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# Analysis of Artificial Intelligence Based Random Forest Classification on Military Dataset

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***Abstract:*** ***This article aims to provide an overview of the potential uses of AI in the military and to emphasize the need to identify and define measurable indicators in order to evaluate the benefits of cutting-edge technologies and solutions that are expected to improve the quality and performance of operations. It focuses on crucial areas such as situational awareness and decision-making support, as well as logistical and operational planning and modelling and simulation (M&S). AI is becoming a crucial tool for intelligence and intelligence analysis of the enemy, and its role in military operations planning and support is growing. Autonomous vehicle and weapon systems are another area in which AI can be put to use. The use of AI is expected to have a greater impact on the military functions of human-machine interfaces (machine-learning, man-machine teaming). AI promises to overcome Big Data's "3V challenge" (volume, variety, and velocity), as well as the "2V challenge" (veracity, value) and render data processing at a controlled level of decision-making based on AI's knowledge. In this essay, we will talk about a number of AI applications in the military, their capabilities, opportunities, and the harm and destruction they could cause in times of instability. The seven AI patterns, the military's use of AI algorithms, object detection, military logistics, and robots, the global instability caused by AI use, and nuclear risk constituted the majority of the discussion.***
***Keywords: Military, Human-Machine Interfaces, Global Instability, Devastation, Artificial Intelligence***

## I. INTRODUCTION

A large, well-organized group of soldiers trained for warfare, especially on land, is known as a military unit. This unit is capable of operating independently and is typically composed of a headquarters, two or more corps, and supporting troops. The entire military force of a country that engages in land-based combat is called a "corps."

The term "ARMY" stands for "Alert Regular Mobility Young." The Army is the land-based military branch of a country that participates in ground combat. It is made up of soldiers who are supported by modern equipment such as tanks, aircraft, and helicopters. The primary mission of the Indian Army is to protect the nation's security by defending it against any potential foreign aggression. It also works to safeguard the country from internal threats. During natural disasters, the Indian Army carries out humanitarian rescue operations to save lives.

Artificial intelligence, or AI, refers to the process of creating machines that can mimic human intelligence, enabling them to learn and think like humans. AI involves various technologies such as machine learning, natural language processing, and robotics. These systems analyse data, detect patterns, and make decisions, often improving their performance over time. AI applications enhance innovation and efficiency in various sectors, including entertainment, finance, and healthcare. While AI brings many benefits, it also raises ethical concerns such as job loss and privacy issues. The ongoing development of AI continues to influence how we interact with technology and each other. The main mission of the Indian Army is to ensure national security and unity, protect the country from external aggression and internal threats, and maintain peace and security within the nation's borders.

The Indian Army undertakes humanitarian rescue operations during natural calamities and other disturbances, such as Operation Surya Hope, and can also be deployed by the government to address internal threats. Along with the Indian Air Force and the Indian Navy, the Indian Army plays a significant role in the country's defence strength. The independent Indian Army has been involved in four major wars with neighbouring Pakistan and one with China. Other significant military operations include Operation Vijay, Operation Meghdoot, and Operation Cactus. The army also conducts large-scale peacetime exercises such as Operation Brass Tacks and Exercise Shorter, and it has actively participated in numerous United Nations peacekeeping missions. The Indian Army played a major role in both World Wars, particularly in the Western Front and Middle Eastern theatre during World War I, and in the Southeast Asian theatre, as well as in the East African and North African campaigns during World War II.

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## II. REVIEW OF LITERATURE

In terms of defence technologies, AI is unquestionably opening up new perspectives. There are high expectations regarding the application of AI techniques to a number of military domains; however, there are still obstacles and unsolved issues that require additional research to resolve [1].

The possibilities and applications of AI in the military, such as autonomous weapons and target recognition, surveillance, cybersecurity, military transportation and logistics, homeland security surveillance, cyber security, autonomous vehicles, and combat training and simulation, are described, discussed, and evaluated in our paper [2].

AI is definitely opening new perspectives in defence technologies. There are high expectations regarding the application of AI techniques to a number of military domains; however, there are still obstacles and unsolved issues that require additional research to address [3].

The limitations of AI are evident. Nevertheless, data and AI have primarily been used to enhance military intelligence and, above all, to target more accurately, quickly, and more deeply across the battlefield Scholars have substantially focused on the question of autonomous weapons and drone swarms. Many believe that autonomous weapons, which operate without human control, must be unethical [4].

The field of artificial intelligence is advancing at an exponential rate right now. It has become the driver of change for mankind. No fields have been left untouched by AI. In a similar vein, the military has been dominated by it. Being a late entrant in the AI race India will have to be laborious in drafting policies, creating skills in AI software, alluring entrepreneurs to invest in AI software and hardware development, etc. to compete with its competitors like the USA, Russia, and China [5].

Academics and bureaucrats alike recognize and acknowledge AI's potential to alter the power structure and security landscape. The outcome of the U.S.-China competition is not clear as yet; however, it can be said that the threat posed to the U.S. by China should not be underestimated. U.S., announced it national strategy approximately one year after China did. Yet many experts have argued that detailed information of funding is lacking in this

Strategy [6].

AI algorithms in the military sector, especially in objects detection, cybersecurity, robotics and logistic and discuss their impact on people's sense of security. The article shortly describes well-known algorithms of neural networks but in new, atypical applications. The authors wanted to point to the huge popularity of neural networks, which is increasing day by day thanks to the possibility of using big databases in the learning process. As Professor Stephen Hawking said: "The rise of powerful AI will be either the best, or the worst thing, ever to happen to humanity" [7].

The military domain. By making opaque systems explainable, artificially intelligent systems may be more quickly, effectively, and reliably trained, designers may more rapidly remove processes that might lead to error or novel unwanted behaviour, and the presence of understandable explanations can greatly streamline troubleshooting efforts when systems do act in unwanted ways Most importantly though, responsible deployments will require, first and foremost, strong human–machine teams where the human acts as a "handler" of the AI and not a "user" or "operator"[8]".

Defence system is also a significant part of international relationship and global positioning of the country and studying the impact of modern technological development in shaping the global positioning or international trade and political strategies of the country can be a significant area for future research [9].

This dual approach of centralizing and decentralizing algorithmic practices in warfare, enabled by platforms, intensifies the violent effects of algorithmic warfare over both space and time, as described in existing critical security studies literature [10].

## III. EXISTING SYSTEM

The Explainable AI is expected to be the solution for Black Box problem, as an AI tool that will provide transparent results on those nodes of layers (Zernike, 2019). That functionality is not yet available in each solution, so the Black Box problem remains a significant risk to which the EU EDIDP called the attention to avoid in submitting proposals to be funded by EU EDF fund (European Commission, 2020). Further research is necessary in the areas of Human-Machine Teaming, since human involvement in military operations remain no matter how advanced the AI techniques are. Machine and deep learning, adversarial AI, and neuromorphic and probabilistic computing in order to achieve advanced algorithms are also areas requiring further research to provide effective algorithms. Since AI is a technology that can raise the efficiency of predictive and cognitive data analytics, the need for processes to transform both structured and unstructured data into insights for decision makers is key for applicability. Neural networks and machine learning methods can process structured data, while deep learning and natural language processing are used to process unstructured data.

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These tools can be used to develop AI agents for defensive and offensive cyber operations across the entire information space, achieve more realistic analysis, and provide personalized training in modelling and simulation. They can also be used to develop adaptive strategies in electronic warfare. The information gained through AI can be weaponized and hybrid warfare countermeasures can be achieved. Artificial Intelligence can contribute promising future for India's defence sector.AI can add $957 billion to the present gross value of the Indian economy by 2035. AI can change the nature of warfare. Warfare in the future will be more technology-driven rather than military action. AI technology will play a key role in war management and control systems. The use of AI in logistics administration, training maintenance, and human resource management will facilitate better military operations. The application of AI in the military will enhance productivity, reduce institutional workload and operate faster than humans. Armed forces equipped with AI will be able to effectively manage massive amounts of data, giving the commander deep strategic insights and assisting nations in reducing war losses.

## IV. PROPOSED SYSTEM

Linear regression algorithm estimates the coefficients by minimizing the sum of the squared differences between the observed values and the values predicted by the model, a process known as least squares. Predictive analytics, trend forecasting, and comprehending the relationships between variables are all common applications of linear regression. While it is straightforward and interpretable, it assumes a linear relationship and can be sensitive to outliers, which may affect the model's accuracy. Regularization techniques, like Lasso and Ridge regression, can help improve performance in cases of multico linearity or over fitting.

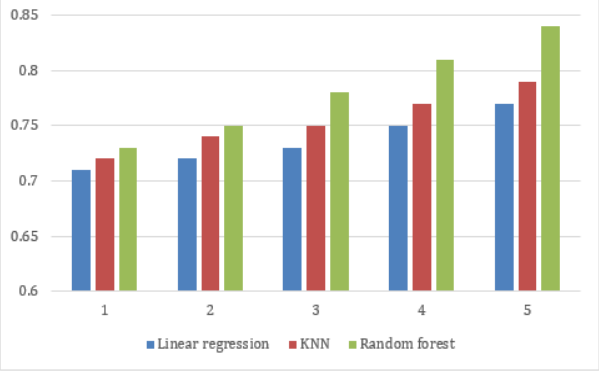
The classification and regression tasks make use of the ensemble learning algorithm known as Random Forest. It operates by constructing multiple decision trees during training and outputting the mode of their predictions (for classification) or the average (for regression).

This technique enhances accuracy and robustness compared to individual decision trees by reducing overfitting. The algorithm randomly selects subsets of features and data samples, promoting diversity among the trees, which helps capture complex patterns in the data. Random Forest is particularly effective for handling large datasets with numerous features and is resilient to noise and outliers. Its interpretability is also improved through feature importance metrics, allowing users to understand the contribution of different features to the predictions. Overall, Random Forest is a versatile and powerful tool widely used in various applications, from finance to healthcare. The Random Forest algorithm is a simple, non-parametric machine learning method used for classification and regression tasks. Random Forest relies on distance metrics, such as Euclidean or Manhattan distance, to measure similarity. It is easy to implement and understand, making it popular for various applications, including recommendation systems and pattern recognition. However, Random Forest can be computationally expensive, especially with large datasets, as it requires calculating distances for all training samples.

1) *Survival Probability (%):* In this section, we compare memory usage for each set of rules with the same datasets as the runtime checks. Our algorithm guarantees Survival Probability with the same level of precision as the most recent algorithm. Moreover, our set of rules affords the most wonderful results in lots of instances.

| No.of samples | Linear Regression | KNN | Random Forest |
|---|---|---|---|
| 100 | 0.71 | 0.72 | 0.73 |
| 200 | 0.72 | 0.74 | 0.75 |
| 300 | 0.73 | 0.75 | 0.78 |
| 400 | 0.75 | 0.77 | 0.81 |
| 500 | 0.77 | 0.79 | 0.84 |

Table 4.1 Survival ProbabilityFigure




4.1 Survival Probability

*2) Accuracy (%):* In nearly all cases, we can examine how our proposed outer forms compare to the others. Our proposed linear shape to its bushes instead of the previous tree from as a way to limit gets entry to instance to look nodes. As an end result,its benefit has an effective impact on lowering run time in complete experiments.

| No.of samples | Linear Regression | KNN | Random Forest |
|---|---|---|---|
| 100 | 50.1 | 55.5 | 60.2 |
| 200 | 55.4 | 58.7 | 62.5 |
| 300 | 60.3 | 62.3 | 68.6 |
| 400 | 65.3 | 67.9 | 70.7 |
| 500 | 70.2 | 75.5 | 80.8 |

Table 4.2 Accuracy

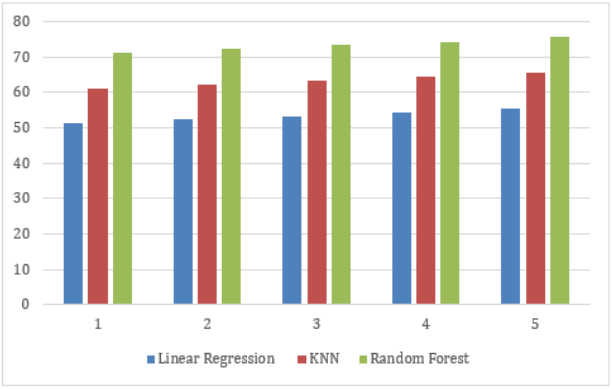



Figure 4.2 Accuracy

*3) Precision (%):* Proposed set of rules indicates the best precision at the same time as the others have especially negative performance, which shows that our scheme can keep those increasing attributes more efficiently than the alternative structures of the competitor algorithms. Through the above experimental consequences, we recognize that the proposed set of rules outperforms the others with admire to increasing transactions and gadgets in phrases of scalability in addition to runtime and memory usage for the actual datasets.

| No of samples | Linear Regression | KNN | Random Forest |
|---|---|---|---|
| 100 | 51.2 | 61.2 | 71.1 |
| 200 | 52.2 | 62.2 | 72.3 |
| 300 | 53.3 | 63.3 | 73.3 |
| 400 | 54.4 | 64.4 | 74.4 |
| 500 | 55.5 | 65.5 | 75.3 |

Table: 4.3Precision

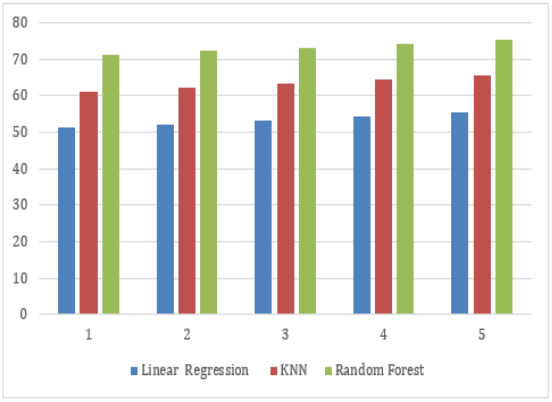



Figure:4.3 Precision

## V. CONCLUSION

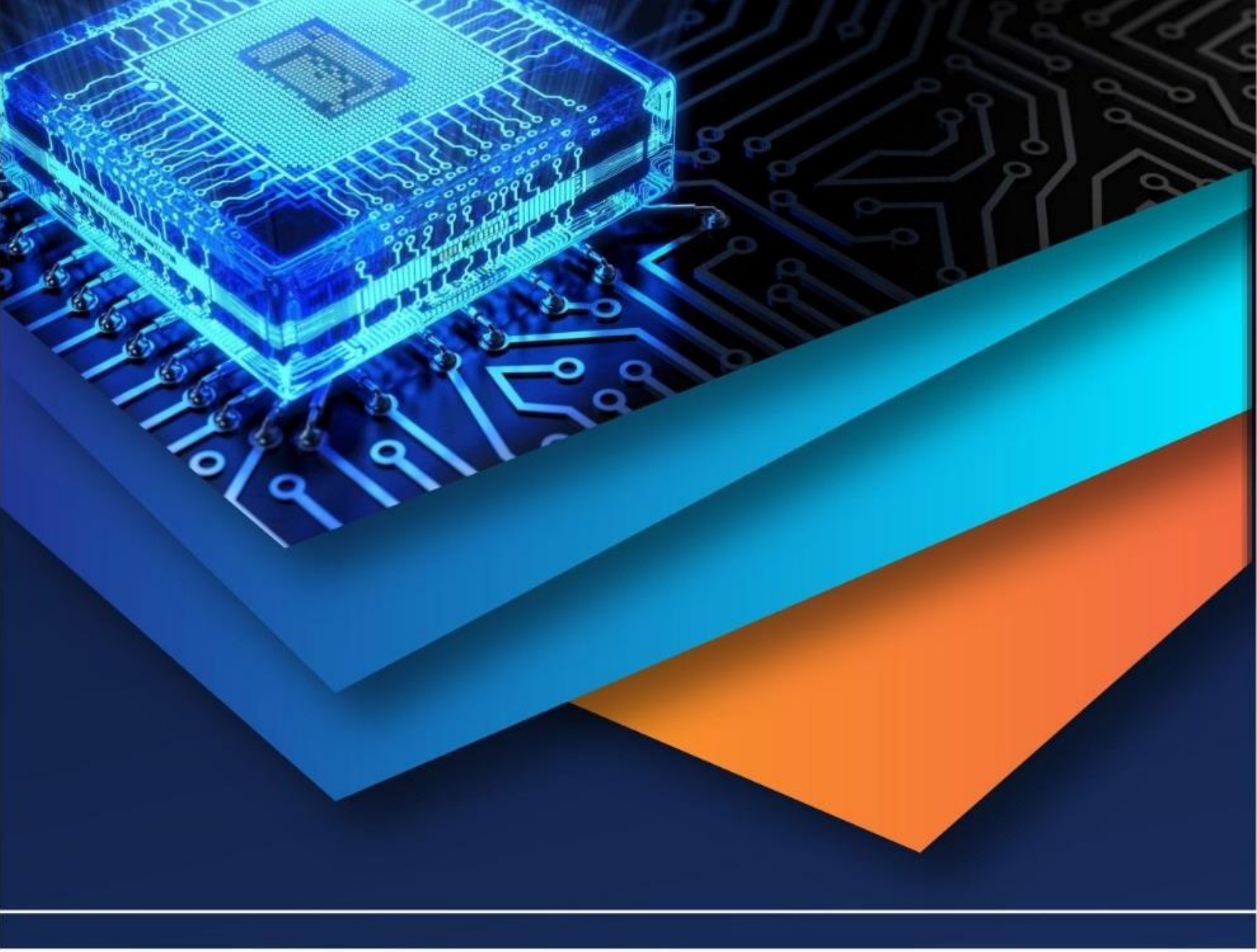
To this end, the most dataset-associated well-known additives, including virtual demonstration and visual representation, were evaluated in this paper to be expecting the military idea into the machine learning process. The overall performance of machine learning, including linear regression, random forest, and KNN, was evaluated. Results indicated that the carried out fashions have suitable performance for military field work, however, the excellent performance was related to the Random forest. Furthermore, a contrast of the performance of carried out fashions indicated that the outcomes of Random forest models have been extra reliable in comparison with the KNN and Linear regression. In this case, using a prescriptive evaluation based totally on projected values would bring about future abilities to help decision and coverage makers.

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