

## **ON THE TOPIC OF THE IMPORTANCE OF DATABASE MANAGEMENT SYSTEMS**

***Pirekeev Jandulla Khamidullaevich***

*Karakalpak Academic Lyceum of the Ministry of Internal Affairs*

*[jpirekeev@gmail.com](mailto:jpirekeev@gmail.com)*

**Annotatsiya:** Algoritmnlarni optimallashtirish so‘nggi yillarda ilmiy-texnik taraqqiyotning muhim yo‘nalishlaridan biri hisoblanadi. Dasturiy ta‘minot va texnologik qurilmalar imkoniyatlarining kengayishi, ma‘lumotlar hajmining ortishi va zamonaviy muammolar yechimiga tezkorlik va aniqlik talab qilinayotgani barcha sohalarda algoritmnlarning samaradorligini oshirish zaruratini tug‘dirdi. Shu sababli algoritmnlarni optimallashtirishga zamonaviy yondashuvlar ko‘plab ilmiy tadqiqotlar va amaliy ishlanmalar markaziga aylandi.

**Kalit so‘zlar:** avtomatlashtirish, zamonaviy texnologiyalar, algoritmnlar, samaradorlik, texnologik qurilmalar, imkoniyat.

**Аннотация:** Оптимизация алгоритмов является одним из важных направлений научно-технического прогресса последних лет. Расширение возможностей программного обеспечения и технологических устройств, увеличение объёма данных, а также потребность в скорости и точности решения современных задач обусловили необходимость повышения эффективности алгоритмов во всех областях. Поэтому современные подходы к оптимизации алгоритмов стали предметом многих научных исследований и практических разработок.

**Ключевые слова:** автоматизация, современные технологии, алгоритмы, эффективность, технологические устройства, возможности.

**Abstract:** Algorithm optimization is one of the important directions of scientific and technical progress in recent years. The expansion of the capabilities of software and technological devices, the increase in the volume of data, and the need for speed and accuracy in solving modern problems have created the need to increase the efficiency of algorithms in all areas. Therefore, modern approaches to algorithm optimization have become the focus of many scientific research and practical developments.

**Keywords:** automation, modern technologies, algorithms, efficiency, technological devices, opportunity.

### **INTRODUCTION**

In the optimization process, efficiency, i.e. the speed of the computing process, memory consumption and consequentiality, are evaluated as the main criteria. To

achieve such results, scientifically based and experimentally tested algorithmic solutions are used at each stage. Modern approaches to optimizing algorithms are based, first of all, on historical experience and statistical analysis of existing results. Dynamically developing areas, such as artificial intelligence, working with large amounts of data, analyzing real-time signals, are taking the effectiveness of algorithms to a new level. Today it is common to use mathematical analysis and modeling techniques as one of the most effective approaches to optimizing algorithms. First of all, the structure of algorithms is thoroughly studied, their work activity is analyzed on the basis of mathematical models and attention is paid to deficient or excessive stages. As a result of such analysis, in most cases, an increase in the time and memory efficiency of algorithms is achieved. Choosing an Optimal algorithmic structure, creating a consistent and perfect model, improving algorithmic blocks – all this is recognized as important steps in optimization.

### **MATERIALS AND METHODS**

Scientific research on optimization of algorithms is also being carried out in our country. In research institutes and higher educational institutions, issues are constantly being discussed in this regard. Modern research suggests that not only traditional, but new approaches are being introduced – such as heuristic optimizations, biologically inspired algorithms (evolutionary approaches, genetic algorithms, particle collision algorithms), and artificial neural networks. Within the framework of modern approaches, methods of achieving global and locally optimal solutions occupy an important place. One of the main advantages of Global optimization algorithms is that they allow you to find the most optimal result, considering countless options. In particular, the importance of such approaches in algorithms that work with massive data or in real-time problems is highlighted. In local optimisation algorithms, however, best results are attempted within a specific region.[1]

Optimization of algorithms through the use of parallel computing systems in the scientific literature has been noted as another important direction of modern approaches. Such methods open the possibility of processing large amounts of data in the short term and with minimal error. With parallel processing, distribution computing and cluster technologies, higher productivity can be achieved compared to traditional algorithms. Especially in cloud technologies and high-performance clustering systems, these approaches prove their usefulness.[2]

### **RESULTS AND DISCUSSION**

Another of the main advantages of modern approaches to optimizing algorithms is the ability to quickly sort, analyze a clear goal – oriented and huge amount of data. With the help of machine learning fundamentals and artificial intelligence algorithms, there is an opportunity to achieve much higher efficiency than traditional approaches. For example, in neural network algorithms, test results help to obtain fast and stable

results. Within the framework of modern approaches, in addition to the above-mentioned mathematical analysis, statistical modeling and optimal distribution of computing power, the possibilities of automatic correction and adaptation of algorithms are also becoming larger. Flexible algorithms, i.e. systems that learn to use and can change their content experimentally, enter the advanced stage of modern optimization. Their peculiarity is that even if an initially non-optimal result is noted, the system will have the property of self-improvement.[3]

Monitoring systems that allow monitoring algorithms and predicting expected results from them are also among the modern approaches to optimization. With the help of such monitoring, the main goal is to quickly identify and eliminate the shortcomings that occur in the system. The result is the possibility of real-time analysis of algorithms and, if necessary, immediate correction. Today, the application of artificial intelligence technologies in algorithm optimization issues is becoming more and more widespread. The development of self-learning and independent decision-making algorithms makes it possible to effectively use them in modern organizations and networks. With the advent of each new technology, its algorithmic base optimization approaches are also being updated and perfected. The development of algorithms for information security, encryption systems optimization, data protection and optimization are also important areas of modern approaches. The high level of reliability of software architecture and algorithms largely directly depends on the correct choice and implementation of optimization approaches. An important aspect of optimizing algorithms is determining their environmental and economic effectiveness. That is, the system provides for the efficient use of resources, elimination of excessive energy consumption, not only speed and efficiency, but also energy efficiency. At the same time, algorithmic innovations, that is, Approaches to control and automatic control of energy consumption of networks, are becoming the center of scientific and practical research. Optimization of algorithms based on structural and modular approaches is also of urgent importance in software design. In larger projects, modular architectures can be used to increase overall system efficiency by dividing into separate sections and optimizing each segment individually. Such an approach makes it much easier to modernize, expand and maintain algorithms.[4]

Testing and the use of standard criteria in the process of optimizing algorithms are also part of the ranks of modern approaches. By testing, the weaknesses and strengths of algorithms are determined, indicators of efficiency and reliability are assessed, and, if necessary, additional blocks or features are introduced into the algorithm. This leads to stable operation of the entire system. In today's scientific and practical experience, five main areas of optimization of algorithms are distinguished: mathematical analysis and modeling, parallel computing, the use of artificial intelligence technologies, automated and adaptive control systems, and increased

security and energy efficiency. Each of these routes has its own characteristics and advantages, complementing each other, bringing algorithms to a new level on a global scale. Currently, as another important approach in the field of optimization of algorithms, the use of cloud computing and split data processing – distribution systems is expanding. With the help of cloud technologies, the possibility of processing split and large volumes of data becomes even easier, and this, in turn, opens the way to achieving previously unimaginable efficiency. [5]

### **CONCLUSION**

In conclusion, Modern algorithm optimization approaches are a direction of scientific and practical activity, which includes multi – stage, complex and various characteristics. Its main purpose is to make algorithms work more efficiently, cost – effective and more accurately. To do this, modern methods from mathematical analysis to artificial intelligence, parallel and distributed computing, automatic control systems, energy and security optimization are applied consistently. As a result, new solutions, advanced technologies and sustainable development are achieved in the digital world with unlimited possibilities. By optimizing modern algorithms, a solid ground is being created for innovation in science, education, economics, health, industry and many other fields.

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