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Artificial Intelligence in Military Systems and their Influence on Sense of Security of Citizens

Ravina Surywanshi and Siddhesh Parab
Students, Department of MCA
Late Bhausaheb Hiray S. S. Trust's Institute of Computer Application, Mumbai, India

Abstract: *This paper will give us an overview of the future and present development of artificial military applications, especially in artificial intelligence algorithms, and conducted research regarding applications in the area of civilians. This paper mainly focuses on AI algorithms in robotics, cybersecurity, and object detection. It discusses the problems related to the present solutions and how artificial intelligence and its algorithm can help solve them. Expectation-Maximization and Gaussian Mixture Model algorithms are present that are used in solving discussed problems. In the application of artificial intelligence, the problem bound to ethics is responsibility issues for errors that occur due to autonomous systems are discussed in this paper.*

Keywords: Neural Networks; Artificial Intelligence; AI in Military; Social Robots.

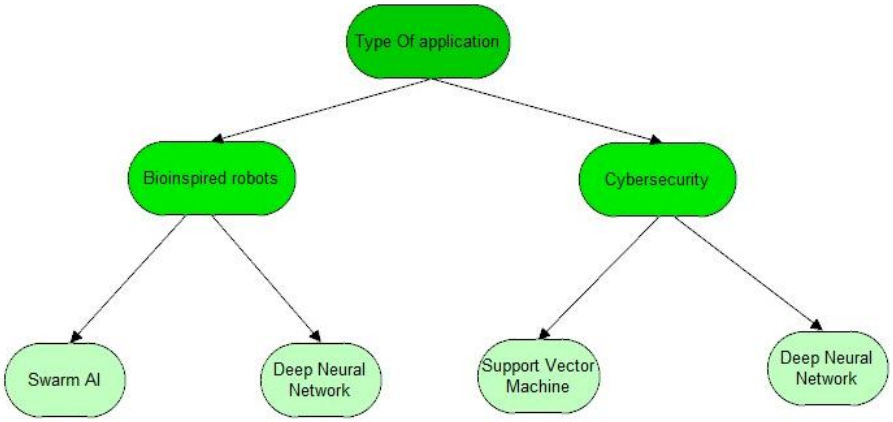
I. INTRODUCTION

One of the key factors defining a state's standing in the world is its military capability. Military capability is defined as "the ability to achieve a specific wartime objective, such as winning a war or battle, or destroying a target set," in the words of the Indian defense minister. The military capability is determined by the organization, modernization, preparedness, and sustainability. Technical sophistication, weaponry, and other pieces of equipment are the key determinants of modernization level.

A Second World War-style conflict is quietly vanishing into the night and moving into cyberspace. According to studies, hacker attacks on both for-profit businesses and governmental organizations are becoming a typical occurrence. Researchers predict that cutting-edge autonomous technologies and artificial intelligence (AI) will become indispensable components of upcoming military conflicts. The majority of current AI algorithms, like those for natural language processing, require a lot of data. They can function more effectively, more quickly, and more effectively, but they can't function adequately without access to expansive databases.

II. METHODOLOGY

First, a few instances of artificial intelligence algorithms that have been implemented in military systems are shown. The aforementioned examples pertain to aspects of the army that are particularly critical for guaranteeing the safety and security of the state and all of its residents, as well as for carrying out contemporary combat operations on the battlefield.



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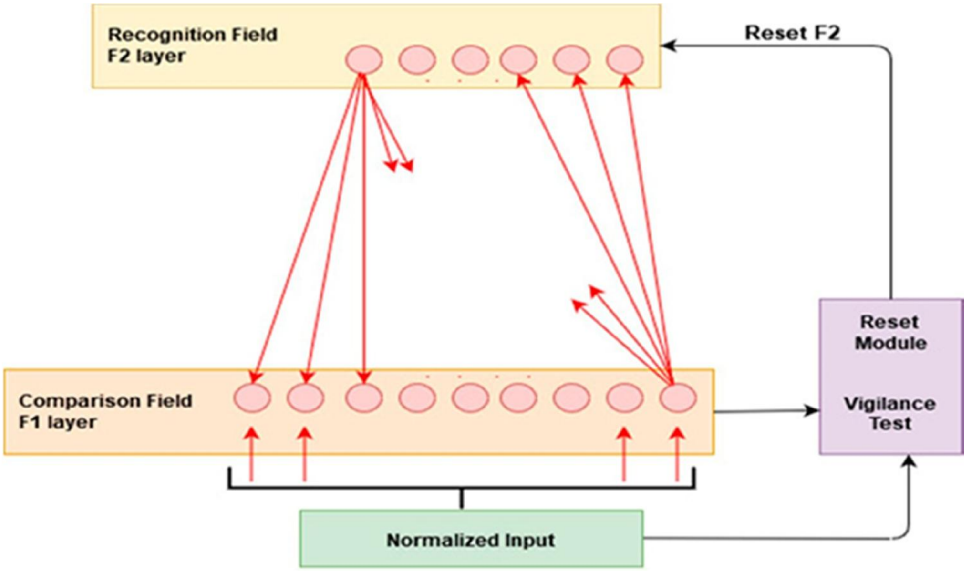
2.1 Military Applications of Neural Networks in Practice

Artificial neural networks in military applications have enormous promise in all areas; they can offer assistance during information warfare as well as land, sea, and air combat. Logistics, transportation, armed attack analysis, and communication are all areas where artificial intelligence is used in the military. The fact that the Indian defense establishment now has a Defense Artificial Intelligence Council (DAIC) under the direction of the defense minister attests to the existence of a substantial demand for applications utilizing AI in the defense sector.

2.2 Application of Neural Networks in Object Location

The use of different kinds of radar stations, air patrols, maritime patrols, remotely piloted drones, or satellites are some traditional techniques for locating ships at sea. The automated identification system (AIS) has been immensely popular in recent years. The system offers a lot of data regarding marine traffic. Fuzzy ARTMAP is one of the techniques used in AISs.

The network's algorithm in this case entails keeping patterns that have already been learned open to learning new ones while guarding against rejecting or changing them. The system needs to be able to remain stable in the face of unimportant occurrences and have the capability to update on important events. As seen in Figure, this network essentially comprises of two layers and a reset module.



According to the WTA principle of "winner takes all," the second layer, also known as the recognition field, is a competitive layer where only the unit with the best match—that is, the unit with the highest product of the input vector and weight—becomes a candidate for learning a new pattern. All other units are ignored. Based on how closely a new unit resembles the prototype vector, the reset module determines if it can learn a pattern; this process is known as the vigilance test.

Due to the inability of parameters to be estimated in closed form, the iterative Expectation-Maximization algorithm is utilized in conjunction with the GMM (Gaussian Mixture Model). This approach, which is typically employed when the data is lacking or contains hidden variables, aids in determining the maximum probability estimations.

2.3 Neural Network Applications in Cybersecurity

Attacks by hackers are getting more frequent and hazardous yearly. They pose a threat to both private businesses and public, military, and governmental institutions worldwide, according to surveys and studies. The IDS (intrusion detection system), which analyses network traffic, categorizes it as intrusive or normal, and in the event of danger delivers a notification, is used to detect incidents. Attack signatures frequently resemble those of routine network traffic, making classification challenging. The process is frequently expensive and slow, which led to the notion of utilizing artificial intelligence algorithms instead. The Support Vector Machine (SVM) is one of the methods being tested for IDS support

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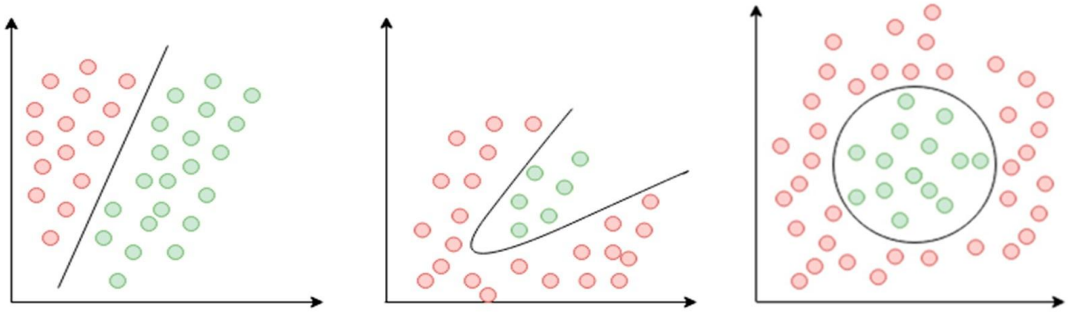
The SVM method looks for a hyperplane in the N-dimensional space that distinguishes (clearly separates) data points into different categories. There are numerous such hyperplanes; nevertheless, the algorithm seeks the one with the largest margin.



One of this method's main benefits is that it operates entirely unsupervised, allowing for model training without the need for a dataset with mixed and separated SAR (synthetic aperture images)

2.4 Social Effects of Artificial Intelligence in the Military

The examples demonstrate how neural network applications can be very beneficial and successful in the military. All human-performed actions over the past few years have been totally automated at this point. What is good and what is evil, safe and dangerous, and when we should act and when we should wait are all determined by algorithms. Because their choices will have an impact on everyone's lives, the issue is much more crucial when we discuss AI uses in the military. When machines decide how to live, can individuals feel safe? Some people are prepared to put their complete belief in the system and nominate it for the presidency. This occurred in Russia in 2017, when 40,000 citizens nominated "Alice," a piece of AI software, to challenge Vladimir Putin in the 2018 election. Yandex's artificial intelligence (AI) assistant could operate around the clock and make judgments only based on logic, free of emotion or self-interest. Similar events occurred in New Zealand, where "Sam" was developed to become the first virtual politician in the history of the globe, and in Tokyo, where a machine named "Michihito Matsuda" finished third in the mayor election.

The development of artificial intelligence is supported or highly supported by 41% of respondents, while 21% are somewhat or categorically opposed, according to a study conducted in 2019. Graduates of four-year colleges and universities exhibit far more support (57%) than do those with less education.

III. CONSEQUENCES OF ERRORS

People worry that a broken algorithm would hurt them, as was stated in the preceding subsection. What are the effects of such an error? It is simple to determine who is to blame for a scenario when someone makes a mistake. A scenario becomes a little more complex though when the machine makes a mistake. Who is accountable? The definition of an error is the primary issue. Think of a scenario where we are organizing a party. We favor traditional meals and are dissatisfied with the artificial intelligence system's selection of menu items, which includes several fusion cuisine dishes. Has the system made an error? Is the creator guilty of not having programmed our preferences in the machine algorithm? Maybe it is our fault because we did not control the machine during the menu selection process. This situation does not have very serious consequences in contrast to military decisions. The use of “ethical principles” can help, but every situation is different, and every person has a different moral system, so people are not ready to totally trust “intelligent systems”, especially in the state defense sector. They could be concerned that no one would take responsibility for any errors done. Artificial intelligence is often built to do helpful activities and assist people, however, errors can occur that have extremely catastrophic consequences.

IV. CONCLUSION

The submission's major objectives were to outline the key applications of AI algorithms in the military, particularly in the fields of object identification, cybersecurity, and robotics, and to analyze how these applications affect people's perception of security. In fresh, unusual applications, the article briefly explains well-known neural network techniques. We draw attention to the enormous popularity of neural networks, which is growing daily as a result of the ability to use

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large databases for learning. This holds true for applications in business, research, education, and pure enjoyment. How vital this branch of knowledge is as evidenced by the popularity of applications like AI. People continue to be concerned about the impacts that these technologies could have, according to study. This makes sense given that not even specialists are certain of how artificial intelligence will advance and grow in the future.

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