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5.2.2. Математические, статистические и инструментальные методы экономики (физико-математические науки, экономические науки)

РОЛЬ ИСКУССТВЕННОГО ИНТЕЛЛЕКТА В ВЫЖИВАЕМОСТИ ЭКОНОМИЧЕСКИХ СИСТЕМ

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Мы все являемся свидетелями революции в области искусственного интеллекта. Статья описывает роль систем искусственного интеллекта в выживании экономических систем, акцентируя внимание на ключевых компонентах ИИ, примерах успешного применения и будущих направлениях исследований. Приводится краткое описание возможностей применения Автоматизированного системно-когнитивного анализа (АСК-анализ) и его программного инструментария – интеллектуальной системы «Эйдос» для решения экономических задач. Кратко рассмотрены следующие направления применения ИИ: финансовый сектор, промышленность, АПК и другие

Ключевые слова: СИСТЕМЫ ИСКУССТВЕННОГО ИНТЕЛЛЕКТА, АВТОМАТИЗИРОВАННОГО СИСТЕМНО-КОГНИТИВНОГО АНАЛИЗА (АСК-АНАЛИЗ), ИНТЕЛЛЕКТУАЛЬНАЯ СИСТЕМА «ЭЙДОС»

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5.2.2. Mathematical, statistical and instrumental methods of economics (physical and mathematical sciences, economic sciences)

THE ROLE OF ARTIFICIAL INTELLIGENCE IN THE SURVIVAL OF ECONOMIC SYSTEMS

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We are all witnessing a revolution in the field of artificial intelligence. The article describes the role of artificial intelligence systems in the survival of economic systems, focusing on the key components of AI, examples of successful applications and future research directions. The study gives a brief description of the possibilities of using Automated system-cognitive analysis (ASC-analysis) and its software tools – the intelligent Eidos system for solving economic problems. The following areas of application are briefly considered: the financial sector, industry, agriculture and others

Keywords: ARTIFICIAL INTELLIGENCE SYSTEMS, AUTOMATED SYSTEM-COGNITIVE ANALYSIS (ASC-ANALYSIS), INTELLIGENT EIDOS SYSTEM

1. Introduction

1.1. The relevance of research

Modern economic systems face challenges that require rapid decision-making and adaptation to constantly changing conditions. In this context, artificial intelligence (AI) systems are playing an increasingly significant role. AI offers tools for big data analysis, forecasting and process automation, which contributes to the survival and sustainable development of economic systems.

1.2. Goals and objectives of the study

The purpose of this study is to analyze the role of artificial intelligence systems in the survival and adaptation of economic systems. Tasks include:

1. Identify key components of AI systems that impact economic systems.

2. Analysis of examples of successful application of AI in various economic contexts.

3. Research on the potential of AI to improve the resilience of economic systems under conditions of uncertainty.

1.3. Research methodology

The study uses data analysis methods, a systems approach, and case studies of AI applications. To confirm hypotheses, both quantitative and qualitative methods of analysis are used.

2. Materials and methods

2.1. Data sources

To conduct the study, data was used from scientific publications, reports of international organizations, as well as specific examples from industry and the financial sector. Additionally, data from open databases and statistical sources was used for analysis.

2.2. Analysis methods

The following methods are used in the study:

1. Systems analysis - to understand the complex impact of AI on economic systems.

2. Automated system-cognitive analysis (ASC-analysis) - to understand the complex impact of AI on economic systems.

3. Econometric methods - to assess the impact of AI on key economic indicators.

4. Case analysis - for a detailed study of examples of successful application of AI in the economy.

2.3. Research structure

The study is structured as follows: introduction, description of methodology, research results, discussion and conclusions. Each part contains detailed analysis and conclusions, supported by examples and data.

3. Results

3.1. Key components of AI systems in economics

AI systems include several key components that impact economic systems:

1. Machine learning - provides big data analysis and predictive models.

2. Natural language processing - allows you to automate interaction with customers and analyze text data.

3. Robotization of processes - automation of routine tasks and increased efficiency.

3.2. Examples of successful applications of AI

3.2.1. Financial sector

In the financial sector, AI is used to analyze risks, predict market trends and automate trading operations. An example of a successful application is the use of machine learning algorithms to predict credit risk, which allows banks to reduce losses from non-repayments.

3.2.2. Industry

In industry, AI helps optimize production processes, reduce costs and improve product quality. Implementing predictive maintenance systems allows businesses to proactively identify and resolve potential equipment failures, reducing downtime and increasing productivity.

Scenario ASC analysis is proposed as a practical method to solve this problem. Although it is not rigorous in a mathematical sense, this method allows you to model the development of situations in the agro-industrial complex (AIC) by representing the predicted scenario as a combination of partial forecasts, weighted by their importance.

The modern educational environment is very dynamic, and this causes significant difficulties for teaching staff (teaching staff). They are forced to spend a lot of time and effort on constantly updating the curriculum (RP) and assessment funds (AF) in accordance with the ever-changing requirements of the Educational and Methodological Directorate (TED). The requirements relate to both the design (templates) and content of materials. This problem is acute in almost all universities in Russia.

In 2013, Professor E.V. Lutsenko proposed using modern web technologies to solve this problem, but this solution was not implemented due to lack of support from management. This article proposes a simpler solution based on web technologies.

All teachers know that in order to publish articles, it is necessary to ensure their high level of originality, verified by the Anti-Plagiarism-University system. This requirement can be extended to RP and FOS. If you analyze these documents, it becomes obvious that they contain a large number of borrowings from open sources on the Internet, such as Federal educational standards, work curricula (RUPs), basic professional educational programs (BEP), library resources and materials related to material and technical provision. As a result, the originality of these documents turns out to be very low, about 1%, since they consist of 99% materials from official sources.

The question arises about the advisability of duplicating this information in the RP and the FOS. If these documents contain only hyperlinks to open source materials, this will eliminate the need to constantly update and re-sign them when source materials change. With the Internet, this solution seems more effective and logical.

If some materials are not on the Internet, they can be centrally posted on the university website and linked to them from the RP and FOS. Thus, this will save a large number of highly qualified specialists, doctors and candidates of

science, professors and associate professors from a senseless waste of time and effort.

One of the goals of a trading agricultural company is to increase profits and profitability. To do this, the management of the agricultural company constantly solves the problem of determining the range and volumes of goods, the purchase and sale of which will bring the greatest profit and profitability. However, traditional methods, which involve accounting for costs and revenues for each product and determining its contribution to overall profits and profitability, are very labor-intensive and are not suitable for large agricultural trading firms. This is due to the lack of source data and software tools necessary for such calculations. The project is relevant because it offers simple and accessible methodologies, technologies, software tools and methods of their application, which can be used even by small trading agricultural firms and individual entrepreneurs to achieve this goal.

There are many disciplines related to artificial intelligence, such as intelligent systems, foundations of artificial intelligence, intelligent information systems, knowledge discovery, representation and use, knowledge representation models, knowledge engineering, artificial intelligence methods, decision making methods and others. For distance teaching and learning of all these disciplines, the personal intellectual online environment “Eidos” (open source software), which is widely used throughout the world, can be effectively used.

This environment includes automated systemic cognitive analysis (ASC analysis), the Eidos intelligent system, as well as the website http://lc.kubagro.ru and the system’s FTP server. The site contains a large amount of scientific and educational literature, installations and updates of the Eidos system, and 411 intelligent cloud Eidos applications are available on the FTP server for all users.

The goal of investment theory is to maximize returns for the investor. However, it is often overlooked that the invested party seeks to improve the

situation in its real sphere, and the regional administration is interested in improving the quality of life of the population. Making correct and scientifically based decisions on the size and direction of investments is a complex task. To solve this problem, you can effectively use the personal intelligent online environment “Eidos” (open source software), which is widely known all over the world. This system is a software tool for Automated Systemic Cognitive Analysis (ASC Analysis). Installations and updates of the Eidos system are available on the website http://lc.kubagro.ru, which also contains a large amount of scientific literature on its use for these purposes.

Automated control systems (ACS) are rarely used to manage economic systems in the agro-industrial complex (AIC). This is due to difficulties in creating mathematical models that adequately reflect the strength and direction of influence of various factors on the control object, assessing the stability of control, the degree of determinism of the future states of the object and developing control decisions. In addition, it is difficult to create adaptive models that take into account local characteristics and the dynamics of the properties of the control object. To solve these problems, the personal intelligent online environment “Eidos” (open source software), widely known throughout the world, can be effectively used. This system is a tool for Automated Systemic Cognitive Analysis (ASC Analysis). Installations and updates of the Eidos system are available on the website http://lc.kubagro.ru, which also contains a large amount of scientific literature on its use for these purposes.

The goal is to improve the speed and accuracy of diagnosis, as well as increase the efficiency of decision-making on prevention and treatment plans for farm animals and poultry. To achieve this goal, it is assumed to interact with the client online in his language and using his data. This will be carried out using automated systemic cognitive analysis (ASC analysis) and the Eidos intelligent system.

The goal is to determine the connections between the applied agricultural technologies and other conditions for growing crops, on the one hand, and the results of activities in physical and value terms, on the other hand. To achieve this goal, it is assumed to interact with the client online in his language and using his data. This will be carried out using automated systemic cognitive analysis (ASC analysis) and the Eidos intelligent system.

The goal is to train customer specialists at the expert level, including knowledge of the theoretical foundations and practice of using automated systemic cognitive analysis (ASC analysis) and its software tools, such as the Eidos intelligent system. This is intended for the development and use of cloud-based intelligent Eidos applications capable of solving a variety of problems in the field of identification, forecasting, decision making and model research in various scientific and practical fields. The mechanism for achieving this goal involves online interaction with the customer in his language and using his data using automated system-cognitive analysis (ASC analysis) and the tools of the Eidos intelligent system.

Instructions for developing your own intelligent cloud application Eidos are available at the following address:
http://lc.kubagro.ru/aidos/How_to_make_your_own_cloud_Eidos-application.pdf.

3.3. The potential of AI to improve resilience

AI has significant potential to improve the resilience of economic systems in the face of uncertainty. Forecasting market trends and analyzing risks allows enterprises to quickly adapt to changes in the external environment. Process automation reduces dependence on the human factor and reduces operational risks.

4. Discussion

4.1. The Impact of AI on Cost Efficiency

AI systems significantly increase economic efficiency by optimizing processes, improving the quality of decision-making and reducing costs.

Adopting AI allows businesses to more accurately forecast demand, optimize inventory, and manage supply chains.

4.2. Problems and risks of implementing AI

Despite the obvious benefits, the implementation of AI is associated with a number of challenges and risks. This includes the need for significant investment, concerns about data security and the impact on the labor market. It is also important to consider ethical aspects of the use of AI, such as transparency of algorithms and protection of personal data.

4.3. Future Research Directions

Further research into the role of AI in economic systems needs to focus on developing more resilient and adaptive models, as well as studying the long-term effects of AI implementation. An important focus is also the integration of AI with other advanced technologies such as blockchain and the Internet of Things (IoT).

5. Conclusion

5.1. Conclusions

Artificial intelligence systems play a key role in the survival and sustainable development of economic systems. AI provides tools for data analysis, forecasting, and automation, leading to greater cost efficiency and agility. However, to realize the full potential of AI, it is necessary to consider the risks and ethical aspects associated with it.

5.2. Recommendations

For the successful implementation of AI in economic systems, it is recommended:

1. Invest in the development and training of personnel to work with AI.

2. Ensure transparency and security of algorithms.

3. Promote interdisciplinary collaboration to integrate AI with other technologies.

The introduction of artificial intelligence systems represents an important step towards increasing the stability and survival of economic systems in a rapidly changing world.

References

1. Lutsenko, E. V. Revolution of the early 21st century in artificial intelligence: deep mechanisms and prospects / E. V. Lutsenko, N. S. Golovin. – Krasnodar: Kuban State Agrarian University named after. I.T. Trubilina, 2024. – 394 p. – DOI 10.13140/RG.2.2.17056.56321. – EDN OMIPIL.https://www.researchgate.net/publication/378138050

2. Lutsenko, E. V. Systems / E. V. Lutsenko, N. S. Golovin. – Krasnodar: Virtual Center for Systemic Cognitive Research “Eidos”, 2024. – 518 p. – DOI 10.13140/RG.2.2.22863.09123. – EDN: INUTJL.https://www.researchgate.net/publication/379654902

3. Lutsenko, E. V. Cognitive functions as a generalization of the classical concept of functional dependence based on information theory in ASC analysis and system fuzzy interval mathematics / E. V. Lutsenko, A. I. Orlov // Polythematic network electronic scientific journal of the Kuban State Agrarian University . – 2014. – No. 95. – P. 58-81. – EDN RVEYDF.

4. Lutsenko, E.V. Hirshamana when assessing the results of scientific activity, its negative consequences and an attempt to overcome them using a multi-criteria approach and information theory1 / E.V. Lutsenko // Polythematic network electronic scientific journal of the Kuban State Agrarian University. – 2015. – No. 108. – P. 1-29. – EDN TROLXF.

5. Lutsenko, E. V. Intensive technologies for cultivating fruit crops / E. A. Egorov, A. N. Fisenko, Zh. A. Shadrina, E. V. Lutsenko [and others]. – Krasnodar, 2004. – 394 p. – ISBN 5-98272-008-9. – EDN QCGJDD.

6. Lutsenko, E. V. Invariant with respect to data volumes, a fuzzy multiclass generalization of the F-measure of reliability of Van Riesbergen models in ASC analysis and the Eidos system / E. V. Lutsenko // Polythematic network electronic scientific journal of the Kuban State Agrarian University. – 2017. – No. 126. – P. 1-32. – DOI 10.21515/1990-4665-126-001. – EDN XXXBDV.

7. Lutsenko, E. V. Synthesis of adaptive intelligent measuring systems using ASK analysis and the Eidos system, system identification in econometrics, biometrics, ecology, pedagogy, psychology and medicine / E. V. Lutsenko // Polythematic network electronic scientific journal of Kubansky State Agrarian University. – 2016. – No. 116. – P. 1-60. – EDN VQUVHJ.

8. Loiko, V. I. Investment and resource management of agricultural production / V. I. Loiko, T. P. Baranovskaya, E. V. Lutsenko // Polythematic network electronic scientific journal of the Kuban State Agrarian University. – 2012. – No. 83. – P. 563-595. – EDN PJVOPF.

9. Lutsenko, E. V. Criteria of reality and the principle of equivalence between virtual and “true” reality / E. V. Lutsenko // Polythematic network electronic scientific journal of the Kuban State Agrarian University. – 2004. – No. 8. – P. 9-27. – EDN JWXNGV.