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ARTIFICIAL INTELLIGENCE IN MILITARY

Summary

Considered to be the fourth Industrial Revolution, Artificial Intelligence (AI) has contributed to substantial economic growth in recent years and, as ever-increasing levels of investment and expertise are entering the sector, further growth is expected. The number of AI applications is bound to increase in the future. Businesses and academics have contributed to the growth of AI to date. Military implementations have lagged behind, but as these technologies mature, they will be used in a growing number of military systems. Military institutions around the world are looking forward to technologies, hoping that this revolutionary technology will help them solve their limitations or provide a new form of overlap. Moreover, world leaders, such as Obama, Trump, Putin and etc, have all made significant remarks that illustrate the role of AI, which can be summed up in what Putin said in September 2017: whoever becomes AI leader will dominate the world.

Key words: *Artificial Intelligence, Human Role in Military Artificial Intelligence, Autonomous Weapons*

Hərbi sahədə süni intellekt

Xülasə

Dördüncü Sənaye İnqilabı sayılan, Süni İntellekt (Sİ) son illərdə əhəmiyyətli dərəcədə iqtisadi artıma öz töhfəsini verib və getdikcə artan investisiyalar və təcrübələr iqtisadi yüksəlişlərin daha da çox olacağını deməyə əsas verir. Nəticə etibarilə, gələcəkdə Sİ tətbiq sahələrinin genişlənməyi danılmazdır. İş adamları və alimlər indiyədək Sİ müəyyən sahələrdə inkişafına öz töhfələrini verib. Hərb sahəsində Sİ tətbiqində gecikmələr olsada, inkişafda olan bir neçə sistemlərin gələcəkdə artan say ilə tətbiq ediləcəyi şübhəsizdir.

Bütün dünya hərbi sənayeləri Sİ texnologiyalarını səbirsizliklə gözləyir, ümid edirdi ki, bu inqilabi texnologiya onlara kömək edəcək və onları məhdudiyyətlərdən azad edəcək. Bundan başqa, dünya liderləri Obama, Trump, Putin və başqalarının Sİ-nin əhəmiyyətli rolunu bildiren önəmli çıxışları vardır. Buna misal olaraq, Rusiya Federasiyasının prezidenti Vladimir Putin 2017-ci ilin Sentyabrında önəmli çıxışlarının birində bildirib ki, "Kim Sİ sahəsində lider olarsa, o, da dünyaya nəzarət edəcək."

Açar sözlər: Süni İntellekt, hərbi süni zəkada insanın rolu, avtomatlaşdırılmış silahlar

Introduction

Artificial Intelligence (AI) has progressed quite rapidly in recent years, resulting in a wide variety of applications, both civil and military. It is reality that the military is motivated by the need for improvement and it is relentless in the pursuit of better, quicker and stronger weapon systems or innovations, and that is exactly what AI offers.

Currently, the use of AI in the military is seen mainly in terms of:

- Autonomous Weapons and Weapons Targeting
- Surveillance
- Cybersecurity
- Homeland Security
- Logistics
- Autonomous Vehicles [1]

For this reason, many country leaders, technology experts, and academics have considered AI to be innovative, but differ in their perspectives on AI. Specifically, major of them consider AI to be a effective development as it would help to minimize human causality-considering that human force would be replaced by machines that could be deployed in any form of mission, even high-risk ones-and at the same time have strategic and tactical advantages.

What is Artificial Intelligence? The term artificial intelligence was invented in 1956, but today AI has become more popular due to increased data volumes, sophisticated algorithms, and better computational and storage capacity. Artificial intelligence is a term that has been ridiculed for decades. Herbert Simon, one of the founders of the field, expressed his discontent with the grandiose imagery that the term evokes, but

conceded, “At any rate” “artificial intelligence” seems here to stay... In current period it will become sufficiently idiomatic that it will no longer be the target of cheap rhetoric.”[2 p.4]

The problem with the term is not necessarily its grandiosity, which sets out unreasonably high aspirations and suggests more potential than it has historically existed. It also has to do with the changing nature of the technologies and capabilities it defines over time. What was once the peak of AI, such as tax-filing applications or chess-playing machines, was gradual moves toward more general AI. Such devices are no longer widely referred to as artificial intelligence. That apparent inconsistency is captured in one of the most commonly accepted definitions considered in the Defense Science Board’s Summer Study on Autonomy in 2016: “the capability of computer systems to perform tasks that normally require human intelligence” [3, page5] By that definition, once a technology is common enough that the task it performs no longer requires human intelligence, it ceases to be AI. This seems to agree with common parlance and also explains why the things that were once called AI are now just computing. Further, it uses the very broad phrasing of “perform tasks,” which allows AI to encompass the full range of tasks that can be performed. This is what leads to claims such as “AI is the new electricity,” but also explains many experts’ trepidation in trying to capture AI in a concise definition that provides explanatory or taxonomic value.[4] Instead, they prefer to speak of AI in terms of the applications that it enables, and, in large part, that implies various forms of autonomy.

Human-Machine Relationship

When it comes to the implementation of AI, especially in the military, the human-machine relationship is one of the key topics discussed. There are actually three forms of relationships that we can discuss: (i) human in the loop, (ii) human in the loop, and (iii) human out of the loop.

While the human being is in the loop, it means that the technology is in charge of the environment; moreover, it is the human being who makes the final decision. This is considered asemi-autonomous device. In the second case, the human loop, the computer will behave and determine on its own. However, human beings have the ability to monitor the actions of the machine and, if necessary, to interfere. In this scenario, we have an automated machine under control. The final case is that of a fully autonomous machine. Here, when the computer behaves and chooses on its own, the person has no influence over the machine, and as a result it remains out of the loop.

Today, in the military application, we might discuss about the application of the first or second case, i.e. drones and precision guided missiles, even though the AI application has not yet reached the third stage of maximum autonomy.

Human Role in Military Artificial Intelligence The role of human operators in AI implementations is frequently openly discussed in terms of their relationship with the biblical ‘observe, orient, determine and act loop’. Many have stressed the importance of a human being in the loop to minimize the ethical and organizational hazards of military AI.

With a human in the AI system, that operator should ensure that the system complies with the relevant rules of engagement and, if not, can be held responsible for the actions of the system. Operators may also be the moral focal point responsible for the defense of human dignity, as well as the source of emotions that guide humanitarian actions. And while humans make mistakes, they usually do not make the same kinds of mistakes as the autonomous systems. In addition, while humans may be affected, they are usually not affected in the same manner or by the same techniques as the computer system. Humans should also provide both external controls to enable the proper operation and utilization of an autonomous system. Moreover, in some military implementations, there is an opportunity to switch people on the loop. For example, in the case of defense systems that need to respond rapidly to incoming attacks, human authorisation for any interaction could slow down the system and undercut the threat-defeating functionality.

In fact, if a competitor uses his own high-speed AI schemes, human-in-the-loop techniques are at risk of a comparative disadvantage. In such situations, there is responsibility to shift the human operator to a device control role and to maintain a process where interference is feasible. However, AI systems with human-on-the-loop modes raise concerns about the degree to which humans can potentially respond fast enough to minimize engagement.

The loop theory proposes an opportunity to risk reduction, but it is incomplete. Next, the loop is more effectively applicable to autonomous weapon systems engaged in target collection and engagement. However, there are several other forms of AI military implementations, such as AI decision support systems or logistics systems, and the role of humans in the loop to reduce risks is not explicit in those instances. In addition, the loop principle is not adequate to guarantee human intervention in other aspects of the device life cycle, such as rigorous testing and assessment, arms inspection, and other measures where risk reduction is essential. Furthermore, there are interpretive difficulties with respect to the scale of the related ring.

In the case of systems that may sustain presence over time or “loiter” and execute several attacks, human authorisations for the initial implementation of the system can be assumed to be “in the loop”, even though the system undertakes a variety of acts over longer periods of time. Last but not least, there are various forms of command-and-control arrangements and interference processes, and the loop theory itself does not serve to differentiate these different variations. As a consequence, while the loop theory is helpful, there are other risk-mitigation methods that might be relevant.

AI Military Application

The rapid development of artificial intelligence has been followed with positive impacts in different fields, including medicine or transportation; however, when it comes to the military application a lot of discussions are raised. It is widely accepted now, that in the future, AI has the capacity to transform military activities such as logistics, intelligence, surveillance and especially weapons design. [5]

For the time being, the controversy surrounding AI and its use have raised a great deal of controversy among military experts. Both discussions are usually related to the effect of AI on the manner in which the war is waged and how much control can be granted to the arms that will be used by AI. In fact, the major debate concerns the deadly autonomous weapons systems (LAWS) or the so-called killer robots. This processes fall under the third case described above, where the human being is out of the loop. Currently, it is argued that in terms of military application, AI can be used (but not limited to) as follows: (i) Based on the image recognition algorithms, AI can be used to assist in processing and interpreting information. An example for this is the American Project Maven [6] that is being programmed to process and interpret the information received from the videos captured by drones. (ii) By using AI, drones, planes, ships, tanks, etc. will not need a human to control or direct their actions. An example of this is the Israeli Harpy drone that has passed to a close to full autonomy (it still needs to be launched by ground troops).

The IAI Harop (or IAI Harpy 2) is a loitering munition developed by the MBT division of Israel Aerospace Industries. It is an anti-radiation drone that can autonomously home in on radio emissions. This SEAD-optimised loitering munition is designed to loiter the battlefield and attack targets by self-destructing into them.[1] The drone can either operate fully autonomously, using its anti-radar homing system, or it can take a human-in-the-loop mode. If a target is not engaged, the drone will return and land itself back at base. Harop was first shown to the public at the Aero India 2009 show in India. Harop was first used in The 2016 Nagorno-Karabakh conflict, also known as the Four-Day War, [a] or April War military operations by Azerbaijan during the Four Days War. It should be noted that this incident was the first time in the history of world war that the use of “floating ammunition”. [7]

Applying a lesser level of autonomy, other aircrafts such as Air Force Global Hawk and Army Gray Eagle drones can be mentioned. For both these drones, it is necessary that the operator directs the aircraft where to go and then the aircraft flies itself. As a result, it is expected that autonomous systems will replace humans in tasks that are considered as “dull, dangerous, or dirty.” [8] Such activities can include long-term intelligence gathering and analysis, cleaning up chemical weapons-contaminated areas or sweeping routes for improvised explosive devices.

Finally, as algorithms grow further, AI can be used for command and control, including combat management, by analyzing vast data sets and making predictions for direct human action.

Benefits of Artificial Intelligence in Warfare Benefits of AI in warfare are often assumed but not explicitly stated. On 27 September 2020, counter-offensive operations against the Armenian aggressors were launched in our region. As a result of the review of information on modern weapons used in combat operations, as well as the military video footage released by the Ministry of Defense and regularly given information on combat operations to the public, I came to the following conclusion on the role and benefits of artificial intelligence in military.

1. Speed of Decision-making

Speed is the most commonly reported type of AI wartime benefits. Interviewees also addressed this in the sense of observing, orienting, deciding, and acting loop, with the assumption that if it is possible to cycle through observing, orienting, deciding, and acting loop quicker than one’s adversaries, then they would not be able to execute the counteractions required to protect themselves against attacks or to create their own offensive options rapidly enough to resolve counteractions. There are undoubtedly instances where this form of benefit can be envisaged; however, it is still important to bear in mind that schedules are not always governed by decision-making cycles that AI can tend to accelerate. Many timelines are dominated by the time it takes to shift vehicles or individuals, or even just the time that ammo travels to targets. In these situations, it is necessary not to overstate the importance of speeding the decision-making process.

It is also worth considering whether accelerating decision timelines introduces new risks or aggravates existing ones. There are situations where providing the adversary with more time may make it more likely to select an option that is favorable to the United States. A standoff in times 17 of crisis where it is hoped that the adversary will back down or offer to negotiate could be an example of a high-stakes situation in which more time could be advantageous as opposed to less. A further risk is that if speed is made the priority attribute for selecting between competing autonomous weapon systems for development, safeguards and robustness might be sacrificed, resulting in weapons that are less safe or reliable than they could be. Despite these caveats though, there is a clear military benefit to the increased speed that AI could provide, as indicated by the large number of experts who suggested it. [9]

2. Use of Big Data Big data and its use by artificial intelligence (AI) is changing the way intellectual property is developed and granted. For decades, machines have been autonomously generating works which have traditionally been eligible for copyright and patent protection. [10] For instance, in the US, the first “computer-generated work” (CGW) was submitted for copyright registration prior to 1965. The US Patent and Trademark Office (USPTO) has granted patents for inventions autonomously generated by computers as early as 1998.

It is typically used to represent data that are too massive to be processed on a computer’s memory, created too rapidly to be handled by a single computer, or used in several different ways or formats. Because of these three problems, it can be difficult for humans to make sense of the data found in the data, but computers and AI prefer to make more data accessible to them. Improved efficiency is one of the advantages that the interviewees have in mind while exploring the use of big data. In addition, though, they found out that the sheer number of information gathered by different sensors is more than a person or person team would analyze. With the ever-increasing amount of data available in the world today, AI is expected to continue to rise in popularity.

3. Improved Targeting and Vision One of the areas where data overload is felt most acutely is in image-processing. The number of cameras conducting surveillance in domestic and foreign environments has increased dramatically and is expected to continue to do so. With all the data being generated, there is a clear need and motivation for automation in the process of analyzing incoming video and imagery. As discussed earlier in this chapter, automated image-recognition and object-detection capabilities have surpassed human ability in at least some cases. As progress continues, these systems will increasingly be able to identify objects that humans would miss. This is already the case for AI that detects skin cancer from images, and it is not unreasonable to expect the same from AI for military or counterterrorism applications.[11]

Further, improvement in face recognition software could be made to easily recognize terrorists or known combatants, and an examination of facial expression could help alert troops and other military forces to dangerous circumstances or properly handle social encounters when building peace.

Conclusion. The capacity of AI to alter the landscape of security and change the current balance of power is obvious and accepted by both bureaucrats and academicians. For this reason, the rise in the development of AI, and its application in the military, has been accompanied by a competition between states, most notably the U.S. and China. Many other states at the same time are trying not to lag behind and advance their own AI applications. Today the development and implementation of AI is a very important field in the military. Developing technologies has now clearly reduced the use of standard weapons and combat equipment that has been preferred in the past. This fact is supported by the use of modern AI weapons in the Counter-Attack (2020 Nagorno-Karabakh conflict) which began on 27 September 2020 and is currently underway. Actually, the application of the AI to the military helps to reduce the loss of military manpower in combat and enables an advantage on the battlefield.

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