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Issue Article

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DESIGNING ARTIFICIAL INTELLIGENCE IN STATISTICAL SYSTEMS

Abstract: *For the effective formation of an artificial intelligence project in statistical systems, the article provides an introduction, approaches and directions of artificial intelligence. Separate subsystems are considered as new dynamic possibilities of transformation of statistical systems.*

Key words: *design, research, statistical processes, directions, approaches, subsystems, digital economy, interbranch balance in new approaches.*

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Introduction

For each country, statistical activity is an important area that is necessary in the dynamic development of society. The use of modern tools in solving numerous issues of statistical systems presents huge opportunities in innovative research. Artificial intelligence in this field is of interest both in theoretical and practical works. Let us consider some aspects of the issues that are relevant both in past, present, and future studies, The use of artificial intelligence in public administration, economy, industry, social protection, education, medicine, employment, rural tourism and other spheres is one of the topical issues, which is based on the Decree of the President of the Republic of Uzbekistan "On measures to create conditions for the operational implementation of artificial intelligence technologies" dated February 17, 2021 PP-4996. The Law of the Republic of Uzbekistan "On Official Statistics" was adopted on August 11, 2021. [1].

The systematic conduct of national research in the Republic of Uzbekistan includes a strategy for the development of artificial intelligence in various economic systems. Designing artificial intelligence in a statistical system has its own peculiarities in the process itself, as well as in achieving specific goals. The mass process of continuous data collection, the methodology of data calculation, work with respondents, the composition of the collected data, depending on the requests and needs of the state and society, is in constant dynamic development and change. This statistical process of organization and management is important in order to obtain reliable summary statistics. In addition, it is important for the rational management and use of state budget funds, for the effectiveness of all processes as a whole]2-4].

It would be appropriate to note that the various subdomains of artificial intelligence research are centered on specific goals and the use of specific tools. Traditional research goals in the field of artificial intelligence include thinking, knowledge demonstration, planning, training; general intelligence (the ability to solve an arbitrary problem) is one of the long-term goals of this field, etc. To solve these problems, artificial intelligence researchers have adapted and combined a wide range of problem solving methods, including search engine and mathematical optimization, formal logic, artificial neural networks and methods based on statistics, probability and economics [5].

Approaches and directions of artificial intelligence (AI).

Approaches to understanding the problem there is no single answer to the question of what artificial intelligence does. Almost every author who writes a book about artificial intelligence begins with some definition in it, taking into account the achievements

of this science from his point of view. Philosophy has not solved the question of the nature and state of the human mind. There is also no clear criterion for achieving "intelligence" for computers, although a number of hypotheses were proposed at the beginning of the development of artificial intelligence, such as the Turing test or the Newell—Simon hypothesis. Therefore, despite the fact that there are many approaches to understanding the tasks of artificial intelligence and the creation of intelligent information systems, two main approaches to the development of artificial intelligence can be distinguished[3]: Top-down AI, semiotic-creating expert systems, knowledge bases and logical inference systems that simulate high-level mental processes:

The Turing test is an empirical test proposed by Alan Turing in the article "Computational Methods and Intelligence" published in the philosophical journal in 1950. The purpose of this test is to determine the possibility of artificial thinking close to a person. The standard interpretation of this test is: "one person communicates with one computer and one person. Based on the answers to the questions, he must determine whom he is talking to: a person or a computer program. The task of a computer program is to motivate a person to make the wrong choice."Not all test participants see each other. [6].

The most general approach assumes that artificial intelligence is able to demonstrate behavior that is no different from human behavior, and in normal situations. The idea is a generalization of the Turing test approach, in which a machine becomes smarter when it is able to maintain a conversation with an ordinary person, and he cannot understand what he is talking about with the machine (the conversation is conducted by correspondence). Science fiction writers often suggest a different approach: artificial intelligence arises when a machine is able to feel and create. Therefore, the owner of Andrew Martin in the movie "The Man of Two hundred years" begins to treat him as a person when he creates a toy according to his project. Star Trek data, being able to communicate and learn, dream of gaining emotions and intuition. However, the latter approach does not stand up to criticism when examined in more detail. For example, it is not difficult to create a mechanism that evaluates external or internal parameters.

Historically, the symbolic approach was the first in the era of digital machines, because after the creation of Lisp, the first symbolic computing language, its author believed in the possibility of starting the practical implementation of these intelligent tools.

The symbolic approach allows you to work with poorly formalized representations and their meanings. The success and effectiveness of solving new problems depends only on the ability to separate important information, which requires flexibility in abstraction methods. Taking into account that a simple program defines a certain way of interpreting data, so its work seems unbiased and purely mechanical. Only a person, an analyst or a programmer who cannot entrust it to a machine in this case solves the intellectual task. As a result, a single abstraction model, a system of constructive entities and algorithms is created. Flexibility and versatility become huge resource costs for unusual tasks, which means that the system returns to sanity.

Logic programming partially solves this cultural problem. The logical approach to the creation of artificial intelligence systems is based on the modeling of thinking. The theoretical basis is logic. The logical approach can be demonstrated using the Prologue logic programming language and a system for these purposes. Programs written in the prologue language reflect the facts and rules for making a logical conclusion in the form of a sequence of actions that lead to the desired result without a strict definition of the algorithm.

The latter approach, developed since the early 1990s, is called an agent-oriented approach or an approach based on the use of intelligent (rational) agents. According to this approach, intelligence is the ability of the computing part (roughly speaking, planning) to achieve the goals set for a smart machine. Such a machine itself will be an intelligent agent that will perceive the surrounding world with the help of sensors and with the help of actuators will be able to influence objects in the environment. This approach focuses on methods and algorithms that help an intelligent agent survive in the environment by doing its job.

Therefore, here the algorithms of pathfinding and decision-making have been studied much more deeply. The hybrid approach assumes that only a synergistic combination of neural and symbolic models provides a full range of cognitive and computational capabilities. For example, expert opinion rules can be created using neural networks, and production rules can be obtained using statistical training. Proponents of this approach believe that hybrid information systems will be much stronger than the sum of individual concepts. Symbolic modeling of thought processes. There is such a broad direction as modeling thinking [7].

For many years, the development of this science has been moving along this path, and now it is considered one of the most advanced areas of modern artificial intelligence. Modeling thinking involves the creation of symbolic systems, the implementation of which sets a specific task, and the output requires its solution. An important area is natural language processing, which analyzes the possibilities of understanding, processing and creating texts in the "human" language. Within this direction, the goal is to process the natural language in such a way that the person present can gain knowledge independently by reading the text. Some direct natural language

processing programs include information retrieval (including in-depth text analysis) and machine translation [8].

Presentation and use of knowledge.

The direction of knowledge engineering combines the tasks of obtaining knowledge from simple data, their systematization and use. This area has historically been associated with the creation of expert systems — programs that use special knowledge bases to gain knowledge.

Obtaining knowledge from data is one of the main problems of data mining. There are various approaches to solving this problem, including the use of neural networks based on technology, neural network verbalization procedures.

Machine learning. Machine learning problems relate to the process of independent acquisition of knowledge by an intelligent system in the process of its functioning. This direction has been central from the very beginning of the development of artificial intelligence [2]. At a summer conference in Dortmund in 1956, Ray Solomonov wrote a paper on probabilistic machine learning without a teacher and called it "an inductive inference machine".

Learning without a teacher - allows you to recognize images in the input stream. Teaching with a teacher also includes classification and regression analysis. Classification is used to determine which category an image belongs to. Regression analysis is used to find a continuous function in a number of numerical input/output examples, based on which it will be possible to evaluate the result.

During training, the agent is rewarded for good answers and punished for bad ones. They can be analyzed from the point of view of decision theory, using concepts such as utility. Mathematical analysis of machine learning algorithms is a branch of theoretical computer science known as computational learning theory.

Neural networks are used to solve fuzzy and complex tasks, such as recognizing geometric shapes or clustering objects. The genetic approach is based on the idea that a particular algorithm can be more efficient if it gets better characteristics from other algorithms ("parents"). A relatively new approach, whose task is to create an autonomous agent program that interacts with the external environment, is called the agent approach.

Big data is the designation of structured and unstructured data of large size and significant diversity.

The appearance of large amounts of information in digital format, technologies for their storage and calculation, mathematical analysis tools lead to changes in business processes. Apparently, simultaneously with the rapid accumulation of information, technologies for their analysis are rapidly developing, as well as new directions in the research plane, such as data science, are emerging. Data science is a very broad field that includes dozens of activities capable of solving a large number of tasks. It is this fact that makes data science important for the modern world. Prospects for further research are associated not only with the risks and difficulties of using big data, but also with the search for concepts that can create additional value for companies or useful services for citizens. [9]

After some familiarization with the approaches and directions of AI, we will consider individual subsystems in the project system that can significantly influence the effective formation of the entire artificial intelligence project in statistical systems as a whole.

The relevance of the issues of digital economy research can be represented by the words in the message of the President of the Republic of Uzbekistan to the Oliy Majlis, held on January 24, 2020, that "accelerated transition to the digital economy will be our priority task for the next five years " ...in order to consistently continue and bring to a new modern level the work we have begun on the development of science and education, the education of our youth by individuals with deep knowledge, high culture and spirituality, the formation of a competitive economy, I propose to declare 2020 the Year of Development of Science, Education and the Digital Economy in our country." [2].

The digital economy is a system of implementation of economic, social and cultural relations based on the use of digital technologies. Sometimes it is also expressed in terms such as internet economy, new economy or web economy.

In 1995, the American programmer Nicholas Negroponte introduced the term "digital economy" into practice. Now politicians, economists, journalists, entrepreneurs from all over the world are engaged in this activity – almost everyone [10-15].

The digital economy is not some other economy that needs to be created from scratch. This means that by creating new technologies, platforms and business models and implementing them into everyday life, we are transferring the existing economy into a new system [3].

Out of the many existing models in this case, let us consider the interpectoral balance of production and distribution of products-a tool for analyzing and planning the structure of social production, taking into account the complex interrelations of the branches of the production sphere.

The process of formation and use of the aggregate social product in a detailed sectoral context. Detailing the general economic proportions reflected by the most important component of the balance of the national economy — the balance of the social product, the intersectoral balance at the same time synthesizes into a single system the private material balances that characterize the sources of resource formation and the

use of certain types of products in the national economy.

V. Leontiev (later a professor at Harvard University, USA) developed the mathematical model of intersectoral balance. The scheme of the intersectoral balance is a synthesis of two tables, one of which characterizes the detailed structure of production costs in the context of individual types of products, and the other - the structure of the distribution of products in the national economy.

The intersectoral balance in kind consists of two sections. The first section reflects the sources of product resource formation. The second section characterizes the directions of the use of product resources for current production consumption (in the context of the same types of products for which the balance sheet takes into account the formation of resources, which ensures the staggered construction of this section of the balance sheet) and for final consumption [4].

In this study, we decided to consider the digital economy in the system of intersectoral balance, to determine which part of each industry is the digital economy. As data from developed countries show, the impact of the digital economy on all other industries increases over time. In the end, this significantly affects the overall GDP figure.

Consider the model of the intersectoral balance of production and distribution of products where the digital economy is represented as one of the branches of material production (Fig.1).

Fig.1

Consuming industries / Manufacturing industries	**1.Industry**	**2.Agricultural industry**	**3.Other branches of material production**	**4.Digital Economy**	**Final product**	**Gross output**
1.Industry	X_{11}	X_{12}	X_{13}	X_{14}	Y_1	X_1
2. Agriculture	X_{21}	X_{22}	X_{23}	X_{24}	Y_2	X_2
3.Other branches of material production	X_{31}	X_{32}	X_{33}	X_{34}	Y_3	X_3
4. Digital Economy	X_{41}	X_{42}	X_{43}	X_{44}	Y_4	X_4
Clean products	Y_1	Y_2	Y_3	Y_4		
Gross output	X_1	X_2	X_3	X_4		

It can be noted here that this model is a statistical model, It is being developed for a particular period.

Let us consider the model on a concrete example:

Fig.2

Consuming industries / Manufacturing industries	**1. Industry**	**2. Agricultural industry**	**3. Other branches of material production**	**4.Digital Economy**	**Final product**	**Gross output**
1.Industry	30.6	10.3	5.3	12	68	114.2
2. Agriculture	15.3	4.9	0.8	8	28	49.0
3.Other branches of material production	10.2	2.1	2.1	4	16	30.4

4. Digital Economy	**12**	**8**	**4**	**24**	**-**	
Clean products	**58.1**	**31.7**	**22.4**	**-**	**-**	
Gross output	**114.2**	**49.0**	**30.4**	**-**	**Gross output 169.6 +24=193.6**	

In this table, we have presented and highlighted the digital economy in order to clearly see its state for a separate period, observe changes and, accordingly, receive more detailed information about gross output both by industry and by the indicator as a whole.

Thus, in the intersectoral balance, the representation of the digital economy allows not only economists and management personnel to make appropriate analysis and conclusions, but also all specialists in these areas to use the information provided more fully in a faster time, corresponding to real indicators. Indicators are presented in detail by industry, as well as a general indicator, which became possible with the emergence of such concepts as “Big Date”, blockchain, cloud spaces in the virtual world, etc.

References:

1. (2021). *Decree of the President of the Republic of Uzbekistan "On measures to create conditions for the rapid introduction of artificial intelligence technologies" dated February 17, 2021 PP-4996. The Law of the Republic of Uzbekistan "On Official Statistics" was adopted on August 11, 2021*.
2. (2020). *Message of the President of the Republic of Uzbekistan to the Oliy Majlis, held on January 24, 2020.*
3. Gulyamov, S.S. (2020*). "Digital Economy"*. (p.150). Tashkent: Uzbekistan.
4. Terekhov, L. L. (1968). *Economic and mathematical methods*. (p.120). Moscow: Statistics.
5. Russell, S., & Norvig, P. (1424). *Artificial Intelligence: A Modern approach (AIMA)*. 2nd ed. (p.1424). Moscow: Williams.
6. (n.d.). *Symbolic modeling of thought processes*- Retrieved from Yandex(yandex.ru).
7. (n.d.). Retrieved from https://yandex.ru//search/?text=NaturalLanguageProcessing&clid=2411726&lr=10335
8. (n.d.). Retrieved from https://yandex.ru/search/?text=Big+Data&clid=2411726&lr=10335
9. Gulyamov, S. S., Shermukhamedov, A. T., & Kholboev, B. M. (2022). *Application of neural networks.* Proceedings of the I-Republican scientific and technical conference "Scientific research and innovation in industry 4.0." March 13-15, 2022. (pp.10-14). Tashkent: In Sience.
10. Gulyamov, S.S., Shermukhamedov, A.T., & Kholboev, B.M. (2022). *Digital economy: innovative digital technologies*. Tutorial. (p.294). Kursk.
11. Gulyamov, S.S., Shermukhamedov, A.T., & Kholboev, B.M. (2022). *Artificial intelligence and cognitive technologies in the economy:* textbook. (p.280). Moscow: Publishing house "RUSINS".
12. Gulamov, S.S., Shermukhamedov, A.T., & Haitmatov, U.T. (2021). Methodological aspects of statistical analysis of the digital economy in Uzbekistan. *International Scientific Journal Theoretical & Applied Science*, Issue 03, Volume 95.
13. Gulamov, S.S., Shermukhamedov, A.T., & Svirin, N.N. (2020). Crowd sourcing and “Internet of things” in the Republic of Uzbekistan. *“Theoretical & Applied Science”.* V.81, Issue 01, 176-180.
14. Gulamov, S.S., Svirin, N.N., & Shermukhamedov, A.T (2019). Digital logistics and blockchein -system- the basis on development of transport services. *J. “Theoretical and applied Science”*, volume 79, issue 11, 249-254.
15. Gulamov, S.S., Shermukhamedov, A.T., & Ikramova, Yd.S. (2019). Creation “the clever city in the concept of digital economy. *American Scientific Journal*, N 31, 50-66.