

EVOLVING ROLE OF AI IN PREDICTIVE ANALYTICS AND DECISION-MAKING

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Анотація

Було розглянуто використання технологій штучного інтелекту в прогностичній аналітиці та їхню роль у різних аспектах прийняття рішень. Також були розглянуті майбутні перспективи цих технологій. Крім того, висвітлено, як штучний інтелект та машинне навчання можуть впливати на стратегії прийняття рішень у різних сферах.

Ключові слова: штучний інтелект, прогностична аналітика, машинне навчання, прийняття рішень, майбутні перспективи.

Abstract

The use of artificial intelligence technologies in predictive analytics and their role in various aspects of decision-making were considered. The future prospects of these technologies were also discussed. In addition, it highlights how artificial intelligence and machine learning can influence decision-making strategies in various fields.

Keywords: artificial intelligence, predictive analytics, machine learning, decision-making, future perspectives.

Artificial Intelligence (AI), which simulates human intelligence processes such as learning, reasoning, problem-solving, perception, and language understanding, has become an integral part of our contemporary technological world. With remarkable advancements in computational power and data availability, we have witnessed its exponential growth and widespread application across multiple sectors.

AI applications range from advanced web search engines like Google Search to recommendation systems utilized by platforms like YouTube, Amazon, and Netflix. It also encompasses systems for understanding human speech such as Siri and Alexa, as well as self-driving cars and generative or creative tools like ChatGPT and AI art. In addition, AI's potential has been recognized in automated decision-making and in competing at the highest level in strategic game systems such as chess and Go [1].

Another critical application of AI is found in Predictive Analytics. This is a branch of advanced analytics that utilizes historical data, statistical algorithms, and machine learning techniques to anticipate future outcomes. Although Predictive Analytics does not claim to predict the future with absolute certainty, it provides valuable insights beyond what the naked eye can see by forecasting potential future events with a considerable level of reliability.

The synergy of AI and Predictive Analytics has been notably beneficial. Machine learning, an AI technique, is increasingly integrated into predictive analytics models, thereby significantly enhancing their accuracy and efficiency. AI-powered predictive analytics models can identify complex patterns and trends in large datasets, offering insights into potential future outcomes based on these patterns.

AI and Predictive Analytics have applications in a wide variety of fields, including healthcare, finance, marketing, and logistics. They are pivotal in decision-making processes, enabling organizations to make data-driven decisions and strategically plan for the future.

As we continue to adopt AI and similar technologies as part of our social infrastructure, it is important to also consider potential effects on society as a whole. This includes understanding the interactions and implications of AI-enabled systems, which are increasingly relied upon for many social functions [2].

Artificial Intelligence (AI) and Predictive Analytics have evolved in parallel, and their integration has led to substantial advancements in various industries. Predictive Analytics focuses on extracting information from existing data sets to identify patterns and predict future outcomes and trends. The field has been a subject of research since the 1940s, but it was the explosion of digital data in the late 20th and early 21st centuries that truly propelled Predictive Analytics to its current status.

AI, particularly machine learning algorithms, has significantly enhanced the capabilities of Predictive Analytics. Machine learning algorithms learn the inherent patterns in the training data and use this understanding to make predictions on new, unseen data. This AI-driven Predictive Analytics approach has revolutionized industries, offering improved decision-making capabilities based on foresight and data-driven insights.

The integration of AI and Predictive Analytics, although relatively recent, is rapidly evolving [3]. The impact on decision-making processes, especially in business contexts, has been profound and continues to be a critical area of research and development. The exploration of the evolving role of AI in Predictive Analytics and its impact on decision-making is an important topic in contemporary research.

AI plays a pivotal role in the decision-making process across various domains. By leveraging vast datasets and sophisticated algorithms, AI delivers insights and predictions that significantly enhance the quality and speed of decisions. The essence of employing AI in decision-making involves automating routine decision-making processes, predicting outcomes of potential decisions, and providing actionable insights based on comprehensive data analysis. This approach enables decision-makers to respond rapidly to changes in their environment, increases efficiency, and allows them to focus on strategic tasks where human intuition and interaction are crucial.

Machine learning, a subset of AI, is particularly impactful in decision-making. Once trained on historical data, machine learning models are capable of identifying patterns and trends in data that may be unrecognizable to human analysts. Additionally, these models can learn and improve over time, refining their predictions as more data becomes available.

As the Gartner report states, the future will be shaped not just by those who can predict what will likely happen but by those who can take these predictions and make strategic decisions [4].

Artificial Intelligence (AI) offers various contributions to decision-making, influencing multiple areas, such as predictive and prescriptive analytics, decision automation, risk management, and personalization.

1. **Predictive Analytics:** AI and machine learning significantly enhance predictive analytics, enabling forecasting of future outcomes based on historical data, thereby supporting proactive decision-making.

2. **Prescriptive Analytics:** Beyond predictive analytics, prescriptive analytics uses AI to suggest several courses of actions, guiding towards optimal solutions. It leverages simulation algorithms, decision-tree methodologies, and machine learning to provide decision-making recommendations.

3. **Decision Automation:** AI allows for automation of routine decision-making tasks, ranging from simple decisions like spam email filtering to complex ones such as real-time bidding in digital advertising.

4. **Risk Management:** AI algorithms can detect potential risks and anomalies in real-time, enabling organizations to respond quickly and avert possible crises.

5. **Personalization:** In consumer-centric industries, AI facilitates personalized decision-making to enhance customer experiences, tailoring services and products to individual customer preferences, leading to increased customer satisfaction and loyalty.

Looking ahead, AI's influence on predictive analytics and decision-making is set to deepen further. Here are some future perspectives to consider:

1. **Enhanced Decision Intelligence:** The future of decision-making is in decision intelligence, a discipline that combines technology, applications, and processes to make data-informed decisions guided by AI. Decision intelligence will increasingly utilize AI and machine learning to navigate complex decision-making, leading organizations towards more strategic and efficient outcomes.

2. **Democratization of AI:** AI tools will become increasingly accessible, enabling businesses of all sizes to leverage AI-driven predictive analytics and decision-making. This democratization will stimulate competitiveness and innovation across businesses and industries.

3. **Data Quality Management:** The growth of AI and predictive analytics will usher in a renewed focus on data quality management. Advanced tools for data gathering, cleaning, and processing will likely become integral components of data management strategies as inaccurate or poor-quality data can significantly impact AI's effectiveness.

4. Ethical AI and Decision-making: As AI becomes increasingly involved in decision-making processes, ethical considerations will become even more critical. Future advancements in AI will need to address these concerns to promote responsible use of AI in decision-making.

5. Integration of AI across various domains: The future will likely see an increased integration of AI into diverse sectors. From healthcare to finance to logistics, AI's role in predictive analytics and decision-making will extend across different domains, leading to significant advancements and efficiency gains.

6. Enhanced Human-AI collaboration: Future systems will likely focus on optimizing human-AI collaboration, supporting humans in making decisions rather than completely taking over the decision-making process. This approach will leverage the strengths of both AI (in processing vast amounts of data and identifying patterns) and humans (in providing context, moral reasoning, and creativity).

In conclusion, AI's role in predictive analytics and decision-making is both transformative and indispensable. As we move forward, it's essential for organizations to adapt and evolve with these advancements, capitalizing on the immense potential that AI offers for data-driven decision-making. The future of AI in this realm is bright and holds the promise of a more efficient, strategic, and data-informed world.

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