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THE IMPACT OF DATA ANALYTICS AND ARTIFICIAL INTELLIGENCE ON TACTICAL PLANNING IN FOOTBALL

ВПЛИВ АНАЛІТИКИ ДАНИХ ТА ШТУЧНОГО ІНТЕЛЕКТУ НА ТАКТИЧНЕ ПЛАНУВАННЯ У ФУТБОЛІ

Nagorna V.O. / Нагорна В.О.*c.s.p.e.s., as.prof. / к.фіз.вих., доц.*

ORCID: 0000-0003-2607-7412

Mytko A.O. / Митько А.О.*Ph.D. / д.ф.*

ORCID: 0000-0002-5139-3751

Rusnak N.O. / Руснак Н.О.*Lecturer / викладач*

ORCID: 0009-0006-6602-7099

Bairachniy O.V. / Байрачний О.В.*c.s.p.e.s., as.prof. / к.фіз.вих., доц.*

ORCID: 0000-0003-3013-0845

*National University of Ukraine on Physical Education and Sport,**Kyiv, Fizkultury 1, 02000**Національний університет фізичного виховання і спорту України,**Київ, Фізкультури 1, 02000*

Анотація. Інтеграція аналітики даних і штучного інтелекту (ШІ) у тактичне планування футбольних команд суттєво змінила підхід до підготовки, стратегічного планування та участі команд у головних змаганнях. У цій статті досліджується еволюція футбольної аналітики, зокрема перехід від базової статистики до складних метрик і передових технологічних інструментів, таких як Opta, Wyscout і Hudl. Ці нововведення дозволяють проводити глибокий аналіз відеозаписів матчів, продуктивності гравців і тактичних схем.

Методи дослідження. У дослідженні проведено комплексний аналіз існуючих технологічних платформ і методів машинного навчання у футбольній аналітиці. Оцінювалися можливості обробки даних алгоритмами ШІ та машинного навчання для виявлення тенденцій, прогнозування результатів та ідентифікації тактичних патернів, таких як контрпресинг і контратаки. Також було проаналізовано вплив цих технологій на обґрунтованість прийняття рішень, тактичні корективи в режимі реального часу та вдосконалення навичок гравців.

Результати. Результати дослідження показують, що аналітика даних і ШІ значно покращують процес прийняття рішень, дозволяючи тренерам приймати тактичні рішення на основі даних і вносити корективи в реальному часі під час матчів. Дослідження також демонструє, як ці технології забезпечують конкурентну перевагу, дозволяючи командам аналізувати суперників і розробляти цілеспрямовані стратегії. Окрім того, аналітика даних сприяє вдосконаленню навичок гравців, допомагаючи визначити аспекти для покращення та створюючи персоналізовані програми тренувань.

Висновки. Майбутнє футбольної аналітики полягає у подальшій інтеграції ШІ, машинного навчання та нових технологій, таких як віртуальна і доповнена реальність. Ці інновації сприятимуть подальшому вдосконаленню тактичного планування, прийняття стратегічних рішень і підготовці гравців, надаючи командам конкурентну перевагу в умовах

змінюваного футбольного середовища.

Ключові слова: аналітика даних, штучний інтелект, футбольна тактика, машинне навчання, розвиток гравців, конкурентна перевага.

Abstract. *The integration of data analytics and artificial intelligence (AI) into tactical planning for football teams has significantly transformed how teams prepare, strategize, and compete in major competitions. This paper explores the evolution of football analytics, highlighting the shift from basic statistics to complex metrics and advanced technological tools such as Opta, Wyscout, and Hudl. These advancements enable in-depth analysis of match footage, player performance, and tactical patterns.*

Methods of research. *The study comprehensively analyzes existing technological platforms and machine-learning techniques in football analytics. Data processing capabilities of AI and machine learning algorithms were assessed for their ability to identify trends, predict outcomes, and detect tactical patterns such as counter-pressing and counterattacks. The impact of these technologies on informed decision-making, real-time tactical adjustments, and player development was also analyzed.*

Result. *Findings demonstrate that data analytics and AI significantly enhance decision-making processes, allowing coaches to make data-driven tactical decisions and real-time adjustments during matches. The research further reveals how these technologies provide a competitive advantage by enabling teams to analyze opponents and develop targeted strategies. Additionally, data analytics facilitates player development by identifying areas for improvement and creating personalized training programs.*

Conclusions. *The future of football analytics lies in the continued integration of AI, machine learning, and emerging technologies such as virtual and augmented reality. These innovations are poised to further enhance tactical planning, strategic decision-making, and player development, offering teams a competitive edge in the evolving landscape of football.*

Keywords: *data analytics, artificial intelligence, football tactics, machine learning, player development, competitive advantage.*

Results

Data analytics and artificial intelligence (AI) have significantly transformed tactical planning and decision-making for football teams in major competitions. This section outlines the evolution of football analytics, the role of AI and machine learning, and their impact on tactical analysis, real-time decision-making, competitive advantage, and player development.

Evolution of Football Analytics

Historical Context: Football analytics has evolved from a rudimentary focus on basic statistics such as goals scored, possession percentages, and shot counts to more sophisticated metrics that offer deeper insights into the game. The development of complex metrics, such as expected goals (xG), player influence, and defensive solidity, reflects the growing understanding of the multifaceted nature of football performance.

Technological Advancements: The advent of advanced software platforms like Opta, Wyscout, and Hudl has been instrumental in this evolution. These tools have

expanded the breadth of data available and enhanced the depth of analysis. They allow for granular examination of match footage, offering detailed breakdowns of player movements, pass networks, and tactical patterns. This comprehensive data collection and analysis enable teams to identify subtle patterns and trends that were previously undetectable.

Role of Artificial Intelligence and Machine Learning

Data Processing: AI and machine learning algorithms have the capacity to process vast datasets at a speed and accuracy unattainable by human analysts alone. These technologies can sift through large volumes of match data, identifying trends, patterns, and correlations that inform predictive models. For instance, AI can assess a player's technical and physical attributes, game context, and historical performance to forecast potential outcomes and optimize tactical decisions.

Tactical Pattern Detection: Machine learning algorithms can analyze positional and event-based data to uncover tactical patterns. For example, these algorithms can automatically detect and classify complex in-game strategies such as counter-pressing, zonal marking, or counterattacking sequences. The automated detection of these patterns facilitates quicker and more accurate tactical analysis, allowing coaches to develop counter-strategies or refine their team's approach more efficiently.

Tactical Analysis and Decision-Making

Informed Decision-Making: Integrating data analytics into tactical decision-making has provided coaches with actionable insights into player performance and team dynamics. This data-driven approach enables more informed decisions regarding tactics, player selection, and game preparation. For instance, analytics can reveal a player's effectiveness in specific tactical setups or against particular opponents, thereby guiding strategic choices that maximize team performance.

Real-Time Adjustments: The deployment of Internet of Things (IoT) devices and sensors during matches allows for the real-time collection and analysis of performance data. Coaches can monitor key metrics such as player fatigue, positional discipline, and passing accuracy in real-time, enabling them to make tactical adjustments on the fly. This capability is particularly valuable in responding to

dynamic game situations, such as adapting to an opponent's tactical shift or capitalizing on emerging weaknesses.

Competitive Advantage and Player Development

Strategic Edge: Teams that leverage data analytics gain a significant competitive advantage. By thoroughly analyzing their own performance and their opponents, teams can identify weaknesses and opportunities that might otherwise go unnoticed. This strategic insight allows for developing game plans that exploit these weaknesses, enhancing the likelihood of success.

Player Development: Data analytics also plays a crucial role in player development by identifying specific areas for improvement. Through detailed performance tracking, coaches can design targeted training programs tailored to each player's needs. For example, analytics might reveal that a player struggles with defensive positioning in certain situations, leading to focused drills that address this issue. Such personalized training contributes to overall team improvement and can have a decisive impact on match outcomes.

Future Directions

Continued Integration: The future of football analytics is poised to see even greater integration of AI, machine learning, and emerging technologies like virtual reality (VR) and augmented reality (AR). These innovations enhance tactical planning by providing immersive, interactive analysis tools. Additionally, they will likely revolutionize player development by offering new ways to simulate match scenarios and provide feedback. As these technologies evolve, they will continue to push the boundaries of what is possible in football strategy and performance optimization.

Conclusions

Data analytics and AI have become integral to football's tactical planning, offering teams a competitive edge through enhanced decision-making, real-time strategy adjustments, and improved player development.

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