THE CONNECTION BETWEEN MATHEMATICS AND COMPUTER SCIENCE

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Abstract

Currently, the flow of information is constantly increasing. The development of science, its transformation into a direct productive force, into the property of every person, is accompanied by an increase in information, because the inexhaustible source that feeds science is the world around us, the thirst for knowledge is unquenchable. The process of cognition is endless, the process of developing new knowledge, obtaining new information. The ability to easily and quickly navigate the ever-increasing flow of scientific and technical information on their own and related specialties, and make extensive use of the capabilities of new computer technology is one of the most important qualities of university graduates. The most important task of our time is to receive, process, transmit, store, present and use information. Information becomes a strategic resource of society. The chain of education is the preparation of a person for a full life in an information society. Therefore, there was a need for mass computer development. The ability to use computer technology in solving professional and educational tasks is now rightfully equated with second literacy. This requires each person to have basic knowledge about the internal structure of a computer, its purpose and capabilities, ways of interacting with a personal computer; the ability to simulate various tasks himself, to compile algorithms and operating programs in at least one programming language. Computer science is closely related to mathematics. Quantitative relations and forms are characteristic of all objects and phenomena of the material world, so we can talk about the universality of mathematical methods and methods of thinking. Mathematics has an accurate symbolic language that allows it to reveal both its own sphere of knowledge and the sphere of knowledge of other sciences, including computer science. In the modern world, the role of mathematics has increased significantly.

Keywords: mathematics, computer science and communication mathematics, computer science, computer science technology, mathematics communication with computer science.

Introduction

To establish the relationship between computer science and mathematics, let us first consider the definition of the concept of information. There are different approaches to defining the concept of information. Let's consider three of them: anthropocentric, technocentric and non-deterministic.

In the anthropocentric approach, reflected, in particular, in the Federal Law "On Information, Informatization and Information Protection", "information means information about persons, objects, facts, events, phenomena and processes, regardless of the form of their presentation."

The anthropocentric approach assumes the presence of a person at the center of the information process, who transforms data into knowledge. The application of this approach is very difficult to the genetic information of wildlife, to abstract mathematical models. In the field of legal and social sciences, the anthropocentric approach has worked quite satisfactorily so far. But the widespread introduction of computer technology into all spheres of society increasingly demonstrates the incompleteness of this approach. For example, this approach to information only as information does not allow for adequate interpretation of objects such as computer programs. In the passive state, the program is, indeed, a set of information about the algorithm, the data being processed, etc. But in the active state, the program is a set of commands, that is, it is a program method.

In the technocentric approach, information is identified with data, which is far from true. Data transmitted, for example, on a computer network may not become information if the user does not have access rights to it. Data becomes information only after appropriate processing by various methods: hardware, software, and others.

The nondeterministic approach is that the concept of information is not defined on the basis that it is fundamental, like matter or energy. This approach is used, in particular, in the "Law on State Secrets", in the "Law on Mass Media" and even in such a respected reference publication as the Encyclopedia Britannica.

Indeed, the concept of information is fundamental, and therefore should be defined within the framework of the relevant fundamental science — "Computer Science", which is just being formed, while the applied and technological aspects in this area are already sufficiently developed.

The need for an adequate definition of information can be illustrated by the example of legal conflicts that arose around the Internet in Russia on the eve of the 1999 State Duma elections and the 2000 presidential elections.

MATERIAL AND METHODS

The scientific definition of information is given quite simply if we assume that information is a dynamic object that does not exist in nature by itself, but is formed during the interaction of data and methods.

Definition: Information is a product of the interaction of data and methods, considered in the context of this interaction.

Let's illustrate this definition with an example from the legal sphere. During the investigation, a piece of paper with the text was attached to the case. This piece of paper is definitely a data carrier. And what information will be obtained on the basis of this medium depends on the method used. Let's consider the possible options.

The message on the sheet is not encrypted. The methods of "Reading" and "Logical analysis". Information about an event.

There is a financial document on the sheet. The methods of "Reading" and "Financial analysis". Information about the financial condition or operation. There is an encrypted text on the sheet. The methods of "Decryption" and "Logical analysis". Information about an event.

The text is handwritten. The method of "Graphological examination". Information about the author.

Application of the "Odor analysis" method to the leaflet. Information about the perfume preferences of the author or recipient of the document.

You can finally lick it or try it on your teeth, but the usefulness of the information obtained by these methods for the investigation is very doubtful.

Mathematical methods are very often used as a method of data processing to obtain information. They can act either as an integral element of other methods, or independently.

In the cases discussed above, mathematical methods will be used in "Financial analysis", "Decryption", "Graphological examination". They can be used in "Odor Analysis" and "Logical Analysis". The role of mathematical methods in data processing increases significantly with the development of computers and information technologies. The tasks of accumulation (storage), processing and transmission of information faced humanity at all stages of its development. Each stage corresponded to a certain level of development of information labor tools. For a long time, the means of storing, processing and transmitting information developed independently of each other.

For a long time, the main tools for solving problems of processing and transmitting information were the human brain, language and hearing. The first fundamental change occurred with the advent of writing (according to scientists, speech originated more than a thousand centuries ago, the invention of writing dates back to the III millennium. This led to a huge qualitative and quantitative leap in the development of society, and the possibility of transferring knowledge from generation to generation appeared. The invention of printing radically changed industrial society, culture, and the organization of activities.

These two stages (writing and printing) created a fundamentally new technology for the accumulation and dissemination (transmission) of information, which saved humanity from having to rely entirely on such a shaky and unreliable tool as human memory.

The end of the century was marked by the invention of electricity, thanks to which the telegraph, telephone, and radio appeared, allowing for the rapid transmission and accumulation of information in any volume.

The rapid development of science and industry in the twentieth century, the unstoppable growth in the volume of incoming information led to the fact that a person was unable to perceive and process everything intended for him. It became necessary to classify receipts by topic, organize their storage, access to them, understand the patterns of information movement in various publications, etc. The research that allows solving the problems that have arisen has become known as computer science.

RESULTS AND DISCUSSION

In this sense, computer science is a scientific discipline that studies the structure and general properties of scientific information, as well as the patterns of all scientific communication processes.

Computer science, being the basis of librarianship, has been studying the structure and general properties of scientific information transmitted through scientific literature for many years. Raising the question of mastering computer science with the whole range of issues related to the development of effective methods for collecting, storing, processing and converting available information into knowledge was previously illegal, since there was almost nothing in

common in the methods of collecting and processing information from physicians, geographers, psychologists, physicists, philologists, etc.

From this point of view, mathematics and physics, chemistry and medicine had a lot in common. There were many examples of individual connections, but there was no common core around which all sciences would unite.

The situation has changed significantly with the advent of electronic computing machines (computers).

The first computers were created to carry out calculations in atomic physics, in aircraft and rocket technology. The subsequent introduction of computers in the field of administrative management and economics gave not only a great economic effect, but also led to the creation and rapid growth of a new industrial sector — means and methods of electronic information processing. Electronic computers began to process numerical, textual, graphical and other information. New computers, new methods and means of communication with them have appeared. Information has become a commodity.

Computer technology immediately showed its effectiveness in those areas of human activity where mathematical modeling methods — accurate quantitative methods - were widely used. This includes physics, mechanics, chemistry, geophysics, etc

. It does not matter what kind of experiment it is — physical, biological, chemical, etc., whether sensors transmit data directly to a computer or instrument readings are first recorded in a notebook and then entered into a machine. The main thing is that algorithms are needed to collect data and write it to storage devices in a way that allows you to find this data repeatedly, read and analyze it.

The machine performs the translation of numbers from decimal to binary and vice versa, but programmers often use octal and hexadecimal number systems at the stages of debugging programs and viewing the contents of files in machine code mode. Numbers in these number systems are counted almost as easily as decimal ones, and require three- and four-times fewer digits, respectively, than in the binary number system.

CONCLUSION

Currently, mathematics and computer science play a very important role in conducting research.

Mathematics, for its part, offers the researcher a number of mathematical methods that allow not only to obtain numerical characteristics of the object under study, but also to simulate its behavior under the influence of various factors, which is of great importance.

Computer science provides tools that allow the researcher to speed up the research process many times. The use of specialized software makes it possible to increase accuracy and reduce labor intensity, allows for multivariate justifications of complex measures that are inaccessible under the dominance of "manual" technology.

Thus, the interaction of mathematics and computer science in conducting research allows us to qualitatively increase the level of research, get the results closest to reality and spend the minimum amount of time both conducting research and processing the results obtained.

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