253. ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING IN ECONOMICS

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The paper examines the role of Artificial intelligence I and machine learning in economic research in the context of data growth. The differences between machine learning and econometrics are analyzed. The application in forecasting, text analysis, and policy assessment is highlighted. The problems of data quality and interpretability of models are discussed.

Economics has always been based on data, but today's intense growth in its volume, speed and diversity has opened up a unique opportunity to apply artificial intelligence (AI) and machine learning technologies that were previously inaccessible to traditional analytical methods. The transition from small structured datasets to massive diverse streams of information requires a methodological evolution in economic research, where machine learning algorithms are becoming a necessary tool for extracting practically meaningful conclusions from information.

Artificial intelligence is the ability of computer systems to perform tasks that normally require human intelligence: such as learning, analyzing problems, and making decisions. One of the key sections of AI is machine learning. It develops algorithms that are trained on arrays of data, revealing hidden patterns and dependencies. Unlike classical programming, the algorithm itself identifies patterns in diverse datasets (e.g., numerical indicators, text, images, and sensor data) [1].

Over the past few years, artificial intelligence has opened new frontiers in economic and financial research. Thanks to its highly developed abilities for perception, learning and analysis, AI allows solving tasks that traditional methods can hardly cope with. Economics and finance as systems are characterized by high complexity, heterogeneity of data and constant variability, which requires fundamentally new technological approaches. The development of big data tools and the growth of computing power have created the necessary conditions for the introduction of AI, which has significantly expanded the horizons of classical economics.

Machine learning and traditional econometrics, being two key methodologies in economic and financial research, have fundamental differences that define their unique application niches. Machine learning is an inductive based on data paradigm. Its main goal is to maximize the accuracy of forecasts by identifying complex nonlinear patterns and efficiently processing multidimensional (including unstructured) data. The price for this is low interpretability ("black box") and weak support for causal inference. Traditional econometrics is a deductive paradigm guided by theory. Its core is hypothesis testing and identification of strict causal relationships (for example, through instrumental variables) with high transparency of the model. However, it is limited by strict assumptions and requires manual feature selection, which makes it vulnerable when working with complex unstructured data. Under the current conditions, artificial intelligence methods, primarily machine learning, are becoming the main tool for solving such problems due to their ability to process huge amounts of data and use self-tuning algorithms [2].

Machine learning methods are becoming increasingly widespread in economics and finance, opening up new research tools and expanding the possibilities of solving complex problems through efficient data processing. In the field of predictive modeling, machine learning methods can achieve higher accuracy when working with complex macroeconomic indicators by integrating diverse data sources. A key application of machine learning is alternative data analysis, where natural language processing extracts indicators of political uncertainty from news and evaluates the tone of corporate reporting. In causal analysis, machine learning provides new ways to choose control variables and evaluate policy interventions. Random forest algorithms and counterfactual analysis methods make it easier to identify cause-and-effect relationships than econometric models [3].

Rapid growth in data has made artificial intelligence and machine learning valuable complements to econometrics for finding nonlinear patterns and using alternative data. Adoption is limited by model opacity, data-quality issues, and challenges for causal inference. Reliable use requires data curation, interpretability tools and causal-aware methods.

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