**Intelligent Algorithms: An Accelerator for Innovation in Tactics**

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● Calculate combat scenarios, calculate offensive and defensive actions, calculate force deployment, and estimate combat losses and results

**introduction**

As an important variable that changes battlefield rules in intelligent warfare, intelligent algorithms play the role of underlying support, intermediate driving, and terminal empowerment in seizing the initiative on the battlefield. Intelligent algorithms use a combination of knowledge reasoning, strategy optimization and other technologies to build data application models, simulate and evaluate tactics, and promote breakthroughs in tactics innovation. A deep understanding of the logical links, mechanism laws, and key links of intelligent algorithm-enabled tactics innovation will help accelerate the transformation of intelligent algorithm advantages into system confrontation advantages and asymmetric combat advantages, and create a new growth pole for system combat capabilities.

**Intelligent algorithms empower innovative logic links in tactics**

Intelligent algorithms can drive combat units to autonomously match targets according to combat missions, autonomously select paths with the help of engagement rules, and autonomously control in real time based on battlefield situations, thereby achieving rapid and autonomous closure of the kill chain and accelerating the innovation chain cycle of tactics.

Calculate combat scenarios. Combat scenarios are a concrete description and presentation of the battlefield, and are the basic basis for commanders to innovate tactics. Intelligent algorithms use deep learning, semantic association, and ubiquitous computing technologies to systematically build models covering different scales, granularities, temporalities, and functions, forming a set of combat scenarios that highly integrate humans, machines, and objects. Intelligent algorithms can deeply calculate the force organization, target distribution, number of platforms, and combat actions of the specific combat scenarios of the warring parties, analyze battlefield dynamics, force status, environmental changes, confrontation situation, and combat effectiveness, build a relatively "transparent" digital battlefield environment and combat situation, clear the battlefield fog, and present combat scenarios in a panoramic manner.

Actuarial attack and defense operations. Empowered by intelligent algorithms, combat units can speculate on the development and changes of battlefield situations according to circumstances, autonomously and comprehensively compare and solve enemy and our combat capabilities, systematically deconstruct combat tasks, accurately design attack and defense operations and combat processes, and realize the transformation from empirical estimation to precise operations. Combat units can conduct in-depth correlation analysis on our main attack direction, key points and areas, force organization and action sequence around seizing the initiative on the battlefield, and implement intelligent and autonomous attacks by using intelligent algorithms to select key targets, coordinated cluster attacks, and controlled standby surprise attacks, thus innovating combat methods and styles.

Deep calculation of force deployment. Relying on the advantages of intelligent algorithms, we can use engineering deconstruction methods to accurately quantify the global coordinated action requirements of combat elements, units, and forces in different fields, calculate the use and strike capabilities of enemy and our own forces, and build a force deployment that is consistent with the combat deployment, with echelon radiation and dynamic organization. For different combat operations in different directions, on the basis of using algorithms to accurately calculate the composition of force units, we optimize the design of the combat force organization mode, propose the optimal force organization plan, and maximize the guarantee of accurate deployment of combat forces and capability integration, and enhance the sensitivity of force deployment.

Calculate the damage and results of the battle. With intelligent algorithms as the core, under the guidance of engagement rules, decision-making strategies, knowledge models, etc., construct typical combat scenarios with strong confrontation and high risk to provide support conditions for calculating the situation of tactics and attacks. Based on pattern recognition, neural networks, deep learning and other intelligent algorithms, comprehensive use of combat experiments and other systems, by simulating the engagement situation and combat process of both sides, accurately analyze the offensive and defensive combat capabilities of the enemy and ourselves, accurately deduce multi-domain combat operations, and judge the damage effects, overall combat effects and potential risks of the strikes, target deviations, optimize tactics design, and form a multi-case and multi-case response tactics set.

**Intelligent algorithms empower the innovation mechanism of tactics**

Throughout the history of human warfare, new empowerment and new checks and balances are the basic rules for gaining a winning advantage. Algorithms, as the "soul" of artificial intelligence, are the key to doubling combat effectiveness on the intelligent battlefield. Intelligent algorithms accelerate the combat cycle and target the design of optimal tactics through precise calculations of combat elements and engagement principles.

Iterative game upgrades. The effectiveness of tactics can only be tested through continuous game confrontation. Intelligent algorithms enable innovation in tactics, closely focus on combat missions, highlight the integration of multiple scenarios and the superposition of multiple variables to create a typical battlefield environment, strengthen command confrontation of autonomous games, action confrontation supported by the system, and continuous confrontation in all domains and at all times. Through virtual confrontation deductions based on combat rules, we can understand the rules of confrontation, multiply the effectiveness of confrontation, gain confrontation advantages, analyze the fatal weaknesses or key nodes of the enemy's combat system, iteratively optimize and upgrade tactics, create a new "tactics chain", and seize the initiative in fierce war games.

Virtual and real co-evolution. With the help of virtual reality and digital twin technology, intelligent algorithms extract key information in all dimensions, stitch combat scenes across the entire domain, and holographically restore the battlefield. They map combat elements, combat rules, and combat actions to virtual space, creating a panoramically distributed, interconnected virtual digital parallel battlefield, achieving a panoramic visual battlefield environment, immersive battlefield action experience, and virtual-real interactive deduction of the battle situation. Through simulation modeling, the combat forces of the warring parties are virtually mapped, and the tactics are deduced in accordance with the rules of engagement, so as to continuously innovate tactics and means to defeat the enemy.

Brain-machine interpenetration generates intelligence. The "human brain" and "machine brain" form a loop and chain, and the strategic art and intelligent technology are deeply coupled, which is the focus of innovation in future war tactics. With the support of intelligent technologies such as knowledge graphs and rule reasoning, the analysis of combat thinking, strategic art, etc. is transformed into data information and mapped to digital space, and combat experiments are carried out from elements to systems, from single domains to full domains. Intelligent algorithm models are refined in iterative upgrades to achieve human-machine fusion design, deduction, evaluation and optimization of tactics.

**Intelligent algorithms empower key links in tactics innovation**

To win future wars, we urgently need to proactively design future operations, explore the key to empowering combat innovation with intelligent algorithms, and actively explore strategies and methods to defeat the enemy.

Design tactics in a coordinated manner. The design of tactics should be based on the actual force composition and equipment conditions, and should also be guided by the technical coupling, tactical fit, and capability aggregation of the new domain and new quality forces to achieve overall coordinated design. Focusing on building an integrated combat system, based on deep learning of combat data such as the enemy's situation, our situation, battlefield environment, and rules of engagement, accurately shape the virtual battlefield environment.

Equivalent verification of tactics. Embed intelligent algorithms into simulation systems, wargame systems, and combat experiment systems, develop tactic verification models, and aggregate to form a tactic verification system. Highlight the full-process embedding of difficult and dangerous situations, the full-process application of new domains and new forces, and the full-process embodiment of integrated joint operations, and explore the capability boundaries of combat units under high-intensity confrontation conditions. Flexible use of multiple methods to launch confrontational games with mutual conditions and opponents, and through dynamic regulation of virtual force actions, test the power limit and test the optimal solution.

Iteratively optimize tactics. Accurately grasp military needs, iteratively optimize algorithm models, build open source aggregated algorithm clusters and model libraries, and promote iterative optimization of tactics. Focus on the main actions and evaluation indicators of tactics, trace back the conclusions of tactics verification, conduct correlation analysis, comparison and verification of key indicator data such as action effectiveness, analyze the complex relationship and potential value between data, and optimize the design of tactics on this basis, and promote the iterative development of tactics innovation in the closed link of design, verification, and optimization.

Integrate and apply tactics. Tactics innovation is a proactive design to cope with changes in war, and it must be effectively extended and transformed to lead training and guide preparations. Relying on the network information system, specific tactics, action tactics, and style tactics are comprehensively integrated to form a tactics system. Focus on the "last mile" of transforming scientific and technological power into combat effectiveness, open up transformation channels, and promptly incorporate innovative tactics that have been evaluated and demonstrated into combat plans, training practices, and equipment systems. In addition, secondary innovation and rolling development are carried out in combat and training practices, driving combat effectiveness from level-by-level and domain-by-domain transformation to synchronous and immediate transformation and upgrading, and effectively transforming algorithm-enabled advantages into system confrontation advantages and asymmetric combat advantages.