what is thinking, precisely? — he proposed what he called the "imitation game." It is also known as the "Turing test", he portrayed placing a PC in one room and a man in another. The man would suggest a progression of conversation starters intended to decide if he was conversing with a machine or with another man. That's what turing attested, in time, a PC could be programmed to address questions so well that it would be indistinct from a human respondent. In any case, does that mean the PC could have the option or ability to think? Turing inferred that it doesn't exactly make any difference[4].

The term artificial intelligence was first utilized as a title for a conference held at Dartmouth College in 1955. Also, in the years since, progress in AI research has gone through apparent patterns of a boom. Meanwhile, a wide scope of military frameworks turned out to be progressively automated without being related, in the vast majority's brains, to AI. In the 1940s, a few aircraft and air defense radars were outfitted with transponders by which radar administrators and the radar systems themselves could examine the aircraft they were following to decide if they were cordial or hostile[5].

Throughout the following years, air defense systems turned out to be progressively refined and had the option to suggest commitment choices or even draw in focus without human intervention. In any case, such frameworks, however progressively independent, didn't lead to nervousness about "killer robots" going crazy, because the extent of their decision-making abilities was so narrow[6].

Be that as it may, a critical leap forwards in AI research and development (R&D) started happening in the last part of the 1990s, and the speed of advances in this field has been speeding up in the years since.The main achievement that caught inescapable public attention was in 1997, when IBM's intelligent system, Big Blue, crushed then-world chess champion Gary Kasparov in a six-game match. In 2016, Google DeepMind's AlphaGo framework crushed Lee Sedol, the world's top player in the Asian round of Go, four games to one[7]. This advance mirrors a basic contrast in a way to deal with the improvement of AI as of late.

While early AI focused on programming and computational complexity, current methodologies center around machine learning.In the years since Big Blue's victory, AI research has made sensational advances in the fields of computer vision, robotics, and speech recognition.

These turns of events, when coordinated with recently referenced signs of progress, like computer reasoning, image recognition, and precision-guided munitions, raise possibilities for rapid progress in the development of military applications of AI. Big data processing of intelligence, surveillance, and reconnaissance (ISR), sophisticated decision support systems, robotic combat vehicles in all domains, and autonomous weapons are all now within reach; a few applications are now accessible. One of the most recent capacities to arise is robotic swarming in which huge quantities of independent vehicles or weapons are customized with decides that, when applied in total by the whole gathering, can display impacts of scale and a few rising ways of behaving that make them substantially more successful in battle than would be conceivable by a similar number of gadgets under human control[8].

Benefits of Artificial Intelligence in Warfare

The advantages of AI on the battlefield are frequently expected but not explicitly expressed. Experts interviews are very useful to identify the benefits of military applications. Figure 1 shows the counts for the quantity of advantages interviewees proposed in every class. The following Figure 1 is from the book "The military application of artificial intelligence".
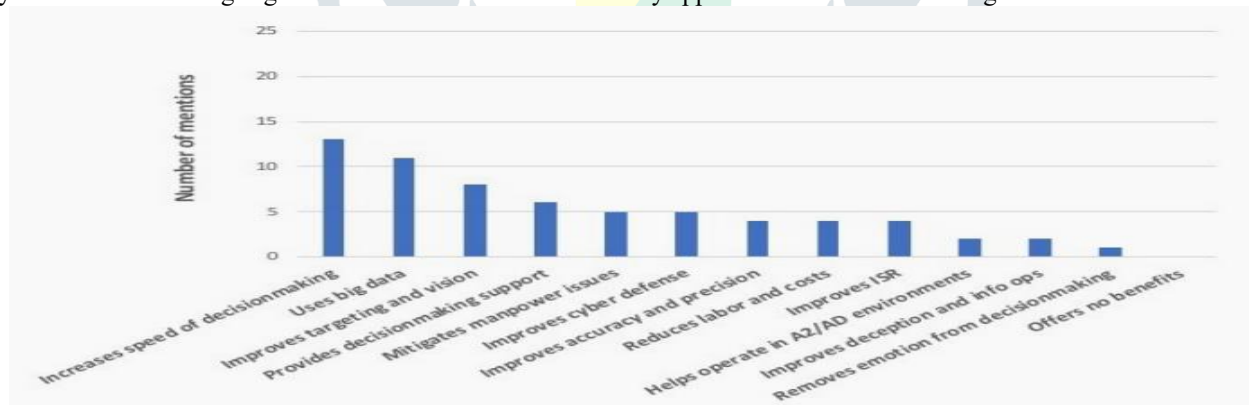

figure 1. Benefits of Military Applications of Artificial Intelligence Identified from available expert Interviews

Speed of Decision Making : The main advantage of AI on the battlefield is speed. Interviewees frequently talked about this concerning the OODA loop, with the thought being that assuming it is feasible to cycle through the OODA loop quicker than one's enemies, then they will not be able to perform the counteractions expected to defend against one's ambush or to produce their own hostile choices fast enough to outperform counteractions.

There are situations where this sort of benefit can be imagined; nonetheless, it is additionally essential to remember that courses of events are not generally overwhelmed by the decision processes that AI can help accelerate. Frequently the courses of events are overwhelmed when it takes to move equipment or individuals or even the time that weapons are moving to targets. It is significant not to exaggerate the benefit of speeding up the decision in these cases.

Use of Big Data: Big data is usually used to describe data that are sized too large to be stored on a memory of a computer, are produced too fastly to be controlled by a single computer, or take multiple forms or formats. Due to these problems, it can be challenging for humans to make sense of the information that is stored in the data, but machines and AI tend to perform essentially the more data made available. The huge volume of information being collected by various sensors is more than a human or group of humans can examine.

Improved Targeting and Vision : Image-processing is one of the areas where data is overloaded. The number of cameras conducting surveillance in domestic and foreign environments has developed rapidly. There is a clear motivation and need for

automation in the process of analyzing incoming video and imagery. Automated image recognition and object-detection capabilities have excelled human ability in at least a few situations. There is an expectation that these systems will increasingly be able to identify objects that humans might miss. This is also the case for AI that detects skin cancer from images, and it is not wrong to expect the same from AI for counterterrorism or military applications[9]. The progress in facial recognition can be applied for fastly identifying terrorists or known combatants, and facial expression analysis can help alert soldiers to dangerous situations or better manage interactions.

Decision Making Support:AI is expected to be able to recommend options to decision-makers quickly, or, to be able to provide superior options to choose from than humans could perform. An example is routing technology that can absorb complete maps and real-time or projected traffic information that humans could not be able to. There are natural applications in logistics, and they are also anticipated to help with other common tasks, like scheduling.

Mitigation of Manpower Issues : The military has a variety of neglected needs for which there is just insufficient personnel. But there is dependably interest in keeping up with the limit of the power, yet there is a gap between demand and personnel available for errands like image analysis and foreign language translation. These are the sorts of tasks that emerge from the quick development in the volume of information accessible for processing. Luckily, they are the kinds of errands for which AI is becoming well-positioned to help people. Artificial intelligence is also key to giving robotic assistance on the battlefield, which will empower forces to keep up with or grow warfighting limits without expanding labor.

Improvements in Cyber Defense : With cyber warfare as a present and developing military concern — and one that starts in a similar digital world as AI — expecting crossing points between the two is natural. These convergences have already started to appear as antivirus organizations push at any point forward in the cat and mouse game among attackers and defenders. Historically one of the ways that antivirus systems have distinguished malware has been to watch for obvious static tags and fixed invisible images that show the code is illegitimate[10]. However, it is as of now not adequate to utilize static tags to recognize malware, since attackers have found ways of producing malware with fewer of those tags.

Accordingly, antivirus organizations have shifted focus over to their huge data sets of malware conduct to make AI that can notice software on a system and flag activities that are distinguished as dubious. As illustrated by DARPA's Cyber Grand Challenge, there is a developing interest in the potential for machines that can find and fix weaknesses in amicable systems or find and attack weaknesses in foe systems, yet these applications actually can't perform these tasks at the level of experienced humans[11].

Improvements in Accuracy and Precision : Machines have greater accuracy and precision than humans. For instance, it is possible to use machines to fabricate the electronic transistors that create computers. Machine precision also extends to Artificial intelligence, which can have floating-point precision easily incorporating 32 or 64 bits per number being represented, while humans tend to think in rough estimates. This isn't to imply that the number that is being addressed with 64-bit precision can be known with certainty, yet in principle, the precision is there to oblige accuracy. Machines can likewise be more accurate than humans because of specific inherent properties, for example, consistency from one machine to another and consistency over time, while individuals have more individual contrasts and are tired or exhausted.

Labor and Cost Reduction : Tasks that once required a committed person to perform are now being performed by AI or robots. This trend allows a single person to perform a large amount of work that would previously have required several individuals or for some jobs to be automated altogether. The military, a large employer, is no exception and may track down ways to decrease staffing levels without sacrificing the services being offered.

Additionally, AI has demonstrated the ability to improve or optimize processes of many different types, which, thus, prompts cost decreases. With the huge number of complicated and costly processes employed by DoD, from logistics to heating and cooling to enlisting, there are a lot of opportunities for AI to increase efficiencies and impact cost savings.

Improvements in Intelligence, Surveillance, and Reconnaissance : One of the areas that have the most current investment in military AI is ISR . This trend is expected to continue. The amount of data being generated is increasing due to the ability to autonomously collect intelligence via drones, from sensors in the terrestrial domain and in space, and even in cyberspace. The volume, velocity, and variety of data will need to be analyzed by machines using AI. ISR platforms are required to analyze some data, due to bandwidth limitations that make it unable to transfer large quantities of data. Intelligence processing centers did most of the analysis.

Ability to Operate in Anti-Access/Area-Denial Environments : Anti-access/area-denial (A2/AD) environments that are increasingly fatal to human operators, platforms, and bases. To operate in A2/AD environments , autonomous systems will have to enable friendly forces. They reduce the numbers of human workers at risk in such environments, but they could be made faster, smaller, and more agile than inhabited munitions platforms and better combat-capable. So we can say, autonomous weapons and ISR platforms will be able to operate in areas that humans cannot.

Improvements in Deception and Information Operations : It might be possible today or in the near future to have a huge number of autonomous agents producing text snippets or short conversations to coax a target audience to believe a specific narrative of military or geopolitical significance. It is possible for AI to analyze the large quantity of data that people disclose about themselves online and attain an improved understanding of how to tailor specific messages to increase the possibilities of influencing them. And it is even becoming viable for AI to develop false but realistic images, videos, and audio of individuals that can be used to deceive. The respondents to a public survey regarding this considered this application highly unethical.

Risks of Artificial Intelligence in Warfare

The military applications of AI are anticipated to make a wide range of benefits, but they also have significant risks. To survey whether utilizing AI in warfare would be a sound policy choice, one should gauge the normal advantages of these abilities against the dangers they present. Figure 2 shows the risks related to military applications of AI-based on "Military application of artificial intelligence".
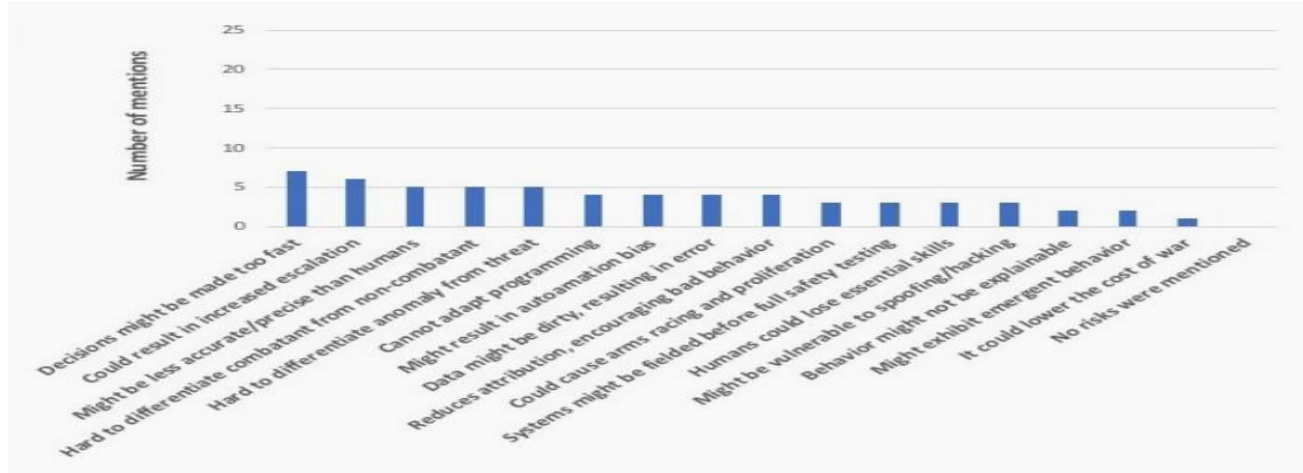
figure 2. Risks of Military Applications of Artificial Intelligence Identified in regarding available structured Interviews

As the figure illustrates significant concerns about military applications of AI. These points can be categorized into several areas—namely, risks of error, increased risks of war, and risks that military operators.

Artificial Intelligence Systems Might Make Dangerous Errors : Increased speed, accuracy, and precision as potential benefits of military AI, but these capabilities might make decisions too fastly, or the systems may not be able to adapt to the complexities of war. So they might not be able to accurately distinguish between combatants and noncombatants or threats and system anomalies, and they might be less accurate and precise than human operators are. These problems could be enhanced if systems are fielded before being efficiently tested or if attackers succeed in spoofing or hacking into them. Machine learning systems could portray emergent behavior, acting in dangerous ways.

Artificial Intelligence Could Cause Arms Racing or Escalation : Every country's quest for military AI to acquire a warfighting advantage over potential foes could bring about proliferation and arms racing. In war, autonomous weapons probably won't be adequately delicate to political considerations or escalation thresholds. They could go after in places or with levels of intensity that heighten clashes. The fact that it may be challenging to credit fault or obligation to human administrators for these acts would complicate matters. This and the likelihood that AI could bring down the expenses of battle as far as human losses could encourage commanders to face noteworthy challenges and act more forcefully, further fueling escalation dynamics.

Military Operators and Leaders Could Put Too Much Trust in Artificial Intelligence :

Military operators and leaders may put too much trust in their AI systems. They may show "automation bias," relying on the outputs of AI systems even when they do not seem to make sense. This tendency is increased in systems in which the algorithmic processing is so complex that their outputs are unexplainable. Operators cannot simply determine why their systems provide particular answers or behave in particular ways.

The Need for a Closer Examination of the Risks of Military Artificial Intelligence: For all the potential benefits of military AI especially on the battlefield, there are significant risks. There are some ethical, operational, and strategic risks associated with employing AI. It would be wrong to rush into indiscriminate development, deployment, and employment of these capabilities without analyzing the risks more closely.

How AI can help in battlefield healthcare

Protecting injured warriors during active battlefield situations is quite possibly the most hazardous position and the reason for some military deaths. As per analysts, around 86% of battlefield deaths happen during the initial thirty minutes post-injury. This is the explanation analysts across the world are pursuing the development of artificial intelligence (AI) technology that can reinforce battlefield healthcare.

Artificial intelligence (AI) can diminish serious injury and death in the field of fight. The vast majority of the advancement is happening in the application of robotic systems and unmanned ground vehicles (UGVs) to execute and give help in on-site surgery; search for and perform loss extraction; and lead intelligence, surveillance, and reconnaissance(ISR) exercises[12].

Battlefield robotic surgical systems : Remote surgical systems - while still in the creating stage - could change the entire situation of war zone medical services. Numerous private companies, as well as the U.S. military, are as of now contributing assets that can guarantee that semi autonomous technology will give different healthcare choices to areas that have none. With on-site robotic surgical systems, medical services staff can perform "remote" or "automated" medical procedures; despite the fact that as of now there actually should be a human specialist to manage a robot-performed procedure, the systems can be useful where exceptionally talented clinical resources and specialists are not accessible to do complex surgeries, for example, on the combat zone, and in isolated areas.

UGVs and platforms on the battlefield:UGVs and automated platforms can perform many errands, from safeguarding the harmed to serving as an armed line of force. A few automated systems work as either quadruped or biped classic-style "robots." The job of UGVs can likewise be changed by the circumstance on the battlefield, including for perilous missions where it is risky to send a human administrator, for example disarming a bomb or checking on mines. UGVs can likewise be worked together independently or can be sent into a generally inaccessible area.

Battlefield casualty-extraction robots: Battlefield casualty-extraction robots - planned particularly for the recovery of harmed warriors - can send through the harsh or lopsided landscape while conveying the heaviness of a human. Metal-bodied remote-control UGVs have a maximum velocity of 10 km each hour (6.2 miles each hour) and can without much of a stretch lift loads up to 227 kg (500 pounds).

"Porter" UGVs and RGPs:Troopers who should take loads on and away from the battlefield have probably the riskiest errands, as frequently they are encumbered and will be unable to shield themselves.AI looks to change this situation by deciding how and where to deploy UGVs and robotic ground platforms (RGPs) to convey weighty burdens over significant distances and harsh landscape. Such stages can also guard soldiers - by directing observation and gathering intelligence – on both operational and logistical missions. A portion of these stages have previously been created and can work as long as 72 hours without refueling.

Prominent AI wars

The first AI war - Israel's Gaza operation: Israeli military activity in May 2021 in Palestinian-controlled Gaza has been portrayed as the main AI war, conferring a brief look at future contentions in the 21st century. Israel has frequently been at the cutting edge of the upheaval in military technology on the grounds that a need might arise to remain one stride in front of its foes and it needs better innovation to beat difficulties. In the past Israel didn't have the advantage of the time to sit around idly to win a conflict, it required a quick overmatch of its adversaries, to overwhelm the region and the land. To arrive at this point it grew better defenses, for example, Iron Dome to stop more modest rocket dangers, and created Trophy to protect tanks. Rafael Advanced Defense Systems, one of Israel's biggest defense organizations, was at the focal point of the work to design Iron Dome and Trophy, among different systems. Artificial intelligence technology was conveyed to shield against rocket assaults and distinguish targets[13].

AI on Russia and Ukraine battle: At the point when Russia attacked Ukraine, one of the inquiries it raised was about whether this war would end up being a proving ground for Artificial intelligence, for better or in negative ways. Beyond deep fake technology and Russia's misinformation assault, AI and machine learning can be found in weaponry and knowledge on the two sides. Russia has displayed, for instance, a strong robot that can distinguish targets utilizing AI. While Ukraine has put a controversial facial recognition software to use.

While weapons are simply used to annihilate or harm targets, AI is a cutting-edge innovation that is incorporated with military systems to acquire strategic benefits in the combat zone. The integrated AI-cloud supports intelligence, surveillance, and reconnaissance (ISR), which gathers and automates analysis data from the internet, digital documents, social media, deployed radar systems, connected satellite systems, sensors of automated systems such as unmanned aerial (UAVs), ground (UGVs), and surface vehicles (USVs) in the battlefield. All states understood that air superiority was essential for winning the advanced fighting. Thus, it wouldn't be inappropriate to say that militaries with predominantly strong AI-compatible aircraft in the combat zone fundamentally decide how the conflict will end.

III. METHODOLOGY

In this paper Artificial Intelligence on the battlefield is discussed. The main aim of this paper is to provide a better understanding of the advantages and risks of AI used on the battlefield.It also discusses how AI can be used in battlefield healthcare. This paper used a qualitative methodological approach for describing, interpreting, contextualizing, and gaining in-depth insight into this topic.

To gain a better insight on this topic I collected and analyzed available trustworthy expert interviews regarding the topic. The interview named "The Role of AI in the Russia-Ukraine War " available on "The Brian Lehrer Show" official website is used to gather information about AI used in the Russian Ukraine war. In this Show, Brian Lehere interviewed Will Knight, senior writer for Wired covering artificial intelligence, and Gregory Allen, director of the AI Governance Project at the Center for Strategic and International Studies. Also collected news articles about AI used in wars, and how it impacts the people in those countries. There are a few ebook articles available on this particular topic, also analyzed by those ebooks.

The methodology used in this paper is,

- Data collection via recorded interviews available online, via relevant news articles, and related ebooks and articles
- Analysis of collected data
- Interpreting and combining collected data meaningfully

IV. RESULT ANALYSIS

AI has great potential to help the progression of human civilization. It may have immense prospects for the progression of mankind but it also leaves some dilemmas and risks. Firstly, the interaction between humans and AI will create organizational conflicts. This can be revealed by understanding the mechanization of factories. Laborers and employees have protested the mechanization of factories because it costs them their jobs. However, opposition to its usage tends to reduce, As technology proliferates in a society.

With the complexity and sensitivity involved in the application of AI, the future may not see such power being handed over to AI. However, as AI technology is evolving consistently, and if it proves its reliability and accuracy, there is a possibility that AI may be given the authority to take a human life.

V. CONCLUSION

Present-day fighting fundamentally is more intricate, because of a rising number of micro variables. Change in any one variable could make a remarkable effect on fight results - and, surprisingly, on the actual conflict. An increasing number of robotic vehicles and autonomous weapons can operate in combat zones too hazardous for human combatants. Intelligent defensive systems are progressively ready to recognize, investigate, and answer attacks quicker and more successfully than human administrators can. Artificial intelligence has burst upon the national-security scene with suddenness and intensity. This spike of interest is driven to some extent by the individuals who view AI as a progressive innovation, comparable to the discovery of fire, electricity, or nuclear weapons.

But concerns have been raised about utilizations of AI, for example, decision support systems that could ask escalatory activities, or on the other hand even preplanned assaults, without administrators having the option to analyze the intricate computations behind such proposals, or residents being kept or even killed because of a facial recognition system or some other complex AI estimation misidentifying them as fear terrorists or criminals.

After reading the paper many of them have two questions that need to find answers themselves, that are-is implementation of AI on the battlefield is good or bad, and is war good or bad for countries. A country can benefit from war, by achieving wealth or freedom and advancing in technology. But the reason why war seems bad is that there is also destruction where millions of innocent people die, losing their resources and time, and also their money. Always remember that the power to give or to deny life is in your hand.

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