HISTORY OF THE CONCEPT OF ALGORITHM AND ITS ROLE IN MATHEMATICS

Usmonaliyeva Gulcharos

Mathematics teacher at Chust District Polytechnic No. 1

Abstract: This article examines the history of the concept of algorithm and a methodology for discussing its role and importance in mathematics with students.

Key words: Exact sciences, mathematics, algorithm, pedagogy, methodology, teaching, interactive.

INTRODUCTION

While teaching at school, the teacher works on the basis of the state educational standards of the continuous education system in the process of imparting knowledge to each student. The state educational standard for teaching mathematics determines the level of knowledge and preparation of students in the field of mathematics, serves as a basis for the development of curricula and programs, textbooks, manuals. Pupils in elementary grades are formed ideas about the sequence of numbers in mathematics, the skills of calculation using four arithmetic operations, the skills of using natural numbers and arithmetic operations in solving practical problems are formed, about geometric shapes initial information is provided.

Algorithms – a set of step-by-step instructions that are executed in a specific order – have been central to human progress. Originally used in scientific mathematics, the concept is now widely used in fields ranging from computer science to physics and the social sciences. This article will explore the rigorous mathematical roots of the concept of an algorithm, its history, and its place in modern life.

MAIN PART

Origin of the term algorithm:

The word "algorithm" comes from the name of the famous mathematician-scientist Muhammad ibn Musa al-Khwarizmi, who lived in the 9th century. His works, in particular, on algebra and algorithms, revolutionized the field of mathematical reasoning. That is why the concept of algorithm is named after him.

Medieval and Islamic Mathematics:

Qadi Zodah al-Rumi, who lived and worked in Central Asia, particularly in Khorasan, in the 14th century, was a mathematician and astronomer who applied algebraic methods to modern formulas, trigonometry, and geometry. During this period, algorithmic approaches were taken into account, and procedures similar to programming began to form in solving mathematical problems.

Fundamentals of Algorithm Theory:

Al-Khwarizmi's algorithms - Al-Khwarizmi's algorithms were mainly concerned with calculating on numbers and solving algebraic equations. He brought the sequence of arithmetic operations on real numbers to mathematical foundations.

The legacy of the Middle Ages – This approach became the basis for developing systematic solutions in mathematics. For example, step-by-step methods for performing arithmetic calculations had an algorithmic structure.

The development of modern algorithms:

In the 19th and 20th centuries – the principle of mathematical induction, dating back to Leonhard Eyrhun (Euler), and then scientists such as David Hilbert and Alan Turing began to study algorithms as abstract systems. Using the example of the Turing machine, he defined algorithmic solutions as mathematical models.

Today – Today, algorithms are the basis of computer science, and complex mathematical tools are used to analyze them — complexity, optimization, probability theory.

The use of algorithms in everyday life:

Algorithms are widely used not only in science, but also in social life:

Search engines (Google, Yandex) – indexing pages, sorting results — these are also algorithmic problems.

Insurance and financial analysis – risk assessment using statistics and probabilities.

Transport systems - route optimization, logistics algorithms.

The efficiency and reliability of algorithms are important in solving problems in these areas.

The original mathematical foundations of algorithm theory

A. Mathematical induction

As the 13th century scientist Blaise Pascal said:

"How are mathematical statements proven by the principle of mathematical induction?"

This principle is an important tool in proving algorithmic solutions.

B. Mathematical logic and probability

Currently, discrete mathematics, Boolean logic, and probability theory are used in the analysis of algorithms.

CONCLUSION

The mathematical roots of the concept of an algorithm date back to the 8th-9th century Islamic mathematicians, in particular al-Khwarizmi. Today, this approach serves as the basis for programming, data analysis, and artificial intelligence. Algorithms have become important in every area of our lives - education, science, business, and everyday services - and their mathematical foundation is becoming increasingly solidified.

Today, independent Uzbekistan has determined its own path of development in order to further develop and find its place in the world. On the basis of this path, special attention has been paid to reforming the education system and developing the intellectual potential of our youth. In the process of the rapid development of science and technology, the knowledge and skills that must be given to students are increasing, the programs and textbooks that are suitable for the national and local conditions of education and enable the preparation of qualified specialists require the development of modern methods of education.

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