APPLICATION OF ARTIFICIAL INTELLIGENCE IN AUTOMATED FINANCIAL RISK MANAGEMENT SYSTEMS

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Financial risk management is a key area in the activities of financial institutions, banks and corporations. In today's conditions of dynamic market development and high competition, automated financial risk management systems (AFS) have become an integral part of collecting, processing and analyzing large amounts of data for timely identification of potential threats and decision-making. These systems integrate a variety of tools and technologies, including statistical analysis and modeling techniques, as well as the latest intelligent approaches. In recent years, considerable attention has been paid to the use of artificial intelligence (AI) algorithms, which can increase the accuracy of forecasts and the adaptability of systems to changing conditions. Structurally, ICS consists of data collection modules, analytical tools, decision support systems, and monitoring and control modules [1]. Thus, financial risks are a complex phenomenon that covers various types and sources of uncertainty, and their management requires the use of integrated approaches, including the use of modern automated systems and artificial intelligence technologies to improve the quality of analysis and forecasting of risk factors. Financial risk management also requires the use of AI-based decision support systems that integrate real-time analytics, simulate various scenarios, and make recommendations for management.

The purpose of the study is to apply artificial intelligence in automated financial risk management systems in order to increase the accuracy, efficiency and efficiency of managerial decision-making in the financial sector. Within the framework of the study, a model for forecasting the credit risk of bank customers has been developed, which allows assessing solvency based on historical data and modern machine learning methods. Thus, artificial intelligence technologies in the financial sector create new opportunities for improving the efficiency of financial risk management, automation of analytical processes and adaptive response to external and internal threats, which confirms their important role in modern automated management systems. The use of modern technologies in the financial sector makes it possible to significantly reduce various risks, optimize processes and increase the efficiency of institutions.

Artificial intelligence is a branch of computer science that deals with the creation of systems capable of performing tasks that would normally require human intelligence. Such tasks include pattern recognition, natural language processing, decision-making, and forecasting. In today's environment, AI is an important tool in the financial field, particularly in risk management, where accuracy, speed, and volume of data processing play a critical role. Financial risk management traditionally involves risk assessment, monitoring and making appropriate management decisions. AI allows you to significantly improve these processes by automating routine tasks, increasing the accuracy of forecasts, and reducing the subjectivity of assessments. The key advantage of AI in risk management is its ability to adapt to changing market conditions. Traditional models usually have a fixed structure and limited upgrade options. Instead, AI systems are able to self-learn from new data, making them especially effective in dynamic environments. In addition, thanks to integration with digital platforms, AI can work in real time, which significantly improves the speed of response to potential threats. In the field of financial analysis, AI also acts as an analytical tool for building forecasting models, analyzing scenarios, detecting fraudulent transactions, and improving the overall level of security of the financial system. It is especially important to use explainable models (Explainable AI), which allow you to get not only the result, but also understand the logic of decision-making, which is critical for financial institutions operating in a highly regulated environment. Overall, the role of AI in risk management is to streamline the processes of identifying, assessing, and responding to financial threats. The use of intelligent algorithms allows you to reduce decision-making time, minimize the impact of the human factor and increase the effectiveness of the risk management system.

Within the framework of the study, a practical case of building a model for forecasting the credit risk of bank customers was implemented. The main goal is to create an intelligent classification system capable of determining whether the client will be able to service the loan in a timely manner in the future. Such a system allows the bank to reduce the likelihood of losses due to non-repayment of loans, increase the effectiveness of risk management and make informed credit decisions.

For the simulation, an open dataset from the Kaggle platform — Home Credit Default Risk — was used. This dataset contains more than 300,000 records of clients with various characteristics such as age, income level, number of dependents, credit history, type of housing, employment, etc. Data was cleaned and transformed. A significant number of missing values were identified and removed in categories where padding is not appropriate. Numerical features have been normalized using mini-max scale. Categorical

variables are encoded using the one-hot encoding method for compatibility with machine learning algorithms. Sampling balancing was also carried out using the SMOTE method to eliminate the imbalance between classes (solvent and insolvent customers). The following results were achieved in the study: The opportunities, advantages and challenges of using artificial intelligence in automated financial risk management systems are analyzed.

The analysis of theoretical foundations, classification of financial risks, technical features of the implementation of intelligent systems, as well as practical modeling on the example of credit risk forecasting has been carried out. General approaches to financial risk management are considered, their classification and features in modern economic conditions are determined.

The basic principles of building automated control systems are analyzed and the feasibility of introducing intelligent methods, in particular machine learning and neural networks, into financial analytics is substantiated. An analysis of modern methods of artificial intelligence used for risk analysis and forecasting is carried out. The features of deep learning models, decision trees, ensemble methods, as well as criteria for evaluating their effectiveness are considered. Particular attention is paid to the issues of model interpretation, which is an important factor for the implementation of AI in risk management practices in accordance with regulatory requirements.

In general, the results of the study confirm the high efficiency of using artificial intelligence methods for automated analysis and forecasting of financial risks. The developed models are able not only to increase the accuracy of risk identification, but also to ensure the efficiency of decision-making in financial institutions. At the same time, their implementation requires proper technical and organizational support, including issues of interpretation, validation and adaptation to changes in the market environment.

References

1. Ministry of Digital Transformation. The concept of AI development in Ukraine. – URL: https://thedigital.gov.ua.

2. Ekonomichna Pravda. The use of AI in Ukrainian banks. – URL: https://www.epravda.com.ua.3.

3. Action. Digital transformation of finance in Ukraine. – URL: https://diia.gov.ua.