COMPUTER SCIENCE, ARTIFICIAL INTELLIGENCE AND THEIR EFFECT ON INTERNATIONAL RELATIONS AND POLITICAL MATTERS

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Abstract: In this essay, we examine the effect of computer science and artificial intelligence on international relations and political matters. Moreover, we mainly seek to understand the meaning of computer science and artificial intelligence and their effect on international relations and political matters. The essay at hand is analytical and expository, utilizes library research method to examine the subject of the essay. The results of this research state that the use of artificial intelligence initially is about symbolic aspects of science and innovative approaches of reasoning that means using ordinary hypotheses and simple rules. Researchers in the field of artificial intelligence normally have an empirical approach with a few mathematical theories. As in other sciences that the researchers create tools to carry out their empirical research, here the researchers create computer programs for the same purpose. There are new computer programs that have been created to present explanations on various theories about how intelligent function can be acquired. Moreover, the results of this essay state that artificial intelligence affects different dimensions of international relations and international policies and caused a serious transformation in this field. The most evident effect of artificial intelligence is in the hard-power area and the manufacture of artificial-intelligence-based weapons, so that soon humans are excluded from the decision-making cycle in attacks that are executed by these systems and AI-operated weapons can autonomously decide whether to perform an attack on a particular target or not. When this becomes real, it would be robots and droids that set foot in the battlefields and armed conflicts instead of human soldiers. Of course, AI can also be used in soft political fields, like anticipating social riots, foreign policy diplomacy, and the likes of that.

Keywords: Computer Science and Artificial Intelligence, International Relations, political matters.

Introduction

Given the importance of international relations and political changes on one hand and the significance of the impact of AI in politics, on the other hand, different dimensions of the effect of artificial intelligence on politics should be examined. In certain dimensions, this examination is of greater importance [1]. International relations is about studying and examining the relations between the various players of the international arena. It is a very vast sphere and includes the study and examination of all the trades and interactions between the political units (governments), international organizations, and non-governmental organizations.

Traditionally, countries and national states are considered as the main elements in international relations. The concept of "Nation" includes the first two constituent parameters of a country, which are land and population [2]. Government is an institution, members of which are the enforcers and actors of the political power domestically and internationally. Sovereignty, which is the last constituent element of a national government, is referred to as the "supreme power of the government within the territory of the country and its independence in action and decision making internationally." [3]. In the meantime, political science is about the study of governments, states, and politics and is considered as a part of social sciences and covers a vast area of study. American Society of Political Science has introduced 42 systematic disciplines under different topics and methods for political science [4]. International relations and political science are influenced by different variables. Computer science and AI are among the novel subjects and variables influencing international relations and politics. The systems that can have reactions similar to intelligent human behavior, like understanding complicated situations and imitating cerebral processes, human discursive approaches, and successful answers to them, learning and the ability to acquire knowledge and reasoning for solving problems, are referred to as systems with AI. In this essay, the writers examine the effect of computer science and artificial intelligence on international relations and political matters.

Computer Science and Artificial Intelligence

Definition of Computer Science and Artificial Intelligence

There are different readings into the essence of the nature of Artificial Intelligence, hence there is no precise definition of Artificial Intelligence that is agreed upon by all the scientists of this field of knowledge. The reason behind this fact that there is no precise definition for Artificial intelligence is that the AI experts are always trying to draw a line that separates Artificial Intelligence from non-artificial intelligence (natural intelligence), thus they cannot define a standard criterion for AI.

The first definition for AI was presented by Margaret Boden. She argues that Artificial Intelligence means the study of how to create a computer program, which enables the computers to do tasks that the human mind can do [5].

Marvin Minsky in 1968 argued that Artificial Intelligence is an instructor of creating machines that do Tasks that if they were to be done by a human, it required intelligence. In 1976 Weizenbaum made the above-mentioned definition clearer. He argued that the supreme goal of Artificial Intelligence is to create an artificial system that is equal or superior to the human mind. One year later Winston and Boden stated this point that AI means to use computer programs and plan techniques to make in general the Intelligence and in particular human thinking more significant [5]. The starting point of AI was the ability of computers to manipulate symbolic terms that can show all the behaviors of objects, including the knowledge about the structure of objects, their functions, and those of the people of the world and beliefs and goals, scientific theories, and the function plans of the computer itself.

Scope of Artificial Intelligence

AI has a very wide scope. One example of AI is computer understanding. This understanding comprises an internal representation, which is appropriate for intelligent processing. "Even though there are various sensory signals, computer understanding is concentrated only on sight and speech. This understanding could be different from intelligence

because it includes sequential distribution of energies, which affects time and take precedence over the representation of the symbolic terms."

Computer understanding is the ability to distinguish patterns in a picture and differentiating the objects from the background at the same speed as a human brain does it. In the 1990s, those military technologies that were initially for analyzing incoming pictures and photos from spy satellites made way to civil and commercial use. To make an example we can mention the manufacturing of digital cameras and automated imaging systems. Computer understanding involves a programmer determining some of the criteria of the inputs generated by a camera or a microphone as important. For example, to recognize a face, the program should distinguish the pupils, nose, and mouth, then measure their size and the space between them. These measurements are done on series of faces in a database to compare them with each other. So, when a face that is familiar to the database is placed in front of the camera, the computer finds the closest match that has the most similarity to the measurements in the database, and in this way, it can identify the face. The same method applies when it comes to distinguishing the features of voice and sound of words that are stored in the database so that the computer can have a final evaluation. "Today there is a type of ATM called Midos, which utilizes software that is developed by a small enterprise called New England to do face recognition on the face of the client. This machine uses two cameras to create a three-dimensional image of the customer, so one cannot fool it by holding the picture of someone else in front of the camera." [6].

The process of language is the other realm, in which AI is used. The ability of humans to communicate with each other through spoken or written language is one of the most significant results of human development. Computers cannot benefit from this ability they cannot do, what humans routinely do. The process of natural language is to program the computers to understand the human natural language. The process of natural language has the highest potential value because it enables people to interact with computers without any particular knowledge. You can easily walk up to a computer and start communicating with it. Unfortunately, programming computers to understand natural language is much more difficult than real thinking. Some very primitive systems of translation can translate a language to another language, yet they are not as good and reliable as human translators. There are also voice detection systems (Dictaphones) that can turn spoken words into written words, however, they do not understand what they write. They are also very limited in terms of their ability, and one should speak very slowly and vividly [7].

Artificial Intelligence should be recognized as a field, where many fields of knowledge, old and new techniques meet and collide. "Its fundamental ideas are derived from philosophy, linguistics, mathematics, psychology, neurology, physiology, control theory, probability, and optimization and it has various functions in computer science, engineering science, biological and medical science, social science and many other fields of science" [8].

There are many programming languages such as Lisp, Prolog, CLIPS, and VP expert. An "intelligent factor" is a system that increases its chance of success after analysis by understanding the surrounding environment [9].

The effect of AI on hard power in international relationships

The effect of AI on autonomous and robotic weapon systems

The way governments put AI to use has important outcomes regarding international relations and should one state possess an unconventional sort of power, it can become so powerful that can potentially threaten the mere existence of other states. For example, one can

point out the development and manufacturing of unmanned, automated weapon systems that operate autonomously without being directly controlled by a human operator. These sorts of weapons that use their own intelligence to track and destroy the target, cannot be countered and dealt with by conventional methods. Therefore, the countries that have access to these sorts of weapon systems alter the Balance of Power in the world. The experts of member countries of CCW consider the AI-operated autonomous weapon systems to be important for countries. The new generations of military weapons and robots are part of the weapon systems that are mainly put into action by the armed forces of different countries. In the current era, countries like China, Russia, England, United States, and fifty other countries are pursuing the goal of extending their robotic arsenal, including lethal military robots. Among these countries, China, by introducing 27 different models of armed robots until 2012, proved to be the vanguard of this trend and has the first rank on the chart of the countries following this goal. AI is rapidly finding its place in the defense industry to help to improve the human decision-making process. The fact that through recent years new products and technologies were introduced shows that the use of artificial intelligence is to expand and develop even more. AI has a very definite and tangible role concerning rapid decision making, executing recurring activities, and collecting and sorting large amounts of data from various sensors to evaluate necessary options and presenting them to the user to make the final decision or in some cases to run a decision-making process by the machine itself.

The development and expansion of autonomous intelligent weapon systems are caused and made possible because of artificial intelligence technology. In the spring of 2019, the UN held an assembly to investigate imposing limitations on the use of autonomous weapons at the request of 25 member countries. This request was opposed by United States, United Kingdom, South Korea, Russia, Israel, China, and Australia. These countries made considerable investments in the development of autonomous intelligent weapon systems. This approach of governments will be discussed in more detail in the second chapter.

The second conclusion of the assembly of the member countries of CCW regarding autonomous weapons operating on artificial intelligence is that the expansion and development of these sorts of weapons cause serious changes in the military balance and the essence of human wars. For the time being, autonomous AI-based weapons are put into action with precaution. Nevertheless, armed forces of powerful countries are planning to put these kinds of weapons in action to greater scales in the near future. Samsung SGR-A is a product of Samsung enterprise. It is a guard and surveys intelligent robot, that can detect a target automatically from 2 miles away (2.3 km) in daytime and half of this distance in the dim of night and target it. Furthermore, this robot is designed in three forms: UAV (unmanned Aerial Vehicles), UGV (Unmanned Ground Vehicles), and UMV (Unmanned Marine Vehicles). This diversity makes its mass production with various capabilities and purposes possible [11].

One of the conclusions made by the experts in the CCW assembly is that the use of autonomous AI-based weapon systems will alter the nature of human wars. Technology will affect the field of military communication more than anything. Everything such as fire alarm or attack alarm will be surveyed by lasers, sensors, and in general pieces of technology. Those military forces, which utilize these technologies more effectively and have better compatibility with them, will triumph over traditional armies. Troops of future armies will have much faster mobility. They will put hydraulic ammunition (weapons that can get deployed five times faster than the speed of sound) into action and have access to hi-tech laser weapons that can target anywhere in the world in a blink of an eye. The military communication will experience drastic changes in a way that every isolated system can analyze and comprehend the data that it gathers, without relying merely on its command center. This results in the formation of radial distribution networks, which are adaptable and automatically adjustable. These days even one

unmanned system needs tens of people to manage it remotely and analyze the data and update them, yet soon these systems will gain more independence and will be able to carry out many commands and tasks without any need of human interference. The development of 5G technology revolutionizes the course of communication on the battlefield and quantum science enhances the military-grade sensors and changes the communication and computation processes. Quantum computations enable us to use the abnormal properties of subatomic particles to indirectly enhance the computation power and create new methods of cryptography that cannot be decoded. Moreover, it enables the military forces to analyze huge amounts of data and solve problems that are far beyond the computation capacity of classic computers.

AI is finding its place very rapidly in the defense industry to help with enhancing the human decision-making process. In the past few years, the development of new products and technologies had shown us vividly that AI is growing and expanding its use. AI has a very clear and tangible role in the fields like instant and rapid decision making that is needed to do recurring activities and collecting and sorting lots of data from various sensors to analyze necessary options for the user or the operator to decide or in some cases even to make a decision by the machine. AI technology has led to the growth and development of intelligent weapon systems and contributed greatly to their success. In the spring of 2019, the UN held an assembly to investigate imposing limitations on the use of autonomous weapons at the request of 25 member countries. This request was opposed by United States, United Kingdom, South Korea, Russia, Israel, China, and Australia. These countries made considerable investments in the development of autonomous intelligent weapon systems. In the following chapter, some of the plans and experiences of the mentioned countries in utilizing AI in the defense industry will be discussed.

The efforts for developing autonomous and robotic weapon systems based on AI

China

In 2017, US security and intelligence agencies published a report suggesting that China is developing gigantic submarines designed to carry large amounts of ammunition and equipment, which are also capable of conducting suicide missions. The AI technology used in these vessels enables them to navigate their path in new uncharted areas, following sea routes, identifying friendly and hostile vessels, and make decisions based on the technical situation they find themselves in. The significant operational feature these submarines pose is that they can carry out very long missions in the depth of the ocean [12]. It is expected that the new unmanned automatic Chinese submarine sees action in the early 2020s. At the IDEX 2019 International Defense Exhibition, China unveiled a 20 tons new drone warship equipped with vertical missile launchers. This vessel operates and navigates on AI and detects enemy targets in a tactical area. If needed, it can launch torpedoes, missiles and fire its deck gun. Chinese government-owned Company, Norinco is developing a new highly accurate costal surveillance system for detecting different targets such as armed forces and military equipment, which is also capable of being synced with surveillance satellites. China is also working on the development of a new generation of stealth aerial drones like Blowfish A2, which is a product of Ziyan Company in China. Blowfish A2 UAV can conduct complicated combat missions including scheduled reconnaissance, searching operations in a distinct area, and precision strikes against ground targets. There are also very few unmanned helicopter drones based on intelligent navigation developed by Ziyan company in China, which can be equipped with mortar and grenade deployers and machine guns. These UAVs get deployed in squadrons to conduct their combat operations [13,14].

Russia

Vladimir Putin, president of Russia, emphasized on the importance of the domestic development of AI technology in 2017, announcing it as one of the important factors in determining the balance of power in the future of the world. In that same year, Russians announced their plan to develop a new tactical missile similar to the American missile "Tomahawk Block IV" which possesses the ability to change its target midair. Next generation "Tupolev PAK DA" stealth strategic bombers can be armed with missiles using AI for analyzing their flight path and its radar and radio coordinates to the target. This AGM cruise missile has a range of up to 7000 kilometers. Russian Navi is backing the project of developing a new automated submarine by the name of Status-VI. These submarines are equipped with a nuclear drive and can achieve a speed of 100 knots, a depth of 10,000 meters, and a range of 10,000 km [15].

United Kingdom

"Start all E" research program by assessing and continuously monitoring the spatial awareness of military forces involved in tactical naval and air environments using artificial intelligence technology helps them to perform their mission tasks more effectively. The company develops autonomous military equipment for supporting the missions performed by American security agencies. Envitia plans on utilizing AI to enhance the effectiveness of autonomous submarines tasks with the detection of sea mines.

BAE Systems is developing a tactical drone called "Taranis". Taranis is identified as a UCAV and can carry a variety of ammunition for a long operational range. This UCAV can conduct a large portion of its functional tasks autonomously. In Paris Air Show 2019 the prototype of a European next-generation fighter jet, called NGF, was unveiled. Also, as a part of a two-year 74-million-dollar project, FCAC the future-generation European fighter jet, equipped with AI technology, capable to act as a field commander for aerial drone squads is under development. In the current year, DARPA signed a contract with BAE Systems for developing a capability called CHIMERA, which is a technology that uses machine learning in the equipment that decodes radio frequencies. BAE systems also established a new robotic operation center, which exclusively develops the special software for automated and autonomous military equipment for supporting the missions conducted by the US security agencies.

United States

Pentagon is planning to invest 2 million dollars in AI. This budget is assigned to DARPA. Under a program called OFFSET, squadrons consisting of 250 aerial drones together with unmanned ground systems are going to be put in action in complex operational areas for conducting automated missions. USAFis considering the possibility of controlling large groups of UAVs with its most advanced fighter jet F-35 and the upgraded version of F-15 (F-15 EX). In this scenario, the drones survey the air space around the flight area of manned fighters and conduct their tactical tasks based on the commands of the fighter pilot. Under the project called Sky Borg, USAF intends to launch an operational network comprised of stealth aerial drones Kratos XQ-58 Valkyrie. Apart from this project, DARPA started the developing project of automated sea hunter called ACTUV. In this project, an autonomous submarine vessel is going to be developed, which can carry out its tactical operations and return to its base automatically. In 2017 US Navy signed contracts with Boeing and Lockheed Martin to work on developing prototypes of sizeable, unmanned submarine vessels called Orca and Echo Voyager. In these contracts, they set 2020 to be the year, when these prototypes are going to be introduced. In Paris airshow 2019, Raytheon announced that they are considering to lunch a joint project with the office tasked with developing the project V-22 based in the US ministry of defense to

develop a new AI device to help with predetermining tilt-rotor Osprey V-22 repair needs [16]. DARPA in cooperation with the Lockheed Martin missile systems department is working on a pilot project called Squad X, the purpose of which is to improve the trustworthiness and reliability of unmanned and autonomous military gear in the eyes of human operators and soldiers on the ground in a joint operation setting between them and improving the knowledge of military personnel about the abilities and potentials of these systems in the battlefield [17].

The effect of AI on political matters

The use of AI in political matters has come to attention. As researchers at the University of Massachusetts explain, one of the examples of the use of AI in politics is the production of a writer robot that can generate acceptable political speech texts. They have used the technology of google n-gram to create AI. To educate the AI, they have used four thousand speeches performed in the US Congress. AI systems can be used to start a psychological war, generating false but effective news to manipulate public opinions in target countries, generating fake news footage, and so on. AI makes it possible to create videos in which anything and any word can be attributed to any celebrity or politician, and it is possible to manipulate one's facial expression and voice to make the words attributed to them more believable. For example, with the help of these technologies a fake video can be generated, in which the president of a country states sharp verbal attacks on the president and officials of another country and talks with inappropriate language. Deeds like this can have irreversible consequences for peace and international security. This can provoke the officials of a country into taking actions that are against their national interest.

We can see the first examples of AI abuse in the field of soft power and media in the mass publishing of fake news especially in social networks on the verge of presidential and parliament elections in different countries. The most controversial example of this had happened during the months before the US presidential elections in 2016. At that time there was a surge of fake news in social media to destroy Hillary Clinton's reputation allegedly organized to a great scale by users that were supported by the Russian government. Incidents like this can disrupt the function of liberal-democratic systems and elections and decrease people's trust in political systems and their elected candidates in different countries [18].

In diplomacy, AI can provide a large amount of classified, cohesive, reliable, and accurate information to ambassadors, diplomats, and specialists of foreign policy, so they can decide in due time the best way possible with the highest level of precision and away from vague guesses and speculations. It also can be expected that in the future, diplomat robots carry out many of the tasks that are currently entrusted to human employees in institutions like the ministry of foreign affairs, make consular affairs easier and reduce the paperwork's in different countries. Those countries, who are the pioneers in this field, possess more knowledge and better analysis. They can put the systematic data they have in different matters to good use as they want to gain political and economic privileges in their country's interest in international arenas.

In 2017 China introduced an AI system that was to be used in its foreign policy. This system was called "Geopolitical environment simulation and predicting platform" and was tasked with deconstructing a large amount of data and then presenting suggestions about foreign policy for Chinese diplomats. According to a source, before this system, China had used a similar AI system to analyze almost every foreign investment project in the past few years [19]. Just imagine what does the development of such a system means: foreign policy is gradually getting out of the hands of diplomats, companies, political risk calculation think-tanks, and risk management institutes. Foreign policy is gradually moving towards being managed by advanced algorithms, the primary objective of which is to analyze the data and predict the

events and incidents, and to consult the governments about what they should do. How would the world look like when countries use algorithms to predict the future?

Besides China, the US is also developing predicting abilities. Infect these abilities are so advanced that according to the CIA, in some cases they are even able to predict civil and social unrests three to five days before they break out. How is it possible for the United States to use such a technology? One way could be issuing a pre-warning to multi-national companies about the coming possible problems.

For example, in early 2019 Chennai and some other Indian cities faces a severe drinking-water shortage. After months, this crisis intensified, and millions of people remained without access to drinking water. Finally, in June 2019 the protests broke out and hundreds of people were arrested during these protests. Gradually, certain political parties got themselves involved in the dispute and asked people to join the protests. If this water shortage continues, is it possible that a protest, even greater than the current one, starts? If the United States predicts that such a thing is about to happen, then she can warn her companies that are active in India about that.

Great companies active in the field of technology can say that in the coming 48 or 72 hours there is going to be massive civil and social unrest. With such information these companies can act and relocate their employees and assets to a safe location, fortify their offices and move their operations to other parts of India that are more stable. This is a possibility that companies can use these predictions to protect their interests (which can be in a form of providing security or physical operations). There is also another possibility: they can use these predictions in business [20].

Conclusion

Artificial intelligence poses some challenges for peace and international security, the most important of which is the growth of the use of this technology in the military field, which can result in the production of autonomous robotic lethal weapons. Currently, different countries of the world are trying to produce robotic soldiers. These robotic soldiers that receive an input of data, collected through the ways that were explained above, cannot easily be stopped. They autonomously conclude whether their decision is right or wrong and this kind of attitude can result in the demise of human society. This is the point that was pointed out by many of the famous and influential people of the world of technology, like Elon Musk, CEO of Tesla Motors and SpaceX.

As a matter of fact, due to the intense competition for benefiting from many benefits of AI, the social and political effects, and consequences of using this technology are often neglected by governments, companies, and military forces around the world. Yet one should note that abusing the AI technology and attempts to hack into systems is also a great threat, therefore the invention of mechanisms to improve the level of security in AI systems, restricting their scope of application by governments, and observing moral codes in this area and signing international pacts and agreements to control the intense competition in this field is very important. On the other hand, overusing AI can lead to widespread joblessness among a large portion of people, who have an occupation in the service sector. This can set the setting for civil and social unrest in many countries around the world, which can eventually develop into an international security crisis. Governments all around the world must pay enough attention to subjects like this, and as their first step, design a comprehensive strategy of AI utilization that directs and shapes the use of this technology in different areas and fields.

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