УДК 004.8

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

СИСТЕМЫ ИСКУССТВЕННОГО ИНТЕЛЛЕКТА КАК СИСТЕМЫ АВТОМАТИЗАЦИИ ПРОЦЕССА НАУЧНОГО ПОЗНАНИЯ И УДВОЕНИЕ НОМЕНКЛАТУРЫ НАУЧНЫХ СПЕЦИАЛЬНОСТЕЙ ПУТЕМ ПРИМЕНЕНИЯ ЭТИХ СИСТЕМ ДЛЯ ИССЛЕДОВАНИЙ В РАЗЛИЧНЫХ НАПРАВЛЕНИЯХ НАУКИ

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В статье кратко описывается процесс преобразования данных в информацию, а информации - в знания. Системы искусственного интеллекта определяются как системы, автоматизирующие процесс преобразования данных в информацию, а ее в знания и решающие путем применения этих знаний задачи идентификации, прогнозирования, принятия решений и исследования моделируемой предметной области путем исследования ее модели. Обосновывается положение о том, что системы искусственного интеллекта являются инструментами, многократно увеличивающими возможности естественного интеллекта в процессе познания, примерно так же, как двигатель многократно увеличивает возможности человека преобразовывать химическую энергию в механическую. Системы искусственного интеллекта могут применяться везде, где человек применяет естественный интеллект (естественно, при наличии доступа к обеспечивающим это системам искусственного интеллекта). Поэтому направление науки и технологий «Искусственный интеллект» имеет ярко выраженный междисциплинарный характер. Учитывая огромное и быстро возрастающее значение интеллектуальных технологий во всех сферах общества предлагается изменить редакцию п.8.8. Перечня критических технологий Российской Федерации: «п.8. 8. Нано-, био-, информационные, когнитивные технологии» добавив в него всего одно слово: «п.8. 8. Нано-, био-, информационные, когнитивные и интеллектуальные технологии». В частности, системы искусственного интеллекта могут применяться для автоматизации процесса интеллектуального познания во всех областях науки, группах научных специальностей и научных специальностях, отраженных в номенклатуре научных специальностей. В это номенклатуре и сейчас есть научные специальности, наименования которых образованы путем объединения названия методов исследования и наименования науки, например: «5.2.2. Математические, статистические и инструментальные методы в экономике». Совершенно аналогично предлагается образовать новые наименования областей науки, групп научных специальностей и научных специальностей путем добавления к имеющимся наименованиям, естественно, только там, где это уместно, слов: «Информационные, когнитивные и интеллектуальные технологии». Тогда получатся, например, такие наименования областей науки: «5ai. Информационные, когнитивные и интеллектуальные технологии в социальных и гуманитарных науках», групп научных специальностей: «5.2ai. Информационные, когнитивные и интеллектуальные технологии в экономике» и научных специальностей: «5.2.3ai. Информационные, когнитивные и интеллектуальные технологии в региональной и отраслевой экономике», и т.п., и т.д. для практически всех областей науки, групп научных специальностей и научных специальностей

Ключевые слова: СИСТЕМЫ ИСКУССТВЕННОГО ИНТЕЛЛЕКТА, АВТОМАТИЗАЦИЯ ПРОЦЕССОВ ПОЗНАНИЯ, НОМЕНКЛАТУРА НАУЧНЫХ СПЕЦИАЛЬНОСТЕЙ, КРИТИЧЕСКИЕ ТЕХНОЛОГИИ РОССИЙСКОЙ ФЕДЕРАЦИИ

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UDC 004.8

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

ARTIFICIAL INTELLIGENCE SYSTEMS AS SYSTEMS FOR AUTOMATING THE PROCESS OF SCIENTIFIC COGNITION AND DOUBLING THE NOMENCLATURE OF SCIENTIFIC SPECIALTIES BY USING THESE SYSTEMS FOR RESEARCH IN VARIOUS FIELDS OF SCIENCE

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The article briefly describes the process of converting data into information, and information into knowledge. Artificial intelligence systems are defined as systems that automate the process of converting data into information, and it into knowledge, and solve, by applying this knowledge, the tasks of identification, forecasting, decision-making and research of the simulated subject area by studying its model. The article substantiates the position that artificial intelligence systems are tools that multiply the capabilities of natural intelligence in the process of cognition, in much the same way as an engine repeatedly increases a person's ability to convert chemical energy into mechanical energy. Artificial intelligence systems can be used wherever a person uses natural intelligence (of course, if there is access to artificial intelligence systems that provide this). Therefore, the direction of science and technology "Artificial Intelligence" has a pronounced interdisciplinary character. Taking into account the huge and rapidly increasing importance of intelligent technologies in all spheres of society, it is proposed to amend the wording of paragraph 8.8. of the List of critical technologies of the Russian Federation: "paragraph 8.8. Nano-, bio-, information, cognitive technologies" by adding just one word to it: "paragraph 8.8. Nano-, bio-, information, cognitive and intellectual technologies". In particular, artificial intelligence systems can be used to automate the process of intellectual cognition in all fields of science, groups of scientific specialties and scientific specialties reflected in the nomenclature of scientific specialties. Even now there are scientific specialties in this nomenclature, the names of which are formed by combining the names of research methods and the names of science, for example: "5.2.2. Mathematical, statistical and instrumental methods in economics". In exactly the same way, it is proposed to form new names of fields of science, groups of scientific specialties and scientific specialties by adding to the existing names, of course, only where appropriate, the words: "Information, cognitive and intellectual technologies". Then, for example, such names of fields of science will be obtained: "5ai. Information, cognitive and intellectual technologies in social sciences and humanities", groups of scientific specialties: "5.2ai. Information, cognitive and intellectual technologies in economics" and scientific specialties: "5.2.3ai. Information, cognitive and intellectual technologies in the regional and sectoral economy", etc., etc. for almost all fields of science, groups of scientific specialties and scientific specialties

Keywords: ARTIFICIAL INTELLIGENCE SYSTEMS, AUTOMATION OF COGNITIVE PROCESSES, NOMENCLATURE OF SCIENTIFIC SPECIALTIES, CRITICAL TECHNOLOGIES OF THE RUSSIAN FEDERATION

CONTENT

I. Introduction

1.1. Relevance of the topic

It is now completely obvious to everyone that in 2020-2023 of the 21st century a real revolution took place in artificial intelligence systems. We can confidently state that we are witnesses and, to a certain extent, participants in the next, already 6th, information revolution, which is unfolding all over the world right before our eyes [1-3][1]:

1st information revolution: The emergence of sound language (verbalization) and objective consciousness and self-awareness.

2nd information revolution: The emergence of writing as a text form of verbalization.

3rd information revolution: The emergence of printing as a method of copying and distributing texts.

4th information revolution: The emergence of computers and electronic forms of storing and transmitting information in the form of files on media.

5th information revolution: The emergence of an electronic form of accumulation and transmission of information, such as local, corporate and especially global computer networks, especially the Internet.

6th information revolution: The emergence of numerous artificial intelligence systems in online access (Figure 1), which can be given a wide variety of tasks in natural language, in any language, and these systems perform these tasks very quickly and very efficiently, relying on all Internet resources.

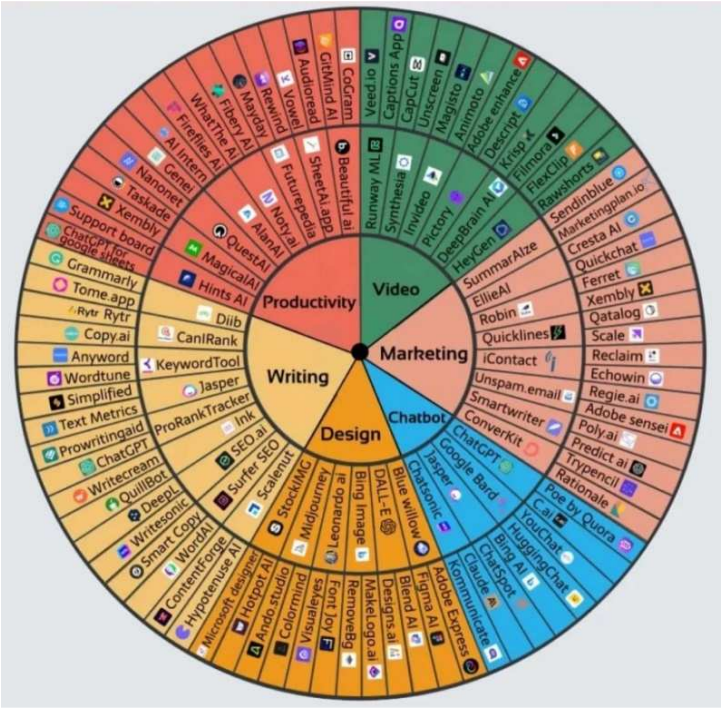


Figure 1. Some online artificial intelligence systems

Source: https://www.reddit.com/r/ChatGPT/comments/14wkb9s/ai_tools_list_sorted_by_category_in_one_place/?rdt=48857

[1] All references to literary sources in this article are given according to the work [1].

To see for yourself, just follow the links:
https://www.seaart.ai/home;
https://ui.chatai.com/;
https://learn.microsoft.com/ru-ru/dotnet/machine-learning/how-does-mldotnet-work;
http://chat.openai.com/;
https://poe.com/;
https://neural-university.ru/;
https://dzen.ru/a/ZCKZRKvrlEMBWOk8;
https://ora.ai/;
https://ora.ai/explore?path=trending;
https://ora.ai/eugene-lutsenko/aidos;
https://poe.com/Aidos-X;
https://rudalle.ru/;
https://bard.google.com/;
https://chatbot.theb.ai/;
https://problembo.com/ru/services;
https://poe.com/GPT-3.5-Turbo-Instruct.

Each information revolution represents a significant stage or an entire era in the development of mankind. Moreover, it should be specially noted that the 1st information revolution marked the very emergence of humanity.

As a result of the ongoing 6th information revolution, the Internet is rapidly transforming from a global data warehouse, which it has always been before, and an information space, which it has become in recent times, into a knowledge space. We have written in a number of works over many years that this is precisely one of the main directions in the development of modern information technologies [1-3].

The 6th information revolution is having an unprecedentedly deep and comprehensive impact on all spheres of society, including science, art and culture. Therefore, consideration of various aspects of this influence is very relevant.

1.2. The problem solved in the work and its significance in the context of scientific research development

A problem is a discrepancy between the actual and desired (target) situation, a contradiction between them that needs to be resolved or overcome.

Problem the solution to which this work is devoted is that, on the one hand, there are fields of science, groups of scientific specialties and scientific specialties [4] that use the scientific method as a method of cognition [1-3], and on the other hand, modern information, cognitive and intelligent technologies are either not used at all to automate the process of intellectual cognition, or are still used extremely insufficiently [5].

1.3. Purpose and objectives of the work

Purpose This work is to consider the possibilities of using modern information, cognitive and intellectual technologies to automate the process of intellectual cognition in all fields of science, groups of scientific specialties and scientific specialties, reflected in the nomenclature of scientific specialties [4].

By decomposing the goal, we set tasks, the solution of which (through research) is the stages of achieving the goal:

Task 1: Definition of concepts: data, information and knowledge and the processes of converting data into information, and it into knowledge.

Task 2: The role of artificial intelligence systems in automating the processes of converting data into information, and it into knowledge.

Task 3: Basic formalizable cognitive concept of automated system-cognitive analysis. ASC analysis and other methods of artificial intelligence as a means of automating scientific knowledge.

Task 4: The interdisciplinary nature of artificial intelligence and the possibility of its application in all fields of science, groups of specialties and scientific specialties.

Task 5: A multiple increase in the capabilities of natural intelligence when using artificial intelligence as a tool of cognition.

Task 6: Problems solved by artificial intelligence systems: identification, forecasting, decision making and research of the subject area by studying its model.

Task 7: Changing the wording of clause 8. list of critical technologies of the Russian Federation [13] by adding smart technologies to it.

Task 8: Formation of new fields of science and groups of scientific specialties by using modern information, cognitive and intellectual technologies as tools for cognition.

Task 9: Formation of new scientific specialties by using modern information, cognitive and intellectual technologies as tools for cognition.

The corresponding subsequent sections of the work are devoted to solving these problems.

II. Data conversion methodology into information, and it into knowledge

2.1. Definition of concepts: data, information and knowledge and processes of converting data into information, and it into knowledge

Note that data are any changes in the degree of expression of any properties of objects and phenomena or the absence of these changes. Information is meaningful data. Meaning according to the concept of meaning by Schenk-Abelson [6] is knowledge of the causes and consequences of processes and phenomena. Meaning in data is revealed through data analysis. Knowledge is information useful for achieving a goal, i.e. for management (management is the activity of achieving a goal). Therefore, information is converted into knowledge by adding a goal and using the information to achieve it. Thus, the transformation of information into knowledge is not an intellectual logical process, but is associated with goal setting, motivation and will (Figure 1) [7]:

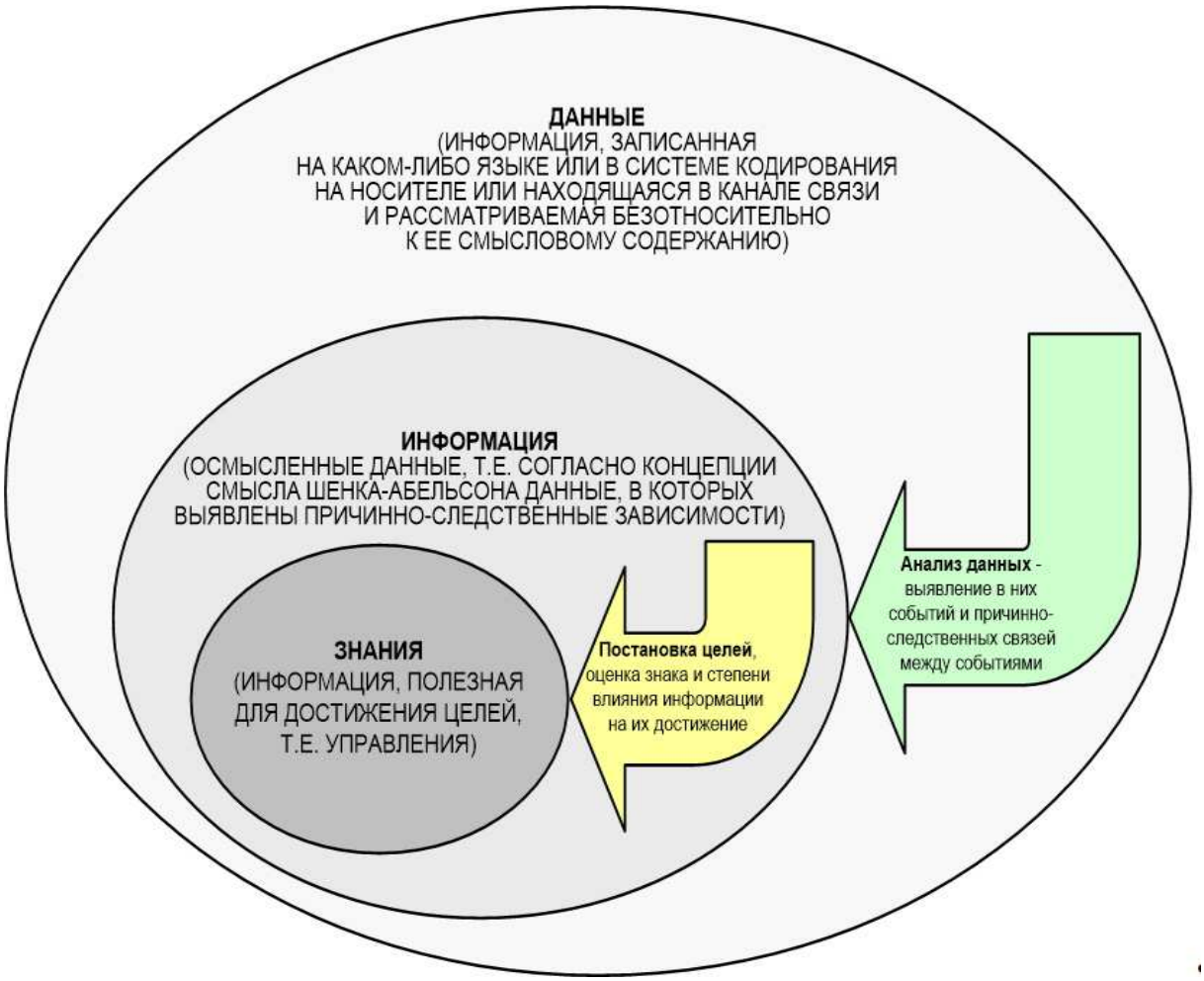


Figure 2. On the relationship between the semantic content of the concepts: “Data”, “Information”, “Knowledge”

<u>Artificial Intelligence Systems</u> from this point of view, it can be defined as systems that ensure the transformation of data into information, and this into knowledge, the accumulation of this knowledge in knowledge bases and the use of this knowledge to solve problems of identification (recognition, diagnosis, forecasting), decision-making and knowledge of the modeling object through research his models.

2.2. The role of artificial intelligence systems in automating data conversion processes into information, and it into knowledge

People in the process of learning using their natural intelligence[2]comprehend the data of experience, and thereby transform it into information, and then use this information to achieve their goals and thus

[2]Although what is it “natural” and how does it differ from “artificial”, if even the children of the senior kindergarten group are absolutely clear that natural intelligence is also created with the help of certain technologies, like artificial intelligence, and now these technologies are being brought to an industrial level using genetic engineering methods

transform it into knowledge. Artificial intelligence systems provide automation of these processes. In modern terminology, such systems are called systems for converting data into knowledge: “Data-Knowledge Systems”.

Data-Knowledge Systems:

1. Definition: Data-Knowledge systems are complex structures designed to efficiently process, analyze and transform data into useful knowledge that facilitates informed decision-making.

2. Data processing stages:

- data collection: the initial stage includes the collection of raw data from various sources such as databases, sensors, web platforms and others;

- data entry and pre-processing: the process of entering data into an automated system, cleaning, structuring and transforming data to prepare it for analysis.

3. Data Analysis: Using statistical techniques, machine learning, and other technologies to identify patterns, trends, and important information in data.

4. Data storage and management: ensuring efficient and secure storage of data, as well as managing access and integrity of information.

5. Translation into knowledge: Integrating data analysis with domain context to generate meaningful knowledge that can support decision-making processes.

6. Visualization and presentation: presenting the results of data analysis using visualizations, dashboards and reports for a more visual understanding of the information.

7. Integration with business processes: Systems integrate with business processes, providing knowledge to support operations and strategic management.

8. Continuous improvement cycle (adaptability, Alexander Feldbaum’s principle of duality of management): continuous improvement of systems based on feedback on the results of the implementation of decisions made, new data and changes in business requirements.

9. Application in various fields: used in science, business, medicine, finance, education and other fields to optimize processes and make informed decisions.

10. Security and Confidentiality: Ensure data security and information confidentiality to protect valuable knowledge from unauthorized access.

Data-Knowledge systems are key elements in the effective use of information, providing companies and organizations with the basis for successful management and decision-making.

2.3. Automated system-cognitive analysis and other methods of artificial intelligence as a means of automating scientific knowledge

2.3.1. Basic formalized cognitive concept of automated system-cognitive analysis

In 2002, Prof. E.V. Lutsenko proposed a basic formalizable cognitive concept of automated systemic cognitive analysis (ASC analysis) [8].

The essence of this concept is as follows. Objects of the training sample are described in two independent ways: on the one hand, by characteristics, and on the other, by belonging to general categories - classes. Such descriptions are called “Ontologies”.

Features are gradations of descriptive scales: properties or factors, and classes are gradations of classification scales.

The scales represent the axes of cognitive spaces: descriptive scales are the axes of the space of factors, and classification scales are the axes of the space of the results of the influence of these factors on the object of modeling.

Based on these data, by generalizing examples of the training set, models are formed in which:

– generalizing images of classes and generalizing images of features have been formed;

– matrix transfer functions have been formed that map the cognitive space of factors onto the cognitive space of classes, in particular in the form of cognitive functions and a neural network.

Thus, ASC analysis models are matrix functions of mapping the space of factors onto the space of classes (future states of the modeling object) [9].

The generated generalized images of classes are visualized in the form of cognitive SWOT diagrams.

The generated generalized images of features are visualized in the form of cognitive inverted SWOT diagrams.

Then class cluster analysis and feature cluster analysis are carried out.

This is followed by constructive class analysis and constructive feature analysis.

A system of constructs represents a paradigm of reality.

Let us briefly consider in more detail the principles of formation of cognitive spaces of factors and classes and the interaction of these spaces.

2.3.2. Constructs and cognitive spaces of factor and classes

Construct is a concept that has poles that are opposite in meaning and a spectrum of intermediate semantic meanings located on a certain scale: ordinal or numerical [9, 12].

For example, the concept of "temperature" has poles of "hot" and "cold" with intermediate values of "warm" and "cool" and a Celsius scale for the quantitative measurement of temperature. Other examples of constructs:

“weight: light-heavy”, “size: small-large”, “age: young-old”, “color: red-violet”, “note: do-si”, etc.

It often happens that a construct is clearly expressed by its poles and spectrum, which are known, but does not have its own name in the language. For example: “Spirit-matter”, “good-evil”, “truth-false”.

One of the most fundamental properties of human intelligence is the ability to think in a system of binary constructs, i.e. constructs, i.e. constructs with two poles.

As a rule, people think precisely in terms of the poles of constructs themselves, and use intermediate shades of meaning less often, as if they see the world in a black-and-white palette or shades of gray.

Classical logic, based on Aristotelian logic, is characterized by the presence of only two truth values: “True and false.” In fuzzy logic there can be many discrete truth values, when the degree of truth is denoted by a rational or even an integer, and there can be a continuum of truth values, when the degree of truth is denoted by a real number.

Constructs represent the coordinate axes of cognitive space that determine a person’s worldview or a model of a certain subject area.

Factors, i.e. descriptive scales correspond to the axes-constructs of a certain space, which we will call the space of factors.

We will describe the future states of the modeling object using classification scales, the values of which are classes and correspond to specific future states of the modeling object, i.e. classes. Classification scales correspond to axes-constructs of a certain space, which we will call class space.

Different people in the cognitive space have a different set of constructs, their different number and the constructs have a different range, as well as different accuracy of positioning of gradations between the poles.

Widely educated people have a larger set of constructs than uneducated people. Even if both educated and uneducated people have the same constructs, then among educated people they have a larger range than among uneducated people and higher accuracy in measuring the position of gradations between the poles.

For example, the construct “temperature” in everyday life has poles: cold-hot, with a range between the poles of about 300 degrees and an ordinal scale, while for physicists it has a range from absolute zero Kelvin to tens of trillions of degrees (obtained at the LHC) with a numerical scale.

Thus, different people have different dimensions and volume of cognitive space, as well as different discreteness: widely educated people have a larger dimension and volume of cognitive space, as well as the accuracy of positioning in it, than uneducated people

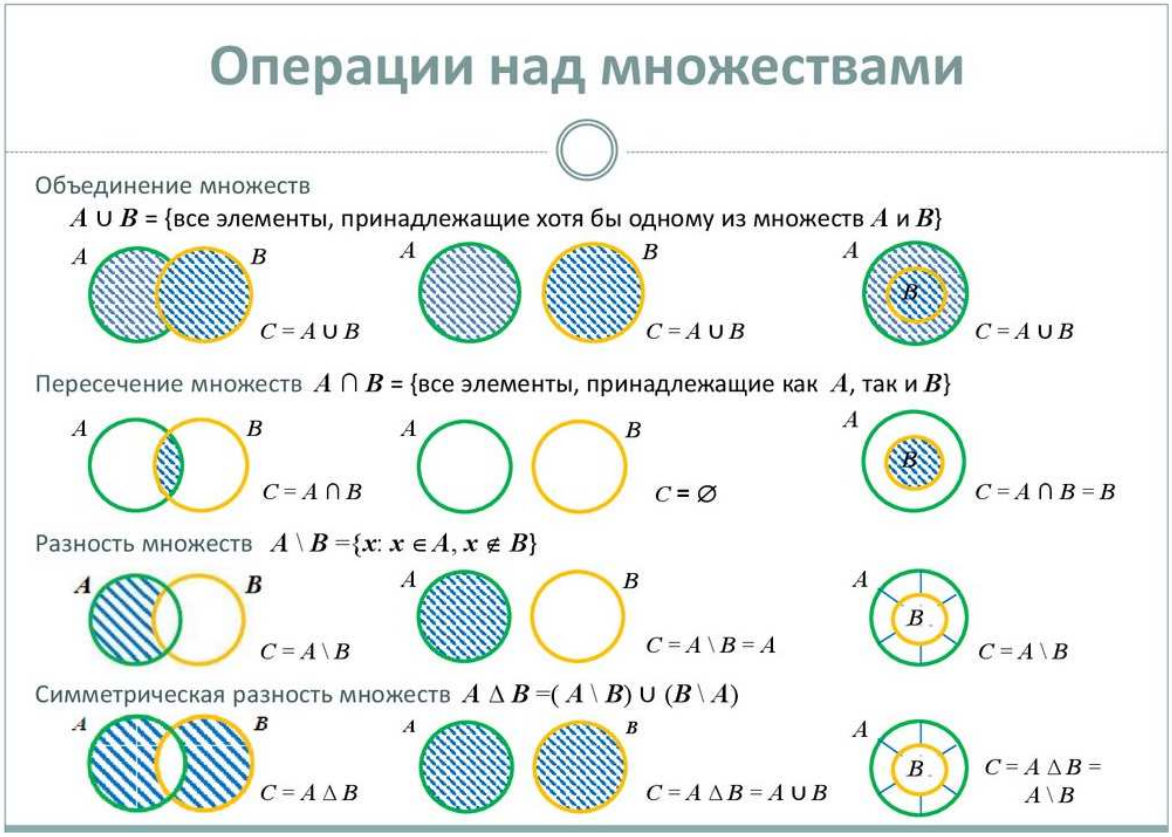
Let us briefly consider the options for the relationship of cognitive spaces of different people and the principle of William Ross Ashby. To do this, you can use the illustration of the relationships between sets shown in Figure 2.

An association cognitive spaces of two people gives rise to a new cognitive space, including all the constructs of both the first and second spaces (“one head is good, but two are better”).

Intersection cognitive spaces of two people gives rise to a new cognitive space, including only constructs common to their cognitive spaces. This intersection contains a common conceptual framework, a basis for mutual understanding.

Difference cognitive spaces of two people gives rise to a new cognitive space containing only those constructs that the first of them has, but does not have in the second. This is something that reflects the difference in the worldviews of these two people.

Symmetric difference cognitive spaces of two people gives rise to a new cognitive space containing only those constructs that only one of them has, but lacks those that both have. This is what most fully and clearly reflects the differences in the worldviews of these two people.



Drawing1.

Let us note in this regard that in the process of the evolution of consciousness the volume and dimension of the cognitive space also changes, in particular the range of the construct changes: “objective-subjective-non-existent” and, accordingly, the content of the areas objective, subjective and non-existent (Figure 3) [1-3].

Drawing2. Periodic criterial classification of forms of consciousness (Lutsenko E.V., 1978) [1-3]

In general, to put it simply, this leads to the fact that as the level of consciousness increases, the volume of what is realized constantly increases. This means that a person in a higher form of consciousness will have more adequate and more complete models of reality (himself and the environment) than a person in a lower form of consciousness.

But this process of increasing the area of awareness does not occur simply by combining the areas of awareness in previous forms of consciousness, but represents a complex dialectical process. The fact is that with different forms of consciousness, the very patterns of changes in awareness as objective, subjective and non-existent environment and oneself are different. These patterns are described in more detail in a number of works [13].

In full accordance with the principle of William Ross Ashby, if two people with different dimensions and volumes of cognitive spaces communicate, then the first more developed person with larger dimensions and volume of cognitive space will be adequately aware of the second person with smaller dimensions and volume of cognitive space. And the second, on the contrary, will be aware of the first in a simplified, limited, defective way, in the projection into his cognitive space of a smaller number of dimensions, i.e. in fact, will judge him by himself.

In this regard, it is appropriate to quote the statement of one well-known specialist in cognitive spaces, Kozma Prutkov: “Many things are

incomprehensible to us not because our concepts are weak, but because these things are not included in the range of our concepts at all").

A Buddhist parable also comes to mind about a student who, from his youth, unsuccessfully searched for the Teacher and, in adulthood, finally found him and it turned out to be his neighbor, whom he had known since childhood, saw him fiddling around with housework in his yard, but did not see there are Teachers in it.

2.3.3. Cognitive functions as an nd-mapping of factor space onto class space

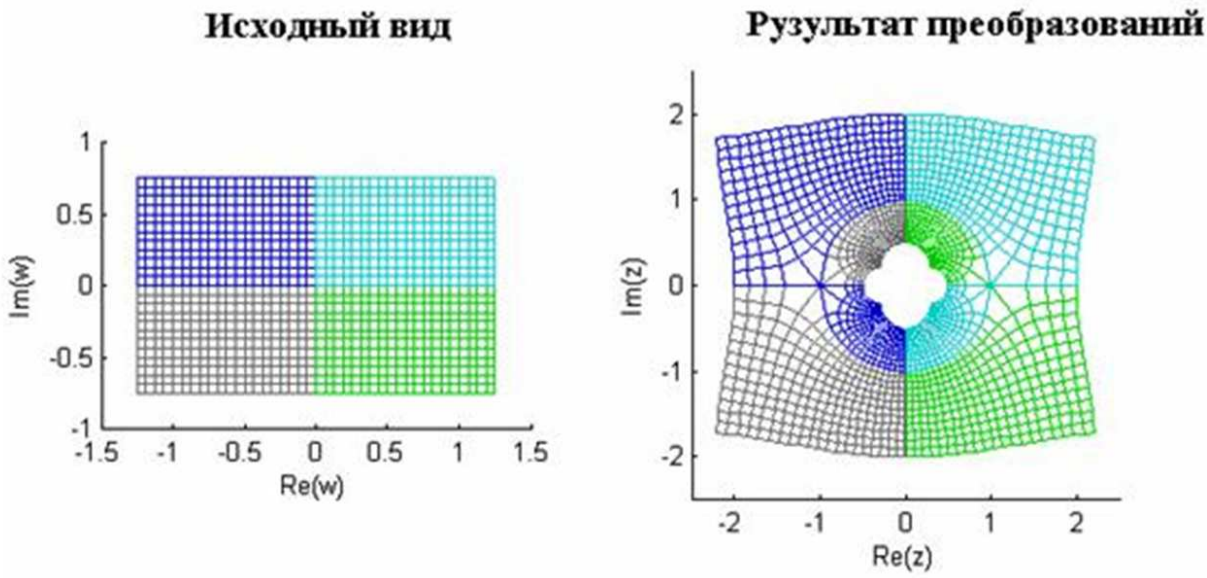
We will assume that we have succeeded in modeling the modeling object if we have determined the strength and direction of influence of each factor value on the behavior of the modeling object, i.e. to its transitions to future states corresponding to classes.

Let us imagine that the factors, i.e. descriptive scales correspond to the axes-constructs of a certain space, which we will call the space of factors.

We will describe the future states of the modeling object using classification scales, the values of which are classes and correspond to specific future states of the modeling object, i.e. classes. Classification scales correspond to axes-constructs of a certain space, which we will call class space.

Thus, to create a model for determining the behavior of a modeling object, we need to find a law for mapping the space of values of factors acting on the modeling object onto the class space, i.e. space of future states of the modeling object.

Such mappings are called multidimensional functions, and the mapping itself in the case of Euclidean space is a conformal mapping or transformation (Figure 4).



Drawing3.Conformal transformation (grid of lines)[3]

[3]Source:http://matlab.exponenta.ru/imageprocess/book2/images_38/image004.jpg

However, for system-cognitive modeling, a well-developed mathematical apparatus of continuous functions and conformal mappings is not a completely adequate means.

The reasons for this are simple and obvious.

This apparatus is designed for metric orthonormal spaces, i.e. such spaces, the coordinate axes of which are numerical scales and are mutually perpendicular to each other, and the dimensions of these spaces must be the same.

If we talk about the space of factors and the space of states of the modeling object, this means that they all must be measured in some quantitative units of measurement and must be independent of each other, i.e. the modeling object must be linear [7] and the number of descriptive classification scales must be the same.

In our case, the space of factors and the space of classes, i.e. states of the modeling object, in the general case, are non-metric non-orthonormal spaces, i.e. may have axes that are not only numerical scales, but also ordinal and even nominal [8], and these axes may not be mutually perpendicular to each other [7], and therefore interdependent, and the number of these axes in the space of factors and space states may be different.

Mathematical modeling of mappings of non-metric non-orthonormal spaces of different dimensions onto each other is a mathematical problem. In the theory of linear and conformal transformations, it is assumed that all axes of spaces are numerical and mutually perpendicular, and the spaces have the same dimension.

In our case:

– factors can be measured in different types of descriptive scales and units of measurement;

– future states of the modeling object can also be measured in different types of classification scales and in different units of measurement;

– the number of descriptive and classification scales may not be equal to each other;

– descriptive scales can be interdependent, and classification scales can also be interdependent.

Therefore, in this paper we propose a mathematical transformation, which we call a generalized conformal mapping.

To do this, it is necessary to convert nominal and ordinal scales into one type of scale: numeric, and all scales into one unit of measurement. This transformation of measuring scales is called “metrization” [8].

As this unit of measurement, we have chosen the unit of measurement of the amount of information. In other words, in the mathematical model of ASK analysis, we calculate how much information is contained in various values of factors that the modeling object will go into certain future states [8]. Moreover, this is done directly on the basis of empirical data, which can be large in size, fragmented, noisy and interdependent.

In the space of factors, the modeling object can be represented by a certain area corresponding to the values of the factors acting on it.

The model reflects the amount of information about the transition of the modeling object to each of the future states contained in each value of each factor.

Using the integral criteria discussed above, we can quantitatively assess the joint influence of all factor values on the transition of a modeling object to future states corresponding to classes.

For each area in the class space, we can display the amount of information contained in the system of factor values about the transition of a modeling object to states corresponding to this area. In the author's opinion, this is most conveniently done in the form of lines of different colors and thicknesses. The color of the line will indicate the sign, and the thickness will indicate the modulus of the influence force.

Thus, if you connect each area in the factor space with each of the areas in the class space with lines of different colors and thicknesses, then this will be a mapping of the factor space onto the class space, visually reflecting the created model of the behavior of the modeling object under the influence of various combinations of factor values.

The intelligent system “Eidos”, which is currently a software tool for automated systemic cognitive analysis, implements a visualization mode of 2d cognitive functions (mode 4.5) [7, 8, 10].

III. Results: argumentation of the feasibility of using artificial intelligence in expanding the range of scientific specialties

3.1. The interdisciplinary nature of artificial intelligence and the possibility of its application in all fields of science, groups of specialties and scientific specialties

Many modern artificial intelligence systems are specialized, i.e. are designed to implement certain functions in a predetermined subject area. Examples include wonderful text recognition systems, i.e. converting images of texts into Word files (Fine Reader), programs for automated online translation of Word files from almost any language to any language and preserving the design structure (https://www.onlinedoctranslator.com/ru/translationform). Widely known, even famous artificial intelligence systems are also narrowly focused, the emergence of which in the public domain, without exaggeration, produced a real revolution in the field of artificial intelligence [1-3]. Some of these systems are shown in Figure 1, and links to a number of others are given below:

https://www.seaart.ai/home;
https://ui.chatai.com/;
https://learn.microsoft.com/ru-ru/dotnet/machine-learning/how-does-mldotnet-work;
http://chat.openai.com/;
https://poe.com/;
https://neural-university.ru/;

https://dzen.ru/a/ZCKZRKvrlEMBWOk8;
https://ora.ai/;
https://ora.ai/explore?path=trending;
https://ora.ai/eugene-lutsenko/aidos;
https://poe.com/Aidos-X;
https://rudalle.ru/;
https://bard.google.com/;
https://chatbot.theb.ai/;
https://problembo.com/ru/services;
https://poe.com/GPT-3.5-Turbo-Instruct.

Of course, the narrow subject focus of these systems cannot be considered their disadvantage.

But there are also universal artificial intelligence systems developed in a special formulation that does not depend on the subject area. One of such systems is the universal cognitive analytical system “Eidos” developed by the author [1-10].

The universal cognitive analytical system "Eidos" differs from most of these systems in at least some of its following parameters:

-is universal and can be applied in many subject areas, because developed in a universal setting, independent of the subject area (http://lc.kubagro.ru/aidos/index.htm) and has 6 automated program interfaces (API) for entering data from external data sources of various types: tables, texts and graphics. The Eidos system is an automated system, i.e. involves the direct participation of a person in real time in the process of creating models and their use to solve problems of identification, forecasting, decision-making and research of the subject area by examining its model (automatic systems work without such human participation);

-is one of the first and the most popular domestic personal-level artificial intelligence systems, i.e. does not require the user to have special training in the field of artificial intelligence and programming technologies: there is an act of implementation of the Eidos system in 1987 (http://lc.kubagro.ru/aidos/aidos02/PR-4.htm);

-really works, provides stable identification in a comparable form of the strength and direction of cause-and-effect dependencies in incomplete noisy interdependent (nonlinear) data of a very large dimension of numerical and non-numerical nature, measured in various types of scales (nominal, ordinal and numeric) and in various units of measurement (t .e. it does not impose strict requirements on data that cannot be met, but processes the data that is available);

-**has a “zero entry threshold”:**

-contains a large amount intelligent local (i.e. supplied with installation) and cloud educational and scientific Eidos applications (currently their **31** and more **392**, respectively:http://lc.kubagro.ru/Source_data_applications/WebAppls.htm) (http://lc.kubagro.ru/aidos/Presentation_Aidos-online.pdf,http://lc.kubagro.ru/Presentation_LutsenkoEV.pdf);

- is fully open and freely available (http://lc.kubagro.ru/aidos/_Aidos-X.htm), and with actual source texts (http://lc.kubagro.ru/__AidosALL.txt): open license:CC BY-SA 4.0(https://creativecommons.org/licenses/by-sa/4.0/), and this means that it can be used by anyone who wishes, without any additional permission from the primary copyright holder - the author and developer of the Eidos system, prof. E.V.Lutsenko (note that the Eidos system was created entirely using only licensed software and has 34 certificates from RosPatent of the Russian Federation);

-is an “interpreter of intellectual models”,those. on the one hand, it is a tool shell that allows you to create intelligent applications based onconfigurator of statistical and system-cognitive models, and on the other hand, it is a run-time system or execution environment that ensures the operation of these intelligent applications in an adaptive mode.

-to independently master the Eidos system just download from the page:http://lc.kubagro.ru/aidos/index.htmand install the full version of the system, and then in 1.3 mode download and install one of the intelligent cloud Eidos applications from the Eidos cloud (http://lc.kubagro.ru/Source_data_applications/WebAppls.htm) and execute it following the description of the application. Typically this is a readme.pdf file in the folder: c:\Aidos-X\AID_DATA\Inp_data. To study, it is better to choose the newest applications, the author of which is Prof. E.V. Lutsenko. Also on the page:http://lc.kubagro.ru/aidos/How_to_make_your_own_cloud_Eidos-application.pdfthere are more than 300 one and a half hour video lessons (in Russian) and many other educational materials and examples of descriptions of intelligent Eidos applications.

- supports on-line environment accumulation and exchange of knowledge, is widely used throughout the world (http://lc.kubagro.ru/map5.php);

-provides multilingual interface support in 51 languages. Language databases are included in the installation and can be updated automatically;
-the most computationally intensive operations of model synthesis and recognition are implemented using graphics processing unit (GPU), which on some tasks speeds up the solution of these problems by several thousand times, which really ensures intelligent processing of big data, big information and big knowledge (the graphics processor must be on the NVIDIA chipset, i.e. support the OpenGL language);
- ensures the transformation of initial empirical data into information, and it into knowledge and solving problems using this knowledgeidentification, forecasting,decision supportand research of the subject area by exploring its system-cognitive model, while generating a very large number of tabular and graphical output forms (development of cognitive graphics), many of which have no analogues in other systems (examples of forms can be viewedat work:http://lc.kubagro.ru/aidos/aidos18_LLS/aidos18_LLS.pdf);
-imitates human thinking style well and is a cognitive tool: gives analysis results that are understandable to experts based on their experience, intuition and professional competence, if these experts already exist, and if they do not yet exist, then it still gives the correct results of knowledge, which will be recognized by future experts when they appear;
-instead of making practically impossible demands on the source data (such as normality of distribution, absolute accuracy and complete repetitions of all combinations of factor values and their complete independence and additivity) automated systemic cognitive analysis (ASC analysis) offers without any preprocessingmake sense of the data you have, and thereby transform them into information, and then transform this information into knowledge by applying it to achieve goals (i.e., decision making and control) and solve problems of classification, decision support and meaningful empirical study of the modeled domain .

What is the strength of the approach implemented in the Eidos system? The fact is that it implements an approach whose effectiveness does not depend on what we think about the subject area or whether we think at all. It forms models directly on the basis of empirical data, and not on the basis of our ideas about the mechanisms for implementing patterns in these data. This is why Eidos models are effective even if our ideas about the subject area are erroneous or completely absent.

This is the weakness of this approach implemented in the Eidos system. Models of the Eidos system are phenomenological models that reflect empirical patterns in the facts of the training sample, i.e. they do not reflect the cause-and-effect mechanism of determination, but only the fact and nature of determination itself. A substantive explanation of these empirical patterns is formulated by experts at the theoretical level of knowledge in substantive scientific laws.

The development of the Eidos system included the following stages:

1st stage, "preparatory": 1979-1992. The mathematical model of the Eidos system was developed in 1979 and was first experimentally tested in 1981 (the first computer calculation based on the model). From 1981 to 1992, the Eidos system was repeatedly implemented on the Wang platform (on Wang-2200C computers). First received in 1987act of implementationto one of the early versions of the "Eidos" system, implemented in the environment of the personal technological system "Vega-M" developed by the author (see Act 2).

Stage 2, "era of IBM PC and MS DOS": 1992-2012. For IBM-compatible personal computers, the Eidos system was first implemented in the CLIPPER-87 and CLIPPER-5.01 (5.02) languages in 1992, and in 1994 they were already obtainedcertificates of RosPatent, the first in the Krasnodar region and, possibly, in Russia for artificial intelligence systems (on the left is the title videogram of the final DOS version of the Eidos-12.5 system, June 2012). From then until now, the system has been continuously improved on the IBM PC.

Stage 3, "era of MS Windows xp, 8, 7": 2012-2020. From June 2012 to December 14, 2020, the Eidos system developed in the languageAlaska-1.9+Express+++ library for working with Internet xb2net. The Eidos-X1.9 system worked well on all versions of MS Windows except Windows 10, which required special configuration. The most computationally intensive operations of model synthesis and recognition are implemented using a graphics processor (GPU), which in some tasks provides acceleration of the solution of these problems by several thousand times, which really ensures the intelligent processing of big data, big information and big knowledge (the graphics processor should be on an NVIDIA chipset).

Stage 4, "MS Windows-10 era": 2020-2021. From December 13, 2020 to the present, the Eidos system has been developing in the languageAlaska-2.0+Express++. The xb2net library is no longer used in it, because all Internet capabilities are included inbasic programming language capabilities.

Stage 5, "era of Big Data, information and knowledge": 2022. Since 2022, the author and developer of the Eidos system, Prof. E.V. Lutsenko, has been closely involved in the development of a professional version of the Eidos system in the xBase++eXpress++Advantage Database Server (ADS) language, which ensures the processing of big data, information and knowledge (Big Data, Big Information, Big Knowledge).

Stage 6, "era of Big Data, information and knowledge": from 2023 to the present. From 2023, the development of the Eidos system will be carried out in the Python languages, as well asAlaska-2.0+Express++.

Download and run the Eidos-X++ system (currently the newest version) or update the system to the current version(http://lc.kubagro.ru/aidos/_Aidos-X.htm). This is the most complete portable version of the

system currently unprotected from unauthorized copying (not requiring installation) with completesource textscurrent version (with the exception of access keys to the Eidos system ftp server and licensed software keys), which is in full open free access (about 180 MB). The update is about 10 MB in size.Credo. Laboratory inResearchGateon ASC analysis and the Eidos system.

Assignment-instructions for students on developing their own intelligent cloud Eidos application(http://lc.kubagro.ru/aidos/How_to_make_your_own_cloud_Eidos-application.pdf)/

The Eidos system can be successfully used as a tool that greatly increases the capabilities of natural intelligence in almost all areas where a person uses his natural intelligence, including it can be used in all areas of science, groups of specialties and scientific specialties.

Suffice it to say that using ASC analysis and the Eidos system, 16 dissertations (!!!) have already been defended, incl. 8 doctoral dissertations in economic, technical and biological sciences, and 8 candidate dissertations in psychological, technical, economic and medical sciences:

- 5 Doctors of Economic Sciences:

E.V.Lutsenko: http://ej.kubagro.ru/a/viewaut.asp?id=11
A.N. Tkachev: http://ej.kubagro.ru/a/viewaut.asp?id=20
V.V. Krokhmal: http://ej.kubagro.ru/a/viewaut.asp?id=22
K.N.Gorpinchenko: http://ej.kubagro.ru/a/viewaut.asp?id=646
O.A. Makarevich: http://ej.kubagro.ru/a/viewaut.asp?id=730

- 2 Doctors of Technical Sciences:

V.S.Simankov http://www.yandex.ru/yandsearch?text=Professor Simankov Vladimir Sergeevich
T.I. Safronova http://ej.kubagro.ru/a/viewaut.asp?id=111

- 1 Doctor of Biological Sciences:

N.N. Karpun https://elibrary.ru/item.asp?id=38160990

- 4 candidates of psychological sciences:

S.D. Nekrasov: http://manag.kubsu.ru/index.php/ofup/kafedry/174-nekrasov
V.G. Tretyak: http://law.edu.ru/person/person.asp?persID=1345265
T.N.Schukin: http://ej.kubagro.ru/a/viewaut.asp?id=94http://2045.ru/expert/27.html
I.L.Napriev http://ej.kubagro.ru/a/viewaut.asp?id=573

- 1 candidate of technical sciences:

E.V.Lutsenko http://ej.kubagro.ru/a/viewaut.asp?id=11

- 2 candidates of economic sciences:

L.O. Makarevich: http://www.mesi.ru/upload/iblock/b5a/Author's abstract%20Makarevich%20LO.pdf
http://ej.kubagro.ru/a/viewaut.asp?id=1377

K.A.Semenenko: https://vak.minobrnauki.gov.ru/az/server/php/filer_new.php?table=att_case&fld=autoref&key[]=100055557&version=100
https://rsue.ru/nauka/gna/after-1-01-2014/semenenko-kseniya-andreevna/
http://krasnodarnivi.ru/news31.html

- 1 candidate of medical sciences:

Sergeeva E.V.: http://ej.kubagro.ru/a/viewaut.asp?id=1034
Fomina E.V.: http://ej.kubagro.ru/a/viewaut.asp?id=813

A number of doctoral and candidate dissertations in medical, philological, economic and technical sciences using Eidos intellectual technologies are in the process of preparation for defense (these are those that the authors know about).

Scientific school: “Automated systemic cognitive analysis” (ASC analysis) [15] is an interdisciplinary scientific direction at the intersection of three scientific specialties of the Higher Attestation Commission of the Russian Federation [4]:

– 5.12.4. Cognitive modeling;
– 1.2.1. Artificial intelligence and machine learning;
– 2.3.1. System analysis, management and information processing.

and includes the following interdisciplinary scientific areas:

– ASC analysis of numerical and text tabular data;

– ASC analysis of text data;

– Spectral and contour ASK analysis of images;

– Scenario ASC analysis of time and dynamic series.

In [7] there is a list of references reflecting the applications of ASC analysis and the Eidos system in various subject areas, including 547 titles. These will be discussed in more detail in the Discussion section of this work.

3.2. Multiple increase in the capabilities of natural intelligence when using artificial intelligence as a tool of cognition (information-functional theory of technology development)

Intelligent systems are the basic means of labor of the 5th socio-economic formation. The first 4 socio-economic formations were listed by Karl Marx, who introduced this very concept.

In his theory of historical materialism, Karl Marx identified the following socio-economic formations:

1. Primitive communal formation: this is the initial stage when people live in conditions of primitive communism, without sharing ownership of the means of production.

2. Slave-owning formation: characterized by the presence of slavery, where some people own others as property. This was a typical formation in ancient Rome and other ancient societies.

3. Feudal formation: based on feudal relations, where landowners (feudal lords) controlled the land and peasants provided labor. Medieval Europe is an example of a feudal formation.

4. Capitalist formation: the main feature is private ownership of the means of production. Capitalism develops from feudalism and has characterized Western societies since the 16th century.

5. Communist formation: In Marx's theory, this is the highest stage of social development, where class differences are eliminated, there is no private property, and production is carried out according to the principle of “from each according to his ability, to each according to his needs.”

These formations represent the evolution of society over time according to the Marxist concept.

However, it is important to see the differences between Marx's theory and actual political practice, i.e. the question remains as to whether it can be reasonably assumed that in the USSR, the countries of the socialist camp and in China there was and is a Communist formation according to Marx.

According to Marx's theory, the communist formation represents the highest stage of social development in which class differences are eliminated, there is no private property, and production is carried out according to the

principle of "from each according to his ability, to each according to his needs." In the USSR and other socialist countries from the mid-20th century to the end of the 20th century, the prevailing model was often characterized as “socialism in one country.” This model differed from the communist formation in the sense that it retained some elements of the class structure and did not completely eliminate private property. The principle “from each according to his ability, to each according to his needs” was not always fully realized in practice. China was also undergoing changes in its economic system, and after reforms in 1978, the country began to move towards a socialist market economy, maintaining the political leadership of the Communist Party. These changes also created a gap between Marx's theory of the communist formation and the actual political reality.

Thus, we can say that although in these countries there were elements of the communist formation described by Marx in his works, this formation was not realized in its entirety. Therefore, it is more correct to call the social system in these countries socialism, considering it as a transition to communism.

If you look at the criteria that allow you to distinguish one socio-economic formation from another, you will see that this is, first of all, the form of ownership of the means of production and the results of production, i.e. these are economic criteria. Therefore, it is natural that formations are called socio-economic.

It is clear that the formations differ from each other not only in economics, but also in political structure, as well as culture and religion (or lack thereof).

But Marx also cites technological criteria that make it possible to distinguish formations from each other [1-3] and proposes a functional theory for the development of technology [11]. The author in 1979-1981 [12] develops the functional theory of the development of Marx’s technology by adding to it the concepts of the scientific theory of information, which arose approximately 100 years after Marx created his theory. In addition, ancient knowledge about the functional structure of a person was used not only at the physical level of reality, but also at its other levels at which mental functions are realized: incl. emotional and intellectual. Also taken into account is knowledge about various forms of consciousness, both lower than the most common at present, and higher, incl. significantly higher, in which a person is differently aware of himself and the environment, objective and subjective, space and time, etc. This is described in more detail in works [1-3, 10] in which they briefly outline the information-functional theory of technology development and the periodic criteria-based classification of forms of human consciousness.

According to the information-functional theory of technology development, socio-economic formations are qualitatively different in the functional level of the technological environment, i.e. the number of labor functions transferred to the means of labor, which determines the level of

technology development. Therefore, socio-economic formations are qualitatively different in their technological structures and they can quite reasonably be called not only socio-economic, but also socio-technological.

In accordance with the information-functional theory of technology development, means of labor of a qualitatively new level are created when a new human labor function is transferred to them. This leads to a qualitative increase in labor productivity, changes in industrial relations, economic relations, as well as political structure and culture. Naturally, the speed of technology development is in no way limited by the speed of natural biological evolution, which was very, very low before the creation of genetic engineering methods.

Four labor functions were listed by Marx, these are:

1. Function of contact with the subject of labor.
2. Transmission function (transfer and redistribution of energy).
3. Work function (the function of transforming a simple movement into a complex, expedient one that does work).
4. Engine function (converting one form of energy to another).

Fifth the labor function, unfortunately, was not named by Marx[4]and was formulated by the author in 1979-1981 as a function of transforming the form of information [12]. The means of labor to which the 5th labor function has been transferred are computers and all information technologies, incl. networks and interfaces. The process of transferring the 5th labor function to the means of labor represents the content of the 5th and 6th information revolutions [1].

In addition, the author in [12] described not only 5 functional types of technical systems already created in the history of our technological civilization, basic for various socio-technological formations of the current group of formations, but also 11 (!!!) functional technical systems, basic for future socio-technological formations and groups of formations. For the closest of these systems, technical solutions have been proposed [1-3] - these are “Soul-computer” interfaces [1-3]. The work [12] also briefly describes these future formations and groups of formations themselves and the most widespread forms of consciousness associated with them, and also touches on numerous other issues that are directly related to this.

Like any means of labor previously created by man in the course of technological progress, information and intellectual systems remove the corresponding (i.e. information and intellectual) natural psychophysical limitations of a person and increase his information and intellectual capabilities by many orders of magnitude.

About the same:

– the engine increases by many orders of magnitude the natural physical capabilities of a person to convert chemical energy into mechanical energy, i.e.

[4]If Karl Marx had done this, he would have become the forerunner of information theory, information systems and the information society, intelligent systems and a knowledge-based society.

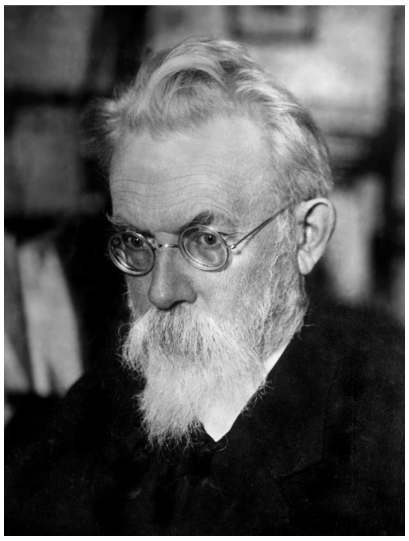
has many times more power and can deliver this power evenly over a much longer period of time;

– a microscope and a telescope increase the capabilities of natural vision by many orders of magnitude, and glasses compensate for its shortcomings, but the truth is that all this is subject to one essential condition: that this natural vision exists.

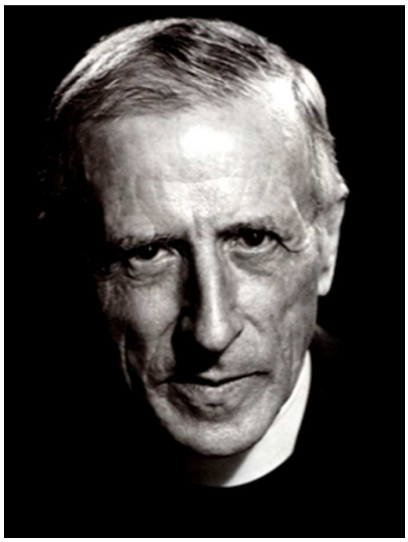
The modern form of society is based on information and intelligent systems, so it is natural to call it an information society or a knowledge-based society. A society based on knowledge is proposed to be called a cognitive society (both briefly and clearly (cognition), and reflects the essence, and corresponds to clause 8. Critical Technologies of the Russian Federation [13]).

Let us give just one example of increasing the capabilities of natural intelligence through the use of intelligent systems. The monograph [14] presents information models of socio-economic and natural processes in their relationship with the space environment. The theory is based on the hypothesis of spatio-temporal similarity of phenomena and processes of the same nature (in meaning, this principle is a generalization of the principles of relativity of Nicholas of Cusa - Galileo Galileo and Einstein). Methods have been developed and algorithms for recognizing various events in geophysics, economics and sociology have been presented, including seismic events, geomagnetic field variations, the movement of the Earth's pole, exchange rates, economic indices and social categories. Due to the large dimension of the problems under consideration, artificial intelligence systems “Eidos-Astra” and “Eidos-Geo” have been created to solve them, and methods and algorithms for data visualization have been developed. The monograph is intended for everyone who is interested in the opportunity to take another step in understanding the general properties of the system of determination of socio-economic and natural processes. All calculations performed are based on data that is fully open and freely available.

In this study, many new, previously unknown patterns and natural phenomena were discovered related to the influence of the planetary space environment of the Solar system on global processes on Earth, and thereby developed the doctrines of the biosphere of V.I. Vernadsky, the noosphere of his student Pierre Teilhard de Chardin, as well as helio- and cosmobiology of A.L.Chizhevsky:



Vladimir Ivanovich Vernadsky 02/28/1863 – 01/06/1945



Pierre Teilhard de Chardin 05/1/1881 – 04/10/1955

Alexander Leonidovich Chizhevsky 02/07/1897 – 12/20/1964

According to rough estimates, the amount of raw data processed and analyzed using artificial intelligence systems in this study in about 3 months would require a person to spend 30 lifetimes just to read them (if you read from 18 to 60 all working days from 9 a.m. to 6 p.m. lunch break). Of course, there can be no question of any analysis of this data by a person using his natural intelligence without the use of information and intellectual technologies.

Modern generative artificial intelligence, such as ChatGPT (GPT - Generative Pre-trained Transformer), pre-trained on data from all available Internet content, can generally be reasonably considered a generalization of almost all open information currently available to humanity. Of course, this goes immeasurably far beyond the capabilities of any particular individual.

3.3. Problems solved by artificial intelligence systems and proposals for doubling the range of scientific specialties

3.1.1. Problems solved by artificial intelligence systems

Above in section 3.1 of this work it is said that the ASC analysis method includes the following interdisciplinary scientific areas:

– ASC analysis of numerical and text tabular data;
– ASC analysis of text data;
– Spectral and contour ASK analysis of images;
– Scenario ASC analysis of time and dynamic series.

Below are typical tasks and subtasks that can be solved in these variants of ASC analysis:

1. TASK-1. COGNITIVE STRUCTURING OF THE SUBJECT DOMAIN. TWO INTERPRETATIONS OF CLASSIFICATION AND DESCRIPTIVE SCALES AND GRADATIONS
2. TASK-2. FORMALIZATION OF THE SUBJECT DOMAIN

3. TASK-3. SYNTHESIS OF STATISTICAL AND SYSTEM-COGNITIVE MODELS. MULTI-PARAMETER TYPICATION AND PARTICULAR KNOWLEDGE CRITERIA
4. TASK-4. VERIFICATION OF MODELS
5. TASK-5. SELECTION OF THE MOST RELIABLE MODEL
6. TASK-6. SYSTEM IDENTIFICATION AND PREDICTION
6.1. Integral criterion “Sum of knowledge”
6.2. Integral criterion “Semantic resonance of knowledge”
6.3. Important mathematical properties of integral criteria
6.4. Solving the problem of identification and forecasting in the Eidos system
7. TASK-7. DECISION SUPPORT
7.1. A simplified version of decision making as an inverse forecasting problem, positive and negative information portraits of classes, SWOT analysis
7.2. Developed decision-making algorithm in adaptive intelligent control systems based on ASK analysis and the Eidos system
8. TASK-8. RESEARCH OF THE OBJECT OF SIMULATION BY STUDYING ITS MODEL
8.1. Inverted SWOT diagrams of descriptive scale values (semantic potentials)
8.2. Cluster-constructive analysis of classes
8.3. Cluster-constructive analysis of the values of descriptive scales
8.4. Knowledge model of the Eidos system and non-local neurons
8.5. Non-local neural network
8.6. 3D integrated cognitive maps
8.7. 2D integral cognitive maps of meaningful class comparison (mediated fuzzy plausible reasoning)
8.8. 2D integral cognitive maps of meaningful comparison of factor values (mediated fuzzy plausible reasoning)
8.9. Cognitive functions
8.10. The significance of descriptive scales and their gradations
8.11. Degree of determinism of classes and classification scales

What exactly the solution to these problems looks like can be seen in [16, 17].

3.3.2. Changing the wording of clause 8. List of critical technologies of the Russian Federation by adding smart technologies to it

Point 8 of the List of Critical Technologies of the Russian Federation reads as follows: “8. Nano-, bio-, information, cognitive technologies” [13].

The new nomenclature of scientific specialties of the Russian Federation [4] includes two new specialties that are directly related to artificial intelligence:

– 5.12.1. Interdisciplinary studies of cognitive processes;
– 5.12.4. Cognitive modeling;
– 1.2.1. Artificial intelligence and machine learning;

Following the same logic and on the same basis on which these new specialties were added to the nomenclature, it is proposed to change the wording of clause 8 of the List of Critical Technologies of the Russian Federation and adopt it in the following wording: “8. Nano-, bio-, information, cognitive and intellectual technologies.”

Compared to the current edition, only one word has been added to the wording of clause 8 of the List of Critical Technologies of the Russian Federation: “intelligent”. It’s just one word, but it’s key for the current stage of technological progress.

3.3.3.Formation of new fields of science, groups of scientific specialties and scientific specialties by using modern information, cognitive and intelligent technologies

So, artificial intelligence systems can be used to automate the process of intellectual cognition in all fields of science, groups of scientific specialties and scientific specialties reflected in the nomenclature of scientific specialties [4].

In this nomenclature there are still scientific specialties, the names of which are formed by combining the name of research methods and the name of science, for example: “5.2.2. Mathematical, statistical and instrumental methods in economics.” In exactly the same way, it is proposed to create new names for fields of science, groups of scientific specialties and scientific specialties by adding to the existing names, of course, only where appropriate, the words: “Information, cognitive and intellectual technologies.”

Then you will get, for example, the following names of fields of science: “5ai. Information, cognitive and intellectual technologies in social and human sciences", groups of scientific specialties: "5.2ai. Information, cognitive and intellectual technologies in economics" and scientific specialties: "5.2.3ai. Information, cognitive and intellectual technologies in regional and sectoral economies,” etc., etc. for almost all fields of science, groups of scientific specialties and scientific specialties

3.3.3.1. New areas of science

Currently, the passport of specialties of scientific workers of the Higher Attestation Commission of the Russian Federation [4] includes the following 5 areas of science:

1. Natural sciences.
2. Technical sciences.
3. Medical sciences.
4. Agricultural Sciences.
5. Social and human sciences.

It is proposed to consider the following new areas of science, formed from the old ones by explicitly indicating in their names the use of information, cognitive and intellectual technologies as a tool of knowledge in these areas of science:

1. Information, cognitive and intellectual technologies in the natural sciences.
2. Information, cognitive and intellectual technologies in technical sciences.
3. Information, cognitive and intellectual technologies in medical sciences.
4. Information, cognitive and intellectual technologies in agricultural sciences.

5. Information, cognitive and intellectual technologies in social and human sciences.

It should be noted that in fact there are more than enough examples of the use of information, cognitive and intellectual technologies in these areas of science, incl. and in the works of the author [7, 18, 19]. Moreover, it would not be a great exaggeration to say that almost all the most significant scientific research in these fields of science, especially at the end of the 20th century and in the 21st century, is associated precisely with the use of information, cognitive and intellectual technologies as tools of cognition. These technologies have long been closely and organically integrated into all the most powerful modern instruments of empirical research (experimental installations and systems for observing the object of knowledge), information measurement systems and scientific research systems. At the time of writing this work, there is nothing new or previously unknown in this; moreover, it is generally known to such an extent that it does not require any special evidence, i.e. obvious to almost everyone[5]. However, this conclusion has not previously been formulated explicitly and consciously in a generalized form in scientific works, and this article fills this gap.

3.3.3.2. New groups of scientific specialties

Currently, the passport of specialties of scientific workers of the Higher Attestation Commission of the Russian Federation [4] contains the following 34 groups of scientific specialties:

1.1. Mathematics and mechanics.
1.2. Computer Science and Information Science.
1.3. Physical Sciences.
1.4. Chemical Sciences.
1.5. Biological Sciences.
1.6. Earth and Environmental Sciences.
2.1. Construction and architecture.
2.2. Electronics, photonics, instrumentation and communications.
2.3. Information technology and telecommunications.
2.4. Energy and electrical engineering.
2.5. Mechanical engineering.
2.6. Chemical technology, materials science, metallurgy.
2.7. Biotechnology.
2.8. Subsoil use and mining sciences.
2.9. Transport systems.
2.10. Technosphere safety.
3.1. Clinical medicine.
3.2. Preventive medicine.
3.3. Medical and biological sciences.
3.4. Pharmaceutical Sciences.

[5]However, in 2002, Vice-Rector for Scientific Work of KubSAU Ph.D. Yuri Dmitrievich Severin “cut down” the author’s proposal to create an Artificial Intelligence Center at KubSAU, arguing that the feasibility of creating such a center still needs to be proven. And now some 22 years have passed and a website has appeared: “Artificial Intelligence of the Russian Federation”:https://ai.gov.ru/

4.1. Agronomy, forestry and water management.
4.2. Animal science and veterinary medicine.
4.3. Agricultural engineering and food technology.
5.2. Economy.
5.3. Psychology.
5.4. Sociology.
5.5. Political science.
5.6. Historical sciences.
5.7. Philosophy.
5.8. Pedagogy.
5.9. Philology.
5.10. Art history and cultural studies.
5.11. Theology.
5.12. Cognitive Sciences.

It is proposed to consider the following new groups of scientific specialties, formed from the old ones by explicitly indicating in their names the use of information, cognitive and intellectual technologies as a tool of cognition in these groups of scientific specialties:

1.1. Information, cognitive and intellectual technologies in mathematics and mechanics.
1.2. Information, cognitive and intellectual technologies in computer science and information science.
1.3. Information, cognitive and intellectual technologies in the physical sciences.
1.4. Information, cognitive and intellectual technologies in chemical sciences.
1.5. Information, cognitive and intellectual technologies in biological sciences.
1.6. Information, cognitive and intellectual technologies in earth and environmental sciences.
2.1. Information, cognitive and intellectual technologies in construction and architecture.
2.2. Information, cognitive and intellectual technologies in electronics, photonics, instrumentation and communications.
2.3. Information, cognitive and intellectual technologies in telecommunications.
2.4. Information, cognitive and intellectual technologies in energy and electrical engineering.
2.5. Information, cognitive and intellectual technologies in mechanical engineering.
2.6. Information, cognitive and intellectual technologies in chemical technologies, materials sciences, metallurgy.
2.7. Information, cognitive and intellectual technologies in biotechnology.
2.8. Information, cognitive and intellectual technologies in subsoil use and mining sciences.
2.9. Information, cognitive and intellectual technologies in transport systems.
2.10. Information, cognitive and intellectual technologies in technosphere security.
3.1. Information, cognitive and intellectual technologies in clinical medicine.
3.2. Information, cognitive and intellectual technologies in preventive medicine.
3.3. Information, cognitive and intellectual technologies in biomedical sciences.
3.4. Information, cognitive and intellectual technologies in pharmaceutical sciences.
4.1. Information, cognitive and intellectual technologies in agronomy, forestry and water management.

4.2. Information, cognitive and intellectual technologies in animal science and veterinary medicine.
4.3. Information, cognitive and intellectual technologies in agricultural engineering and food technologies.
5.2. Information, cognitive and intellectual technologies in economics.
5.3. Information, cognitive and intellectual technologies in psychology.
5.4. Information, cognitive and intellectual technologies in sociology.
5.5. Information, cognitive and intellectual technologies in political sciences.
5.6. Information, cognitive and intellectual technologies in historical sciences.
5.7. Information, cognitive and intellectual technologies in philosophy.
5.8. Information, cognitive and intellectual technologies in pedagogy [175, 176, 177].
5.9. Information, cognitive and intellectual technologies in philology.
5.10. Information, cognitive and intellectual technologies in art history and cultural studies.
5.11. Information, cognitive and intellectual technologies in theology.
5.12. Computer science, cognitive science, artificial intelligence science.

It should be noted that in fact there are more than enough examples of the use of information, cognitive and intellectual technologies in scientific research in these groups of scientific specialties, incl. and in the works of the author [7, 18, 19]. Moreover, it would not be a great exaggeration to say that almost all the most significant scientific research in these groups of specialties, especially at the end of the 20th century and in the 21st century, is associated precisely with the use of information, cognitive and intellectual technologies as tools of cognition. These technologies have long been closely and organically integrated into all the most powerful modern instruments of empirical research (experimental installations and systems for observing the object of knowledge), information measurement systems and scientific research systems. At the time of writing this work, there is nothing new or previously unknown in this; moreover, it is generally known to such an extent that it does not require any special evidence, i.e. obvious to almost everyone[6]. However, this conclusion has not previously been formulated explicitly and consciously in a generalized form in scientific works, and this article fills this gap.

3.3.3.3. Examples of new scientific specialties

Currently, the nomenclature of specialties of scientific workers of the Higher Attestation Commission of the Russian Federation [4] includes 351 scientific specialties. It is clear that due to strict restrictions on the volume of this work for all these specialties, it is inappropriate to give their new names. Therefore, we will limit ourselves to specialties in one field of science: “4. Agricultural Sciences":

4.1.1. General agriculture and plant growing.
4.1.2. Selection, seed production and plant biotechnology.

[6]However, in 2002, Vice-Rector for Scientific Work of KubSAU Ph.D. Yuri Dmitrievich Severin “cut down” the author’s proposal to create an Artificial Intelligence Center at KubSAU, arguing that the feasibility of creating such a center still needs to be proven. And now some 22 years have passed and a website has appeared: “Artificial Intelligence of the Russian Federation”:https://ai.gov.ru/

4.1.3. Agrochemistry, agro-soil science, plant protection and quarantine.
4.1.4. Gardening, vegetable growing, viticulture and medicinal crops.
4.1.5. Melioration, water management and agrophysics.
4.1.6. Forestry, silviculture, forest crops, agroforestry, landscaping, forest pyrology and taxation.
4.2.1. Animal pathology, morphology, physiology, pharmacology and toxicology.
4.2.2. Sanitation, hygiene, ecology, veterinary and sanitary examination and biosafety.
4.2.3. Infectious diseases and animal immunology.
4.2.4. Private animal husbandry, feeding, technologies for preparing feed and producing livestock products.
4.2.5. Breeding, selection, genetics and biotechnology of animals.
4.2.6. Fisheries, aquaculture and capture fisheries.
4.3.1. Technologies, machines and equipment for the agro-industrial complex.
4.3.2. Electrical technologies, electrical equipment and energy supply for the agro-industrial complex.
4.3.3. Food systems
4.3.4. Technologies, machines and equipment for forestry and wood processing
4.3.5. Biotechnology of food and biologically active substances

It is proposed to consider the following new scientific specialties, formed from the old ones by explicitly indicating in their names the use of information, cognitive and intellectual technologies as a tool of cognition in these scientific specialties. Then we get the following new names of scientific specialties:

4.1.1.Information, cognitive and intellectual technologies in ogeneral agriculture and plant growing.
4.1.2.Information, cognitive and intellectual technologies inselection, seed production and plant biotechnology.
4.1.3.Information, cognitive and intellectual technologies in agrochemistry, agro-soil science, plant protection and quarantine.
4.1.4.Information, cognitive and intellectual technologies inagriculture, vegetable growing, viticulture and medicinal crops.
4.1.5.Information, cognitive and intellectual technologies in mreclamation, water management and agrophysics.
4.1.6.Information, cognitive and intellectual technologies in lenvironmental science, forestry, forest crops, agroforestry, landscaping, forest pyrology and taxation.
4.2.1.Information, cognitive and intellectual technologies in panimal athology, morphology, physiology, pharmacology and toxicology.
4.2.2.Information, cognitive and intellectual technologies insanitation, hygiene, ecology, veterinary and sanitary examination and biosafety.
4.2.3.Information, cognitive and intellectual technologies in andinfectious diseases and animal immunology.
4.2.4.Information, cognitive and intellectual technologies in hanimal husbandry, feeding, feed preparation technologies and livestock production.
4.2.5.Information, cognitive and intellectual technologies in Russiabreeding, selection, genetics and biotechnology of animals.
4.2.6.Information, cognitive and intellectual technologies in Russiafisheries, aquaculture and industrial fisheries.
4.3.1.Information, cognitive and intellectual technologies in ttechnologies, machines and equipment for the agro-industrial complex.

4.3.2.Information, cognitive and intellectual technologies in eelectrical technologies, electrical equipment and energy supply of the agro-industrial complex.
4.3.3.Information, cognitive and intellectual technologies in psearch systems.
4.3.4.Information, cognitive and intellectual technologies in ttechnologies, machines and equipment for forestry and wood processing.
4.3.5.Information, cognitive and intellectual technologies in biotechnologies of food products and biologically active substances.

For specialties in other fields of science, this is done in exactly the same way. It should be noted that the developers of the new nomenclature of scientific specialties included in this nomenclature a number of specialties, the names of which are formed in a similar way, for example:

2.9.8. Intelligent transport systems [178].
5.3.3. Occupational psychology, engineering psychology, cognitive ergonomics.

In addition, the new passport of specialties includes specialties directly related to artificial intelligence and cognitive technologies, which did not exist before:

1.2.1. Artificial intelligence and machine learning.
5.12.1. Interdisciplinary studies of cognitive processes.
5.12.4. Cognitive modeling.

It is significant that in 2003, the author defended his doctoral dissertation in the specialty 08.00.13 “Mathematical and instrumental methods of economics” on the topic: “System-cognitive analysis in the management of the agro-industrial complex” [20, 21]. Many then dissuaded the author from using the term “cognitive” in the title (unsuccessfully). They did not know that in more than 20 years this term would be used in the name of critical technologies of the Russian Federation and in the names of scientific specialties of the Higher Attestation Commission of the Russian Federation. Currently this dissertation corresponds to the specialties: 1.2.1. Artificial Intelligence and Machine Learning and 5.12.4. Cognitive modeling.

It is important that in fact there are more than enough examples of the use of information, cognitive and intellectual technologies in scientific research in these and other scientific specialties, incl. and in the works of the author [7, 18, 19]. Moreover, it would not be a great exaggeration to say that almost all the most significant results of scientific research in these and other specialties, especially at the end of the 20th century and in the 21st century, are associated precisely with the use of information, cognitive and intellectual technologies as tools of cognition. These technologies have long been closely and organically integrated into all the most powerful modern instruments of empirical research (experimental installations and systems for observing the object of knowledge), information measurement systems and scientific research systems. At the time of writing this work, there is nothing new or previously unknown in this; moreover, it is generally known to such an extent that it does not require any

special evidence, because obvious to almost everyone[7]. However, this conclusion has not previously been formulated explicitly and consciously in a generalized form in scientific works, and this article fills this gap.

IV. Discussion: examples of the use of modern information, cognitive and intelligent technologies (ASC analysis) in various fields of science

At the time of writing this work, 564 publications of the author are registered in the RSCI: https://www.elibrary.ru/author_profile.asp?id=123162/. An analysis of the author's publication activity according to RSCI data and its means is given in [7], and by means of ASC analysis in [19].

On the page http://lc.kubagro.ru/aidos/_Aidos-X.htm On the author's website, many of these publications are collected into thematic collections of publications.

With these publications, the author solved a number of problems, including trying to demonstrate the possibility and extreme promise of using artificial intelligence as a universal tool for scientific knowledge in a wide variety of subject areas. The author himself was always aware of this and tried to substantiate it in his doctoral dissertation [20, 21].

The result was 15 thematic collections of scientific publications on the use of ASC analysis in various fields of science[8], links to which are given below.

4.1. Rwork on systematic generalization of mathematics and information measures of the level of systematicity (coefficients of emergence by Prof. E.V. Lutsenko)

4.1.1. System generalization of mathematics

The author proposed in a number of works [22-52][9]a program idea for a systematic generalization of the concepts of mathematics, in particular information theory, based on set theory, was developed by replacing the concept of a set with a more meaningful concept of a system. This idea was partially implemented by the author when developing automated systemic cognitive analysis (ASC analysis), the mathematical model of which is based on a systemic generalization of formulas for the amount of information of Hartley and Kharkevich. The implementation of the next step - a systematic generalization of the concept of functional dependence - is considered in [85], where new scientific concepts and the corresponding terms "cognitive

[7]However, in 2002, Vice-Rector for Scientific Work of KubSAU Ph.D. Yuri Dmitrievich Severin "cut down" the author's proposal to create an Artificial Intelligence Center at KubSAU, arguing that the feasibility of creating such a center still needs to be proven. And now some 22 years have passed and a website has appeared: "Artificial Intelligence of the Russian Federation":https://ai.gov.ru/

[8]These areas of science in which ASC analysis has already been successfully applied are not exhausted. It's just that no more thematic collections have been made.

[9]See for example:http://lc.kubagro.ru/aidos/Work_on_emergence.htm

functions" and "cognitive numbers" are introduced. Numerical examples show that ASC analysis provides identification of cognitive functional dependencies in multidimensional noisy fragmented data.

4.1.2. Systematic level information measures – emergence coefficients of Prof. E.V. Lutsenko

By proposed in a number of works [22-52][10]a system information theory (SI) has been developed, within which system generalizations of the formulas for the amount of information of Hartley, Shannon and Kharkevich and information measures of the level of systematicity, named by Professor E.V.Lutsenko in honor of outstanding scientists who made a significant contribution to the creation of information theory, coefficients, are substantiated emergence of Harty and Shannon and Kharkevich.

Note that for unknown reasons, many authors mistakenly think that systemic generalizations of the formulas for the amount of information of Hartley, Shannon and Kharkevich and information measures of the level of systematicity based on them - emergence coefficients - were proposed not by Prof. E.V. Lutsenko, but by Harty and Shannon themselves and Kharkevich or someone else, for example Volkova V.N. and Denisov A.A.[11]. Therefore, in this work we once again write that they were proposed not by them, but by Prof.E.V.Lutsenko.

Ignorant authors mislead their readers, in particular:

1. "The fundamental differences between the two approaches to determining emergence coefficients proposed by the American mathematician Ralph Winton Lyon Hartley and the Soviet mathematician Alexander Aleksandrovich Kharkevich are that...»[12](my italics, author), in fact, these scientific concepts were proposed and developed by the Soviet and Russian scientist Professor Evgeniy Veniaminovich Lutsenko in a fundamental monograph [8] and a number of earlier and later works[22-52][13].

2."From here, a systemic numerical measure of the amount of information in an information system is constructed based on an assessment of the emergence of the system (according to Hartley and)"[14]. It is clear that it should be written here not "according to Hartley", but "according to Lutsenko" and a link to the scientific work should be given [8].

There are such peculiar articles in which an incorrect reference is given to one formula, and then half the article is an exact copy from the works of Prof. E.V. Lutsenko without any references at all. Cases of direct plagiarism are also

[10]See for example:http://lc.kubagro.ru/aidos/Work_on_emergence.htm
[11]See for example:https://elib.belstu.by/bitstream/123456789/24065/1/Trusevich_Ocenka_urovnja.pdf
[12] https://easyhelp.su/sirvices/kontrolnye_raboty/raschet_koefficientov_emerdzhentnosti_hartli_i_harkevicha/
[13]See for example:http://lc.kubagro.ru/aidos/Work_on_emergence.htm
[14] https://pandia.ru/text/78/381/542-3.php

quite common. An excellent article about this “Group plagiarism from student to minister” was written by Viktor Vyatkin[15].

4.2. Work on ASK image analysis: [53-68]

Automated systemic cognitive analysis (ASC-analysis) and its software tools, which are currently the Eidos system, provide automated images from graphic files into the system [53-68][16].

In this case, the following can be considered as image features:

– all pixels;

– contours;

– spectra.

The Eidos system allows you to create specific images of each image, generalized images of class images and solve problems of image identification, i.e. comparison of specific images with generalized images of classes, comparison of classes with each other (cluster analysis of classes), as well as the task of studying a modeling object by studying its model.

4.3. Work on ASC analysis of texts

ASC analysis of texts[69-84][17]allows:

- form generalized linguistic images of classes (semantic cores) based on fragments or examples of related texts in any language;

- quantitatively compare the linguistic image of a specific person, or the description of an object, process with generalized linguistic images of groups (classes);

- compare generalized linguistic images of classes with each other and create their clusters and constructs;

- explore the modeled subject area by studying its linguistic system-cognitive model;

- carry out intellectual attribution of texts, i.e. determine the probable authorship of anonymous and pseudonymous texts, dating, genre and semantic orientation of the content of the texts;

- all this can be done for any natural or artificial language or coding system (for example, you can determine in what language or dialect a certain text is written or in what programming language a program is written (by its source text)).

[15] https://www.trv-science.ru/2011/11/gruppovojj-plagiat-ot-studenta-do-ministra/

[16] http://lc.kubagro.ru/aidos/Works_on_ASK-analysis_of_images.htm

[17] См.:http://lc.kubagro.ru/aidos/Works_on_ASK-analysis_of_texts.htm

4.4. Work on cognitive functions

The Eidos system, currently a software tool for ASK analysis, provides the generation and visualization of direct, inverse, positive, negative, fully and partially reduced cognitive functions [85-101][18].

***Cognitive function** is a graphical display in color of the strength and direction of influence of all values of a certain factor on the transitions of a control object to future states corresponding to classes of one scale.*

Cognitive functions represent a new promising tool for reflecting and visualizing patterns and empirical laws. The development of a meaningful scientific interpretation of cognitive functions is a way of understanding nature, society and man. Cognitive functions can be: direct, reflecting the dependence of classes on features, generalizing information portraits of features; inverse, reflecting the dependence of features on classes, generalizing information portraits of classes; positive, showing what the determination system contributes to; negative, reflecting what the determination system prevents; weighted averages, reflecting the total influence of all factor values on the behavior of an object (and the amount of information in the value of the argument about the function values is used as observation weights) with varying degrees of reduction or degree of determination, which reflects in graphical form (in the form of a strip) the amount of knowledge in the argument about the value function and is an analogue and generalization of the confidence interval. If we display the submatrix of the knowledge matrix, displaying in color the strength and direction of the influence of each gradation of some descriptive scale on the transition of an object to states corresponding to the classes of some classification scale, we obtain an unreduced cognitive function. Cognitive functions are the most developed means of studying cause-and-effect relationships in a simulated subject area, provided by the Eidos system. It should be noted that the mathematical model of ASC analysis does not impose any restrictions on the type of influence functions; in particular, they may not be differentiable.

4.5. Work on identification, presentation and the use of knowledge, logic and methodology of scientific knowledge

Apparently, we do not study reality itself, but only our models of reality, which we most often mistakenly and unlawfully take for reality [102-121][19]. This also applies to ourselves, i.e. our ideas about ourselves. These models of the internal and external world become more and more adequate as the form of consciousness increases. With an increase in the form of consciousness, the boundary between the internal and the external shifts inside the person and the

[18] http://lc.kubagro.ru/aidos/Works_on_ASK-analysis_of_texts.htm

[19] http://lc.kubagro.ru/aidos/Work_on_identification_presentation_and_use_of_knowledge.htm

content of the categories “objective” and “subjective”, “I” and “not I” changes, as well as the relationship between the theoretical and the practical.

Different forms of consciousness are supported or limited by different structures (bodies). These bodies have various information and energy capabilities for interaction with the outside and internal world. This places restrictions on the models of reality created by these forms of consciousness.

The theory of knowledge must be developed into a theory of consciousness. The main question of philosophy must be posed and resolved by the method of scientific induction.

It is usually thought that the true model of reality is the limit to which the model of reality created under the ordinary form of consciousness with an unlimited increase in the level of intellectual cognition strives.

But in reality, the true model of reality is the limit to which models of reality created under various forms of consciousness with an unlimited increase in the level of consciousness strive.

4.6. Works on ecology, climatology and the study of the influence of the space environment on various global processes on Earth

In a number of scientific monographs, scientific articles and certificates of RosPatent [122-160][20] information models of socio-economic and natural processes in their relationship with the space environment are presented. The theory is based on the hypothesis of spatio-temporal similarity of phenomena and processes of the same nature. Methods have been developed and algorithms for recognizing various events in geophysics, economics and sociology have been presented, including seismic events, geomagnetic field variations, the movement of the Earth's pole, exchange rates, economic indices and social categories. Due to the large dimension of the problems under consideration, artificial intelligence systems “Eidos-Astra” and “Eidos-Geo” have been created to solve them, and methods and algorithms for data visualization have been developed. This may be of interest to anyone who is interested in the opportunity to take another step in understanding the general properties of the system of determination of socio-economic and natural processes.

4.7. Work on intelligent information and communication technologies in research and education

This area of research and development is represented by a number of textbooks for graduate students[161-166][21]. These manuals had to be redone and published every time the requirements for them changed, which changed in a circle, and then they were canceled altogether.

[20] http://lc.kubagro.ru/aidos/Work_on_the_study_of_the_influence_of_the_space_environment_on_various_processes_on_Earth.htm
[21] http://lc.kubagro.ru/aidos/Information_and_communication_technologies_in_research_activities_and_education.htm

4.8. Work on intelligent interfaces and virtual reality

The author has a number of works on intelligent interfaces and virtual reality [167-174][22]. In [167] there are two lectures devoted to this topic:

1.6. LECTURE-6: SYSTEMS WITH INTELLIGENT FEEDBACK AND INTELLIGENT INTERFACE

1.6.1. Using biometric user information in systems management

Identification and authentication of a person by handwriting. Concepts of keyboard and interface handwriting
The relationship between psychographics and text attribution
Identification and authentication of a computer user's identity using keyboard handwriting
Variants of setting the task of recognizing keyboard handwriting
Characteristics of keyboard and interface handwriting
Mathematical methods for recognizing keyboard handwriting

1.6.2. Biofeedback systems

General provisions
Monitoring the condition of assembly line employees to ensure high quality products
Computer simulators based on biofeedback for teaching patients how to manage their condition
Computer games with biofeedback

1.6.3. Predicting operator errors based on changes in his electroencephalogram

1.6.4. Computer Ψ-technology, intelligent subliminal interface and its use for subliminal testing and automated NLP of the user

1.7. LECTURE-7: VIRTUAL REALITY

1.7.1. Classic definition of a virtual reality system

1.7.2. Effects of virtual reality: effects of reality, presence, depersonalization (modification of self-awareness), modification of the user's consciousness, virtualization of interests, goals, values and motivations ("reals and virtuals")

The “reality effect” of virtual reality and the unreality of “true” reality
"Presence effect" in virtual reality
“The effect of depersonalization or modification of self-awareness” in virtual reality
“Consciousness modification effect” in virtual reality
“The effect of virtualization of goals, values and motivations” in virtual reality, “reals” and “virtuals”

1.7.3. Criteria of reality for various forms of consciousness and their application in virtual reality

1.7.4. Virtual reality systems and criteria of reality, principles of equivalence (relativity) of Galileo and Einstein and criteria of virtual reality

1.7.5. Virtual I/O devices

1.7.6. Author's definition of a virtual reality system

1.7.7. Dreaming sleep, hypnotic states and virtual reality

1.7.8. Augmented reality and augmented virtuality

1.7.9. Modification of the user's consciousness and self-awareness in virtual reality. Consideration of promising and pathological altered forms of consciousness that arise in systems with intelligent interfaces

1.7.10. Compliance with moral standards in virtual reality and the consequences of non-compliance

1.7.11. The danger of virtual reality effects and the need for their most serious scientific study. Transfer of knowledge, skills and abilities from virtual reality to true

1.7.12. Transfer of knowledge, skills and abilities from virtual reality to true

1.7.13. Mechanisms for the formation of models of true and virtual reality by humans and the principles of their correct meaningful interpretation

1.7.14. Principles and prospects for correct meaningful interpretation of subjective (virtual) models of physical and social reality, formed by human consciousness

1.7.15. Applications of virtual reality systems

The works [1-3] briefly discuss promising intelligent interfaces “Soul-computer”[23]and links are given to works where this issue is discussed in more detail.

[22] http://lc.kubagro.ru/aidos/Virtual_reality_publications.htm
[23]Not to be confused with Brain-Computer Interface

4.9. Works on cognitive veterinary medicine

The author has a number of scientific publications [179-192][24]on the use of ASA analysis in veterinary medicine.

4.10. Works on cognitive agronomy and cognitive ampelography

The author has a number of scientific publications [193-223][25]on the use of ASA analysis in veterinary medicine.

4.11. Work on ASC analysis of the economy of the agro-industrial complex

The author has a number of scientific publications [224-248][26]on the application of ASC analysis in the economics of the agro-industrial complex.

4.12. Works on scientometrics

The author has a number of scientific publications [249-257][27]on the use of ASK analysis in scientometrics.

4.13. Works on higher forms of consciousness, perspectives on man, technology and society

The author has a number of scientific publications [258-272][28]about higher forms of consciousness, prospects for man, technology and society.

4.14. Work on the development and application of professionograms and tests (psychological, pedagogical, i.e. tests of educational achievements, career guidance, medical (diagnostic) and veterinary)

The author has a number of scientific works [273-318][29]on the development and application of professionograms and tests: psychological, pedagogical, i.e. tests of educational achievements, as well as career guidance and medical (diagnostic) tests.

4.15. Work on scenario ASC analysis

The author has a number of scientific publications [319-330][30]according to scenario ASC analysis.

V. Conclusion

5.1. Results of the study

The article briefly describes the process of transforming data into information, and this into knowledge. A definition of the concepts data, information and knowledge is given.

[24] http://lc.kubagro.ru/aidos/Publications_on_cognitive_veterinary_medicine.htm
[25] http://lc.kubagro.ru/aidos/Works_on_cognitive_agronomy.htm
[26] http://lc.kubagro.ru/aidos/Work_with_agricultural.htm
[27] http://lc.kubagro.ru/aidos/Works_on_scientometrics.htm
[28] http://lc.kubagro.ru/aidos/Works_on_higher_forms_of_consciousness.htm
[29] http://lc.kubagro.ru/aidos/Work_on_the_development_and_application_tests.htm
[30] http://lc.kubagro.ru/aidos/Works_on_Scenario_ASC-analysis.htm

Artificial intelligence systems are defined as systems that automate the process of converting data into information, and it into knowledge, and by applying this knowledge, solving problems of identification, forecasting, decision-making and research of the simulated subject area by studying its model.

The thesis is substantiated that artificial intelligence systems are tools that repeatedly increase the capabilities of natural intelligence in the process of cognition, in much the same way as an engine greatly increases a person's ability to convert chemical energy into mechanical energy.

Artificial intelligence systems can be used wherever a person uses natural intelligence (naturally, if he has access to the artificial intelligence systems that provide this). Therefore, the direction of science and technology "Artificial Intelligence" has a pronounced interdisciplinary character.

Taking into account the enormous and rapidly growing importance of intelligent technologies in all spheres of society, it is proposed to change the wording of clause 8. List of critical technologies of the Russian Federation: "clause 8. Nano-, bio-, information, cognitive technologies" adding just one word to it: "clause 8. Nano-, bio-, information, cognitive and intellectual technologies."

In particular, artificial intelligence systems can be used to automate the process of intellectual cognition in all fields of science, groups of scientific specialties and scientific specialties reflected in the nomenclature of scientific specialties.

In this nomenclature there are still scientific specialties, the names of which are formed by combining the name of research methods and the name of science, for example: "5.2.2. Mathematical, statistical and instrumental methods in economics."

Main idea, proposed and justified in the article, is that it is proposed to form new names for fields of science, groups of scientific specialties and scientific specialties by adding to the existing names the words: "Information, cognitive and intellectual technologies."

Then you will get, for example, the following names of fields of science: "5ai. Information, cognitive and intellectual technologies in social and human sciences", groups of scientific specialties: "5.2ai. Information, cognitive and intellectual technologies in economics" and scientific specialties: "5.2.3ai. Information, cognitive and intellectual technologies in regional and sectoral economies," etc., etc. for almost all fields of science, groups of scientific specialties and scientific specialties.

The main result of the study. Briefly described in this work, the extensive and successful experience of using intelligent technologies (ASC analysis and the Eidos system) over a very long period of about more than 40 years in a huge number of different subject areas corresponding to various scientific specialties of the Higher Attestation Commission of the Russian

Federation convincingly shows that The main idea of the work is completely substantiated and justified.

5.2. Scientific and practical significance of the results

According to the authors, the implementation in practice of the main idea proposed and substantiated in the article will give modern science, figuratively speaking, a 2nd wind[31], i.e. will remove a number of psychological and methodological restrictions on its development and allow it to breathe freely and rush forward like a high-speed sailing ship with full sails and an almost hurricane tailwind.

5.3. Prospects for further research in this area

This work very briefly, but with references to primary sources, describes the author's personal experience in the use of one of the methods of artificial intelligence: Automated system-cognitive analysis, and its software tools - the universal cognitive analytical system "Eidos" for scientific research in a variety of scientific specialties The Higher Attestation Commission of the Russian Federation, as well as in a number of scientific areas that are not yet included in the range of scientific specialties of the Higher Attestation Commission of the Russian Federation, just as it once did not include cognitive technologies and artificial intelligence methods.

Perspective The authors see the use of other artificial intelligence systems for scientific research in absolutely all areas of science, among which a real scientific and technological revolution is currently taking place. The authors are convinced that the scientific and technological revolution in the field of artificial intelligence, currently occurring before our eyes and to some extent even with our participation, will inevitably lead to a revolution in all spheres of society, primarily in science, technology, culture and art , as well as in all others.

Желающие ознакомиться с данной работой на русском языке могут это сделать по ссылке https://www.researchgate.net/publication/377771942.

References

1. Lutsenko Golovin N.S. Artificial intelligence systems as systems for automating the process of scientific cognition and doubling the nomenclature of scientific specialties by using these systems for research in various fields of science // January 2024, DOI: 10.13140/RG.2.2.12712.34565, License CC BY 4.0, https://www.researchgate.net/publication/377771942

[31]Science got its first wind when it began to use the scientific method: the method of scientific induction