Manifold of generalized knots was called informative lattice, [5].

In addition, right and left transformations are introduced, which act only on the right or, respectively, the left part of the functional number, [5]. Also, such a concept as the rank of transformations plays an important role, [5]. Supermodular arithmetic was creating to work with these elements, [5].

These transformations may be have various nature. It may be all possible transformations, [5].

Only 15 minimal main types of generalizing mathematical transformations are existed, [5]. Strictly speaking, only 9 types of transformations are mathematical in classical sense. The other six types of transformations are not mathematical in the classical sense of the word. Thus, the classification allows a single point of view to classify transformations (generalized mathematical ones) that can relate to different fields of knowledge and culture.

The manifold of generalized knots was called an informative lattice, [5].

Now we represented the general problem of calculation in modern science according to, [5]. This problem is one of central in modern computing science. Systematization and representation of large volumes of information is connected with various technical and mathematical difficulties. In some chapters of information calculation as self-numeric algorithms the general approaches and criteria of estimation the efficiency are absent.

For the resolution of this problem, the theory of informative calculation was created. Later this theory was introduced in the structure of PA.

Three types of informative calculation (computability) were selected, [5]:

1. Informative calculation (computability) C – the number of possible mathematical operations, which are required for the resolution of a proper problem.
2. Technical informative calculation (computability)

$$C_t = C\sum_{i=1}^{n} t_i, \tag{2}$$

where t_i – realization time of proper computation.

3. Generalizing technical informative calculation (computability)

$$C_g = k_{AC}C_t, \tag{3}$$

where k_{AC} – a coefficient of algorithmic complexity, [1], [5].

The main principle of this theory is the **principle of optimal (minimal) informative calculations,** [5]: any algebraic, including constructive, informative problem has an optimal resolution for minimum informative computability C, technical informative computability C_t, or generalizing technical informative computability C_g.

The idea of this principle may be more detail explaining on the basis de Broglie formula from the thermodynamics of point, [5], [22]

$$\frac{S_a}{\hbar} = \frac{S_e}{k_B} = S_g \tag{4}$$

(equivalence of quantity of ordered and disorder information [5]). Where S_a– action, ħ – Planck (Dirac) constant, S_e– entropy, , k_B – Boltzman constant ,and S_g may be represented as a dimensionless measure of information. Therefore, we can go from dimensional quantities (action and entropy) to dimensionless quantities – a number of proper mathematical operations. This formula allows uniting an information theory and physics in one system.

The theory of informative calculations was constructed analogously to the theoretical classical mechanics. The role of the action principle is introduced here to the principle of optimal information calculation. This is clearly visible from the ratio:

$$\delta S_g \geq 0. \tag{5}$$

With sign equality (=) in (5), we have the generalized second law of equilibrium thermodynamics and the action principle, with the sign greater (>) we have Shannon's theorem, the principle of non-equilibrium thermodynamics and the criterion for the existence of open systems [5]. It should be noted that in this case, this criterion can be extended to deterministic systems (the theory of Yu. Klimontovich includes the entropy functional), [5].

Formula (4) indicates a synthesis of theoretical physics and information theory. An attempt to bring physics and mathematics closer was made in, [4].

A hybrid theory of systems was built to systematize of the procedure of formalization and calculations on informative lattice and may be expanded on other systems, [5]. At the same time, we used Condillac's principle that the system should have a minimum of principles, preferably one, [24]. We came up with two of them: the principle of combining elements into a system – the **criterion of reciprocity**, and the principle of optimality of this arrangememinus the**criterion of simplicity**.

Strictly speaking, the second criterion of the hybrid theory of systems can be the principle of optimal information calculations. This makes it possible to use this theory both for the analysis of calculations in a more narrow sense, such as computed algorithms, and in a broader sense for the creation of a universal theory of computer science.

For more formalization, the all-famous regions of knowledge and science the **parameter of connectedness** σ_t was introduced. This parameter means the number of different bonds the one element of mathematical construction with other elements of this construction. For example, in classic mathematics $\sigma_t = 1$, in linguistics and semiotics $\sigma_t > 1$. The need to take connectivity into account when analyzing complex systems was pointed in, [1]. Taking this fact into account, we introduced σ_t. It should be noted that connectivity to one degree or another is specified in generalized transformations as well. In general, it should be separated into a separate category of values, which is what we did.

For systematization of the computational processes and procedures on information lattices the hybrid theory of systems was created. This theory is based on two principles:

The criterion of the reciprocity for corresponding systems is signing the conservation in these systems the next categories, [5]: the completeness; the equilibrium; and the equality of the number of epistemological equivalent known and unknown notions.

The criterion of the simplicity for corresponding systems is signing the conservation in these systems the next categories, [5]: the completeness; the equilibrium; and the principle of the optimal calculative transformations.

In general, there are only10 minimal types of knowledge formalization systems, [5], [15]:

1. *Simple system* is characterized by the conservation all positions of the criteria of reciprocity and simplicity for all elements of mathematical construction (functional numbers $N_{\varphi_{ij}}$ and transformations).

2. *Parametric simple system* is characterized by the conservation the criterion of simplicity only for functional numbers $N_{\varphi_{ij}}$.

3. *Functional simple system* is characterized by the conservation of the criterion of simplicity only for general mathematical transformations.

4. The S*emisimple system* is characterized by the no conservation of the principle of optimal informative calculation and with $\sigma_t = 1$.

5. *Parametric semisimple system* is characterized by the nonconservation of the principle of optimal informative calculation only for $N_{\varphi_{ij}}$ and with $\sigma_t = 1$.

6. *A functional semisimple system* is characterized by the no conservation of the principle of optimal informative calculation only for general mathematical transformations and with $\sigma_t = 1$.

7. *A complicated system* is characterized by the no conservation of the principle of optimal informative calculation and with $\sigma_t \neq 1$.

8. *A parametric complicated system* is characterized of the no conservation of the principle of optimal informative calculation only for $N_{\varphi_{ij}}$.

9. *A functional complicated system* is characterized by the no conservation the principle of optimal informative calculation only for general mathematical transformations and with $\sigma_t \neq 1$ is calling.

10. *An absolutely complicated system* is characterized of no conservation the criteria of reciprocity and simplicity and with $\sigma_t \neq 1$ is calling.

Thus, there is a finite number of types of knowledge formalization systems, and the number of implementations of specific systems can be arbitrarily large. So, from the representing 10 types of systems, only 6 are mathematical. This classification is based on the concept of completeness, which is also related to the problem of information complexity.

In modern computer technology, inductive logical types are used, [17]. There can be any number of them; just one system differs from another in the type and number of predicates. The role of predicates in PA is played by generalized mathematical transformations, which are classified using a polymetric measure, [5], [15].

Russell's types are obtained by inductive expansion from simpler ones to more complex ones, [17]. There can be any number of them. In this respect it is somewhat similar to intuitionism, there can also be an almost infinite number of mathematical systems. This fact allows us to attribute the logical, formal, and intuitionistic approach to structural approaches in the foundations of mathematics and shows that there is no significant difference between them, [5], [23]. Therefore, we have no other choice but to go to the natural concept of the foundations of mathematics. The subject of mathematics is the analysis, synthesis, and formalization of any system of knowledge, [20]. This brings us closer to defining mathematics as exact knowledge, [24], while science is ordered knowledge, [5].

This can automatically be transferred to the foundations of computer science. In the polymetric analysis, the number of types of formalization systems is finite, with only 10 types, and taking into account the types of transformations – 150. However, the number of implementations can be arbitrarily large.

4. Polymetric Analysis and Computer Science

In this section, we want to emphasize how the polymetric method with computer sciences.

Many of these issues have already been highlighted in previous chapters. This is the theory of dynamic information-physical structures, functional logic, the theory of multimedia games, the problem of image recognition in polymetric analysis, the theory of information lattices and calculations, the theory of hybrid systems, the theory of functional numbers, the theory of generalized mathematical transformations, etc., [5].

According to modern representations, [9], [10], computer science is a theoretical and applied (technical, technological) discipline that studies the structure and general properties of information, as well as methods and means of its creation (including technical), transformation, storage, transfer, and use in various fields of human activity, [5], [9], [10].

In general, polymetric analysis is a mathematical basis of knowledge and one of its main applications is the convergence of the exact and humanitarian branches of knowledge and bringing them into one system, [5], [15].

With the development of modern computer science, one should not wait for some kind of system optimization of the methods being created. An important role in the development of computer science played and still plays mathematical logic, matrix analysis, and number theory, [1], [5], [12], [15]. When the first one is used mainly for theoretical substantiation of certain computer theories or approaches and in programming, the last two sections are used in the processors, which is today the basis of real computers.

However, it should be noted that in the computer sciences arose several unresolved problems that should be solved for faster progress of both computer science and computer technology, [5], [15].

Since polymetric analysis is a universal system of analysis, synthesis, and formalization of knowledge, and based on its variable polymetric measure, it can claim the role of both theoretical foundations of informatics and generalized computer theory, [5], [15].

In contrast to the logical approach, which has a finite number of formalization types in the polymetric method, there is a finite number of types of systems (hybrid system theory) for obtaining and formalizing knowledge. Each computer science can be classified through these types of systems. In addition, in this way, one can revise computer science as a whole, as well as anticipate its development and the emergence of new components, [5], [15].

Many unsolvable problems in the theory of algorithms (multiplication of numbers and matrices) can be successfully solved in the theory of information calculation, [5]. In particular, the task of sorting arrays is successfully solved here, [5].

System approaches of the polymetric approach led to the emergence of functional logic, where each logical element is an element of a polymetric measure. It should be noted that the synthesis of logic and probability theory has led to the creation of the theory of fuzzy sets. The comprehensive logic, [26], also allows us to extend the limits of the application of mathematical logic, but not to the whole science. In any science, the main thing is to measure, evaluate and forecast the obtaining of relevant results and the question of the truth of these or other judgments is usually resolved by history.

That is why the polymetric analysis is a metatheory for the next theories: information theory, physics, and computer science, [15].

Other branches of computer science (including cybernetics, artificial intelligence, and computer arithmetic) can be extended, representing, and explained using polymetric analysis, [15].

So, the theory of informative calculations and the principle of optimal informative calculations allow for resolving many computer problems of modern cybernetics in the area of the obtained algorithms, matrix algebra, and the problem of forming arrays. This theory may be used for the resolution of computational fifth and sixth Smale's problems of modern mathematics, [5]. From a fundamental point of view, the principle of optimal informational calculations makes it possible to bring physical processes and information theory closer together. This is shown in the theory of information-physical structures, [5] and in formulas (4) and (5). PA may be used for the determination of the step of computing complexity of systems and in the choice of both an expert system and a new promising system for the corresponding synthesis (theory of hybrid systems), [5], [15].

Roughly speaking, a generalized constructive mathematical element is an element of a multifunctional matrix. A computer processor is a device that performs matrix operations. This functional "processor" can select and carry out operations of almost any calculations, including the procedure of their organization, establishment of hierarchy, and assessment of complexity at various stages of calculations. Therefore, from this point of view, it can be said that polymetric analysis is a functional extension of the processor, which includes the procedure and pre-processing of information. That is why the PA can be a candidate for the theoretical foundations of computer sciences, [15].

The problem of the complexity of information (the problem of the centurial problem in cybernetics [2]) can be presented in polymetric analysis as the problem of simplicity-complexity, [15]. The arrangement of types of systems according to their level of complexity can be a solution to centurial problem in cybertnetics, [15].

Therefore, the problem of the resolution of the problem of complexity in computer sciences must be connected with the problem of calculations, [2], [15]. This confirms Casti's hypothesis about the resolution the problem of the complexity of information with the help the calculation, [1], and maybe representing as its realization in the general sense, [15].

The main difference is that in the Casti case, we have hierarchical systems tied to a specific mathematical apparatus, while for polymetric analysis we are dealing with systems with a variable hierarchy, [15].

The Casti work is devoted to a thorough discussion of stability theory in all of its mathematical manifestations, [1]. After a rapid treatment of classical notions involving input-output and stability, and a more detailed discussion of qualitative ideas centering upon structural stability. In particular, it was presented an extended account of catastrophe theory and its relations to bifurcation analysis. In addition, several sections are devoted to the topic of the "resilience" of a dynamic process, [6]. This notion, originally motivated by ecological considerations, involves the ability of a system to persist in the face of unknown (and possibly unknowable) external disturbances. All these problems in the polymetric analysis are described using the choice of mathematical transformations and the connectedness parameter, [15].

Unlike other theoretical approaches that claim the role of a universal theory of computer science, PA is not based on existing theoretical approaches and sections of mathematics or their combination, but on the basis of a general system mathematical apparatus and procedure of creation mathematical and other theories, which is based on a generalized theory of calculations with a minimum of philosophical paradoxes. In other words, this is a further development of the methods of Pythagoras and Plato about the three types of numbers (arithmetic, sensible, and ideal), Euclid (axiomatics based on the structure of his principles), and Newton (four principles of reasoning in physics), [5]. The system properties of Godel's numbers were also pointed in [12]. Functional numbers are generalizing all types of numbers. Whole numbers may be represented as numbers of four types: first type – arithmetic numbers; second type – algebraic, stochastic, and other numbers; third type – coding numbers and fourth type – system numbers, [5]. System type numbers include the number of signs in the Egyptian mythology), [5], Cabbalas tree of sephirots, [6], Plato's ideal numbers, [5], and Dee's monadology, which is based on the number 22 (the number of letters in the ancient Egyptian alphabet), [5]. In Polymetric Analysis, all these types of numbers are combined into one system that can change the hierarchy, [5].

Formula (4) allows you to combine stochastic and deterministic calculations and systems into a single system and thus bring physical and informational processes closer together and show their interrelationship. In addition, it allows us to conclude that all theories have an information basis and can be included in a generalized theory of information. If this theory is related to calculations, like polymetric analysis, then this theory claims to be a universal theory of computer science.

It should be noted that the basis of the criterion of reciprocity is the concept of completeness in a broader sense than in Gödel's theorems, [5]. In this case, the concept of incompleteness is related to calculations and the construction of the corresponding theory. The incompleteness itself is defined through the fulfillment of the relevant provisions of the reciprocity and simplicity criteria and the value of parameter the of connectedness, [5].

Thus, we arecv expanding Gödel's incompleteness theorems on a system level. Newton's fourth rules of reasoning in physics have analogous role and may be using for the creation of other concrete theoretical sciences, [6]. However, the Newtonian method (four rules of reasoning in physics) was created for the mathamatization of natural philosophy. Therefore, these rules are also called four rules of reasoning in philosophy, [27].

Generally speaking, a universal theory of computer science should include computational processes at all stages of information preparation and processing and satisfy the six criteria listed above, [5]. This is because both the technological base of modern computer technology and the field of applications are changing. That is why the general principles of its construction, which would consider these factors, should be included in the structure of the universal theory. Polymetrical analysis has more wide application. Roughly speaking PA is a deductive addition to Newtonian method, [6]. It is resolving back problem of Newtonian rules – the creation of a universal system of knowledge and culture and the evolution of their formalizaton, [5].

In other words, if Newtonian method is the extension of Euclid's method to the mathematization of various fields of knowledge, then polymetric analysis is an extended synthesis of the methods of Aristotle and Euclid, or the extension of the Pythagorean method to modern science, [5].

The problem of any science or area of knowledge can also be considered from the point of view of a polymetric measure (formula (6)). The polymetric theory of measurements and measurements itself is based on two principles (the principle of asymmetry of measurements – the criterion of primary measurements) and the principle of dimensional homogeneity – the criterion of secondary measurements). the primary measurements include the measurement itself (the Bache-Mendeleev problem, etc.), and the secondary measurements include the selection of measured values (dimensional analysis, etc.), [5].

In general, polymetric analysis can be used not only as a universal system of analysis, synthesis, and formalization of knowledge but also as an expert system for existing knowledge systems, and the need for the feasibility of creating new effective knowledge systems that arise during the development of science, [5]. It was shown that the existing theories of measure and measurements are included in this theory as partial cases, [5].

Therefore, polymetric analysis is a universal theory of analysis, synthesis, and formalization of knowledge, which is based on measurements, including the procedure of measurements and calculations. This is the basis of this science. Computer science is based on the creation of various systems and calculation methods for the resolution of various problems of science, knowledge, and culture. Thus, Polymetric Analysis may be represented as variant of universal theory of computer science.

5. Conclusions

1. A short system historical analysis of the development of computer science is represented.
2. Necessity of creating the universal theory of computer science as a variant theory of everything in a global sense is formulating.
3. Six criteria that must be satisfied by the theories of the general deductive type (theories of everything) are given and analyzed.
4. The main concepts of polymetric analysis as a theory of everything is analyzed.
5. The relationship between polymetric analysis and computer science is showing.
6. It is concluded that polymetric analysis can be presented as a universal theoretical approach for computer sciences.

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