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Applications of AI in Military Decision-Making and Strategic Planning

The rapid advancements in artificial intelligence (AI) have significantly impacted various domains, including the military sector. The integration of AI in military decision-making and strategic planning has become a critical area of interest, offering the potential to enhance situational awareness, support course of action development, and improve the overall effectiveness of military operations. This article explores the various applications of AI in military decision-making and strategic planning, including situation assessment, course of action generation and analysis, wargaming, and strategic analysis. It also examines the use of AI in the ongoing Russo-Ukrainian war, highlighting its role in intelligence gathering, targeting, and information warfare. The article discusses the challenges associated with AI integration, such as the need for human-AI collaboration, ethical considerations, and the adaptation of existing decision-making processes. It emphasizes the importance of continued research and development efforts to advance AI technologies and address the ethical, legal, and societal implications of their use in the military context.

Keywords: artificial intelligence, military decision-making, strategic planning, situational awareness, course of action development, wargaming, Russo-Ukrainian war, human-AI collaboration, ethical considerations, research and development

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Introduction

The rapid advancements in artificial intelligence (AI) have significantly impacted various domains, including the military sector. As modern warfare becomes increasingly complex and data-driven, the integration of AI in military deci-

sion-making and strategic planning has become a critical area of interest. AI technologies offer the potential to enhance situational awareness, support course of action development, and improve the overall effectiveness of military operations [1].

However, the application of AI in the military context also presents unique challenges, such as the need for human-AI collaboration, ethical considerations, and the adaptation of existing decision-making processes [2]. Therefore, it is crucial to explore the various applications of AI in military decision-making and strategic planning, while also addressing the associated challenges and opportunities.

The integration of artificial intelligence in military decision-making and strategic planning has the potential to revolutionize the way military operations are conducted. AI technologies can assist military leaders and planners in various aspects of decision-making, from situation assessment and course of action development to wargaming and strategic analysis [3].

Applications of AI in Warfare

One of the key applications of AI in military decision-making is in situation assessment and understanding. AI algorithms can process vast amounts of data from various sources, such as satellite imagery, social media, and intelligence reports, to provide a comprehensive picture of the operational environment [4]. By analyzing patterns, anomalies, and trends in the data, AI

systems can help military leaders identify potential threats, opportunities, and key decision points. Moreover, AI can assist in the fusion of information from multiple sources, enabling a more accurate and timely understanding of the situation [5].

AI can also support the development and analysis of courses of action (COAs) in military decision-making. By leveraging machine learning algorithms and optimization techniques, AI systems can generate and evaluate a wide range of potential COAs based on objectives, constraints, and available resources. AI can also assist in identifying the strengths, weaknesses, and risks associated with each COA, enabling military leaders to make more informed decisions. Furthermore, AI can help in the continuous refinement of COAs based on real-time data and changing operational conditions. According to GlobalData’s Technology Foresights, there are over 180 innovation areas that will shape the future of the aerospace and defense industry (see Figure 1) (GlobalData Patent Analytics, as cited in [6]).

Wargaming and simulations play a crucial role in military decision-making and strategic planning. AI can enhance these processes by enabling more realistic and dynamic simulations of military operations. AI-powered wargaming sys-



Source: GlobalData Patent Analytics

Fig.1. Innovation S-curve for artificial intelligence in the aerospace and defense industry, built on over 262,000 patents

Source: [6]

tems can model complex interactions between friendly, enemy, and neutral forces, as well as the impact of various environmental and operational factors. By running multiple iterations of wargames and simulations, AI can help military leaders explore different scenarios, identify potential outcomes, and refine their strategies.

At the strategic level, AI can assist in analyzing the broader geopolitical, economic, and social factors that shape the strategic environment. AI algorithms can process large volumes of structured and unstructured data, such as news articles, academic publications, and government reports, to identify emerging trends, risks, and opportunities [7]. By providing a more comprehensive and data-driven understanding of the strategic landscape, AI can support long-term planning and decision-making at the highest levels of military leadership.

Similar to its applications in course of action development, AI can also support the generation and evaluation of strategic options. AI algorithms can analyze historical data, current trends, and future projections to identify potential strategies that align with the military's long-term objectives. By considering a wide range of factors, such as resource constraints, political considerations, and technological advancements, AI can help military leaders develop more robust and adaptable strategic plans.

AI can also enhance strategic wargaming and scenario planning by enabling the simulation of complex, long-term scenarios. AI-powered strategic wargames can model the interactions between various actors, including nation-states, non-state actors, and international organizations, over extended time horizons [8]. By exploring multiple potential futures and testing different strategic approaches, AI can help military leaders develop more resilient and flexible long-term plans.

Applications of AI in Russo-Ukrainian War

The ongoing Russo-Ukrainian war has emerged as a proving ground for the extensive use of artificial intelligence technologies in modern warfare. Both Ukraine and Russia have employed AI to gain strategic and tactical advantages, with Ukraine in particular leveraging AI capabilities to offset Russia's numerical and

resource superiority. The conflict has highlighted the growing importance of AI in enhancing decision-making, improving situational awareness, and enabling precision targeting [9].

One of the most significant applications of AI by Ukraine has been in the realm of intelligence gathering and analysis. With the help of its Western allies, Ukraine has harnessed AI algorithms to process and analyze vast amounts of data from a wide array of sources, including satellite imagery, drone footage, social media posts, intercepted communications, and open-source intelligence. By integrating these diverse data streams, AI has enabled the Ukrainian military to create a comprehensive, real-time picture of the battlefield, allowing commanders to make informed decisions and respond rapidly to evolving threats [10].

AI-powered solutions provided by companies such as Palantir have been instrumental in this regard, enabling Ukrainian forces to identify Russian troop positions, track enemy movements, and pinpoint vulnerabilities in Russian defenses. This has allowed Ukrainian units to launch targeted strikes, disrupt Russian supply lines, and maintain a flexible, adaptive posture in the face of a larger adversary [11].

In addition to enhancing situational awareness, Ukraine has also employed AI in a more controversial capacity through the use of facial recognition technology. Clearview AI, a U.S.-based company known for its vast database of facial images scraped from social media and other online sources, has provided its services to Ukraine, allowing authorities to identify dead and captured Russian soldiers, as well as to detect Russian saboteurs and combat misinformation [12].

While this use of AI has proven effective in countering Russian infiltration and exposing the scale of Russian casualties, it has also raised significant concerns among privacy advocates and human rights organizations. The deployment of facial recognition in a conflict zone, without clear guidelines or oversight, sets a worrying precedent and highlights the need for robust ethical frameworks governing the use of AI in warfare.

On the frontlines, AI has been a key enabler for Ukraine's effective use of unmanned aerial vehicles (UAVs) and loitering munitions. The Turkish-made Bayraktar TB2 drone, which has been used to devastating effect against Russian

armor and supply convoys, relies on AI algorithms for autonomous navigation, target acquisition, and real-time battle damage assessment. Similarly, Ukrainian-developed drones such as the R18 octocopter have been equipped with AI capabilities to optimize their range, endurance, and payload capacity [13].

The integration of AI into these platforms has allowed Ukrainian forces to conduct precision strikes deep behind enemy lines, disrupt Russian command and control networks, and degrade Russia's combat effectiveness. As the conflict has progressed, Ukraine has also increasingly turned to AI-enabled loitering munitions, such as the RAM II and ST-35 Silent Thunder, which can autonomously detect, identify, and engage targets with minimal human intervention [14].

In the information domain, Ukraine has leveraged AI to counter Russian disinformation campaigns and undermine Russian morale (see Figure 2). Initiatives like the government-run *Poter.net* website have used AI-powered facial recognition to identify Russian soldiers killed or captured in Ukraine, and then linked this information to their social media profiles and family

contacts. By revealing the true extent of Russian losses and challenging the Kremlin's narrative of a swift, victorious "special military operation," Ukraine has sought to sow doubt and dissent among the Russian population.

While the full scope of Russia's military AI capabilities remains opaque, there are indications that Russian forces are employing AI in electronic warfare, cyberattacks, and the analysis of social media data to manipulate public opinion. Russia's KRET R-330Zh Zhitel electronic warfare system, for example, is believed to use AI algorithms to autonomously detect, classify, and jam enemy communications and radar systems [15]. Similarly, Russian state-sponsored hackers have likely used AI-powered tools to identify vulnerabilities, craft tailored phishing attacks, and automate the spread of disinformation across social media platforms.

As the war continues, both sides are likely to invest heavily in AI technologies, seeking to gain a decisive edge over their adversary. However, the proliferation of AI in the conflict also raises profound ethical and legal questions that remain largely unresolved [16]. The use of facial recog-

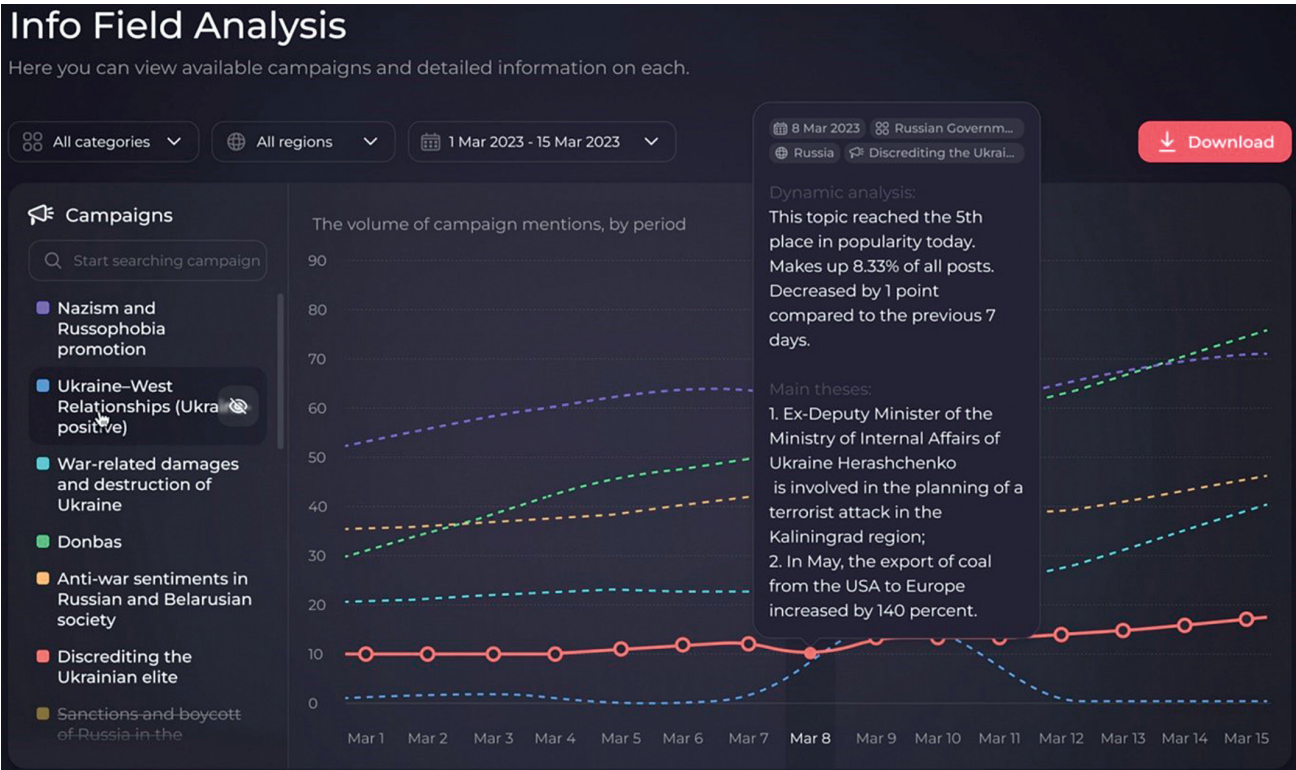


Fig. 2. Mantis Analytics (<https://mantisanalytics.com>) program interface demonstrates narratives it identified and their timeline

Source: [15]

nition technology, for instance, has sparked concerns about privacy rights, data protection, and the potential for abuse or misuse by state actors.

Similarly, the deployment of increasingly autonomous weapon systems, such as loitering munitions and AI-enabled drones, blurs the line between human and machine decision-making, raising questions about accountability, proportionality, and the risk of unintended escalation. As AI becomes more deeply embedded in military operations, there is a pressing need for international norms and standards to ensure that these technologies are developed and used responsibly, with appropriate human oversight and control [17].

The Russo-Ukrainian war has thrown into sharp relief the transformative impact of AI on modern conflict. From intelligence analysis and situational awareness to autonomous weapons and information warfare, AI is reshaping the contours of the battlefield and redefining what it means to wage war in the 21st century [18]. As the conflict unfolds, it will continue to serve as a crucible for the development and deployment of military AI, offering invaluable lessons for other nations seeking to harness the power of this emerging technology.

At the same time, the war underscores the urgent need for a global dialogue on the ethical, legal, and strategic implications of AI in warfare. As AI systems become more sophisticated and autonomous, it is essential that we grapple with the profound challenges they pose to human rights, international humanitarian law, and the stability of the international order. Only by engaging in this difficult but necessary conversation can we hope to build a future in which the immense potential of AI is harnessed for the benefit of all humanity, rather than becoming yet another tool of destruction and oppression.

Future of Warfare AI Integration

While AI can provide significant benefits in military decision-making and strategic planning, it is crucial to emphasize the importance of human-AI collaboration. AI should be considered a tool to augment and support human decision-makers, rather than replacing them entirely [19]. Military leaders must be able to understand the capabilities and limitations of AI systems, in-

terpret their outputs, and apply their own judgment and expertise in making final decisions.

Effective human-AI collaboration requires the development of trust, transparency, and accountability in AI systems. Military leaders must be able to understand how AI algorithms arrive at their recommendations and have the ability to override or adjust them when necessary. Moreover, there must be clear protocols and guidelines for the use of AI in military decision-making and strategic planning to ensure that its application is consistent with ethical, legal, and operational requirements.

The integration of AI in military decision-making and strategic planning offers significant potential benefits, such as improved situational awareness, faster and more comprehensive analysis, and the ability to explore a wider range of options and scenarios. However, it also presents several challenges and risks that must be carefully considered and addressed.

One of the key challenges in the application of AI in the military context is ensuring that its use is consistent with ethical and legal principles. There are concerns about the potential for AI systems to make decisions that may have unintended or harmful consequences, particularly in the context of lethal autonomous weapons systems (LAWS) [20]. As AI becomes more integrated into military decision-making and strategic planning, it is crucial to develop clear ethical guidelines and legal frameworks to govern its use and ensure that human operators retain meaningful control over critical decisions.

Another challenge in the integration of AI in military decision-making and strategic planning is the potential for adversarial actors to exploit or manipulate AI systems. As AI relies heavily on data inputs, adversaries may attempt to corrupt or manipulate data sources to mislead or deceive AI algorithms. Moreover, there are concerns about the vulnerability of AI systems to cyber attacks and the potential for unintended escalation or conflict due to AI-driven decisions or actions.

The integration of AI in military decision-making and strategic planning also raises questions about the readiness and adaptability of military organizations. Effective use of AI requires not only technological investments but also changes in organizational culture, processes, and training. Military leaders and personnel must be

equipped with the necessary skills and knowledge to work effectively with AI systems and interpret their outputs.

To fully realize the potential of AI in military decision-making and strategic planning, continued research and development efforts are necessary. Future research should focus on advancing AI technologies, such as machine learning, natural language processing, and computer vision, to enhance their capabilities in processing and analyzing military-relevant data. Moreover, research is needed to develop more effective human-AI interfaces and collaboration methodologies to ensure that AI systems are used in a way that complements and enhances human decision-making.

Another area for future research is the development of AI-enabled decision support systems that can provide military leaders with real-time recommendations and insights across various operational and strategic contexts [8]. These systems should be designed to be adaptable, scalable, and interoperable with existing military information systems and processes.

Finally, future research should also explore the ethical, legal, and societal implications of AI in the military context. This includes the development of ethical frameworks and guidelines for the responsible use of AI, as well as the establishment of governance mechanisms to ensure transparency, accountability, and oversight in the application of AI in military decision-making and strategic planning [21].

Conclusions

The integration of artificial intelligence in military decision-making and strategic planning represents a significant opportunity to enhance the effectiveness, efficiency, and adaptability of military operations. AI technologies can assist military leaders and planners in various aspects of decision-making, from situation assessment and course of action development to wargaming and strategic analysis.

However, the successful application of AI in the military context also requires careful consideration of the associated challenges and risks, including ethical and legal implications, potential vulnerabilities, and organizational readiness. Effective human-AI collaboration, based on trust, transparency, and accountability, is crucial to en-

suring that AI is used in a way that complements and enhances human decision-making.

Continued research and development efforts are necessary to advance AI technologies, develop more effective human-AI interfaces and collaboration methodologies, and explore the ethical, legal, and societal implications of AI in the military context. By harnessing the potential of AI while addressing the associated challenges, military organizations can improve their decision-making and strategic planning capabilities, ultimately enhancing their ability to respond to the complex and evolving challenges of modern warfare.

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Застосування штучного інтелекту у прийнятті військових рішень та стратегічному плануванні

Стрімкий розвиток штучного інтелекту (ШІ) суттєво вплинув на різні сфери діяльності людини, в тому числі на військову справу. Інтеграція штучного інтелекту у процеси прийняття військових рішень та стратегічного планування стала критично важливою сферою інтересу, пропонуючи значні можливості для покращення аналізу тактичних середовищ, підтримки розробки планів дій та підвищення загальної ефективності військових операцій. Ця стаття, першо-

чергово, досліджує різноманітні застосування штучного інтелекту у прийнятті військових рішень та стратегічному плануванні, включаючи оперативно-тактичну оцінку, розробку, створення та аналіз планів дій, воєнні ігри та стратегічний аналіз. Розглядаючи використання штучного інтелекту у поточній російсько-українській війні, стаття висвітлює його роль у збиранні розвідданих, націлюванні та інформаційній війні. Дослідження демонструє, що ШІ надає військовим унікальні можливості з обробки величезних обсягів даних, забезпечення швидкої та точної ситуаційної оцінки, генерації потенційних стратегій та підтримки прийняття критичних рішень. У контексті російсько-української війни ШІ довів свою ефективність у розвідувальній діяльності, аналізі супротивника, оптимізації бойового застосування безпілотних систем та протидії дезінформаційним кампаніям. Водночас стаття підкреслює виклики, пов'язані з інтеграцією штучного інтелекту, зокрема необхідність ефективної взаємодії людини та штучного інтелекту, етичні міркування та адаптацію існуючих процесів прийняття рішень. Особливо важливим є забезпечення належного людського контролю над системами ШІ та дотримання міжнародних правових норм. Стаття наголошує на важливості продовження дослідницьких та розробницьких зусиль для вдосконалення та просування технологій штучного інтелекту та вирішення етичних, правових та соціальних наслідків їх використання у військовому контексті. Підкреслюється, що ШІ повинен розглядатися як інструмент підтримки, а не повної заміни людського судження в критичних військових рішеннях. Зроблено висновок, що правильна інтеграція ШІ у військове планування може значно підвищити стратегічну адаптивність, ситуаційну обізнаність та ефективність військових операцій, водночас вимагаючи постійної уваги до етичних та правових аспектів його застосування.

Ключові слова: штучний інтелект, прийняття військових рішень, стратегічне планування, ситуаційна обізнаність, розробка курсу дій, воєнні ігри, російсько-українська війна, співпраця людини та ШІ, етичні міркування, дослідження та розробка