Optimization Strategies for Mathematical Algorithms in Computer Programming

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Abstract: Computer programming is an important part of computing information technology, mathematical operation is one of the main modules of computer programming, through the optimization of mathematical operation to simple computer programming algorithm, can improve the efficiency of computer software. Therefore, in order to improve the efficiency of computer operation, it is particularly important to optimize the mathematical algorithms. Based on this, this paper studies the optimization strategy of mathematical algorithm in computer programming. Firstly, a brief overview of mathematical algorithm and computer programming is made, secondly, the role of mathematical algorithm in computer programming is analyzed, and finally, the optimization strategy of mathematical algorithm in computer programming is given.

Keywords: Computer Programming; Mathematical Algorithm; Operation Efficiency

1. Overview of the Mathematical Algorithm and Computer Programming

Mathematical algorithm plays an important role in computer programming, and it is of great help to the development of computer information technology, and it has a strong correlation between the two. Computer programming is built on the basis of the mathematical operation, through the computer language to express the mathematical operation, with the mathematical operation as the logical basis point to construct a mathematical model to comprehensively solve the complex problems, so as to get a solution. The focus of mathematical operation is that the mathematical algorithm constitutes a mathematical model based on the logical relationship between its own numbers and geometry. Through the mathematical model, complex problems are transformed into simple mathematical structures, so as to simplify the program and improve the efficiency of computer operation.

Mathematical algorithm is to accurately describe the solution in the process of problem and data processing. In computer programming, the algorithm transforms to different instructions to run between problem data and accurately describes the real-world problem solution. the evaluation criteria of the algorithm are space and time complexity. When the two are identical, advanced algorithms are often the first to draw a conclusion first. In general, mathematical algorithms are used to analyze and design practical problems according to mathematical programs and methods, simplify the process of solving problems, and quickly obtain accurate results. With the development of computer programming technology, mathematical algorithm and programming language correlation between the more and more strong, makes the programming language programming language for mathematical algorithm more widely, due to the programming language applicability, promote the innovation of the modeling idea, make the modeling model more standard, and shorten the time of computer program to solve the problem, improve the operation efficiency.

Computer programming is to write a program code through a certain language, so that the program code to achieve a certain function. In the computer program running, when selecting and applying the algorithm, using the reasonable algorithm, can make the program run more efficient, the operation speed up. Computer language is the realization of computer programming program, in-depth study of computer language to improve the language algorithm, strictly speaking, the algorithm in programming is the specific application of mathematical thinking, computer programming algorithm optimization, to improve the quality of programming, improve the efficiency of computer operation.

2. The Role of Mathematical Algorithms in Computer Programming

2.1 Optimize the Programming Data Structure

Computer programming data structure will also use the mathematical algorithm, in the computer programming reasonable data structure can effectively shorten the computer running processing time. Mathematical algorithm applied in the data structure, can optimize the programming data structure, improve the efficiency of data structure, through the mathematical algorithm to calculate the Shared variables in the program, make the Shared variables under the same memory, can save the use of computer running memory, improve computer performance, at the same time reduce the complexity of storage space in the process of program use. Through the mathematical algorithm to optimize the programming data mechanism, can make the program to obtain data faster, the computer memory footprint more reasonable, ultimately reflected in the computer program response faster and the memory footprint smaller [1]. the essence of mathematical algorithm optimization of data data is to use the current optimal algorithm to optimize the data capture mode in the data structure, use more convenient data processing forms, increase the computer memory space, report the operation efficiency of the data structure, and then improve the operation efficiency.

2.2 Change the Complex Problems in Computer Programming

the role of mathematical algorithm is to effectively change the complex problems in computer programming. In the work, it is necessary to use the computer to solve the complex problems in the actual computer programming. In order to deal with these complex problems, it is necessary to use mathematical algorithm to build a complete mathematical model. Through a complete mathematical model science split complex problems in computer programming work, will simplify complex problems, split into several small problems, these small problems into specific data structure, placed into the mathematical model, using mathematical calculation, persuasive mathematical results, and the reverse operation verification, verify the results. At the same time, under the action of mathematical algorithm, the data content in the data structure, that is, the complex problem in computer programming, is transformed into the equal quantity relationship through mathematical algorithm, effectively processing the equal quantity relationship, and finally get a numerical result.

3. Optimization Strategy of the Mathematical Algorithm

Mathematical algorithm optimization is based on the comprehensive analysis of the time complexity, space complexity, robustness and other performance indicators of the algorithm, so that it best meets the requirements. In the era of big data, data is generated every moment. Because these data are generated in different time and space, it has a huge volume, even reaching pb level. How to make these data produce the due effect, appropriate algorithm and corresponding optimization scheme are particularly important [2]. In the development of the computer industry, optimizing the mathematical algorithm, simple computer programming and improving the computer operation efficiency have always been the goal of computer enterprises.

3.1 Use Mathematical Models to Optimize Mathematical Algorithms

Before the computer programming optimization, how to use mathematical algorithms to establish scientific and standardized mathematical models is the primary problem considered by computing programmers. the key to mathematical algorithm optimization is mathematical modeling. Because scientific and normative mathematical modeling can describe complex problems in quantitative specification, and transform it into convenient mathematical structure, which can make the program more rigorous and more refined, so as to speed up the speed of the program, and ultimately improve the efficiency of computer work. The focus of computer programming optimization is on mathematical modeling, skilled use of computer and mathematical theoretical knowledge, can provide a theoretical basis for modeling, so that the modeling is completed smoothly. the premise of computer programming is mathematical modeling. In order to ensure the reasonable and effective optimization of computer programming, it is necessary to accurately apply the mathematical algorithm and choose the mathematical

algorithm that meets the conditions. It can be seen that the mathematical algorithm has a decisive role in programming, algorithm optimization can simplify the computer operation process, improve the computer running speed, to ensure that the computer to efficiently complete the task [3]. Common algorithms in the era of big data are: content based on the recommendation algorithm, based on the user use utility of recommendation algorithm and algorithm based on knowledge reasoning algorithm and their combination recommendation algorithm, in practice to ensure that these algorithms can build the appropriate mathematical model, according to the algorithm specific use scenarios, target and actual situation is analyzed, to optimize the algorithm, construct a qualified mathematical model.

3.2 Reasonable Design of Data Structure Optimization Mathematical Algorithm

Data structure is a collection of characteristic relational elements, the way a computer stores and organizes data. the algorithm is based on the data structure. the reasonable data structure can give full play to the advantages of the algorithm and fundamentally improve the computing performance. In addition, it is also necessary to reasonably control the existing memory space, so that the algorithm can solve the problem in a short time and get a solution. For example, for sparse matrices, storing traditional arrays reduces space utilization and causes wasted space. As shown in Figure 1 Schematic of ternary storage sparse matrix, for this phenomenon, more advanced trimode can be used to compress the high sparse matrix storage space to meet the memory requirements of the algorithm [4]. For another example, to find the key path in the AOE network, which is an important path affecting the whole project. At this time, the adjacent to the table in the data structure can be used to store the relevant data. Based on this data structure design, the algorithm to solve the problem is to judge whether the activity is a key activity according to the screening conditions of time, and finally form the key path. It can be seen that if the mathematical algorithm wants to be optimized, it is necessary to start from the data structure, and design the data structure reasonably, provide the required memory for the operation, and play the role of optimizing the mathematical algorithm.

3.3 Use Programming Languages to Optimize Mathematical Algorithms

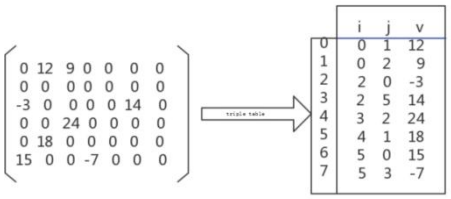

Figure 1. A Schematic Diagram of the Ternary Storage Sparse Matrix

algorithms are composed of program code, and both are executed by computer. In the process of computer programming, in order to optimize the mathematical algorithm, it is necessary to fully understand the differences in the programming operation and execution mechanism of different languages, and select the qualified programming language optimization mathematical algorithm according to this difference. For example, as a system-level C language, its application scope includes: system-level application, hardware development, and general software can be used for development. In C language, it often refers to the operation of memory address, and optimizes the algorithm through memory operation. In the algorithm optimization, the corresponding logical design and language can be implemented according to the language characteristics. For Java, C++ language, classes and objects form a program. Classes are an abstraction of the objective world, including data and actions. the objects are created by classes. The basic characteristics of programming language are encapsulation, inheritance and polymorphism. the application of encapsulation processing mode can accelerate the programming efficiency and promote the achievement of programming goals as soon as possible. In the program design, it is also necessary to clearly set the type of the problem involved, and change the object in the problem into the object in the program, so that the concept and structure of the description problem are consistent with the solution structure, so as to achieve the purpose of facilitating the software development. At that time, through the scientific use of modeling ideas, bring the advantages of the object design program into full play, and then ensure the standardization of the program design, make the program run more simple and fast, optimize the algorithm flexibly, and play the advantages of different program language design to achieve the best effect. It can be seen that different programming languages are used in different

ways. In order to optimize the mathematical algorithm, it is necessary to reasonably optimize the mathematical operation according to the characteristics of the programming language.

Conclusion: In the process of software development, the mathematical algorithm provides sufficient guarantee for the improvement of the software performance and reliability, and provides a computational basis for the program operation. Thus, mathematical algorithm is the core of computer programming, computer information technology development without the mathematical operation, with the integration of computer technology and mathematics, mathematical algorithm in the process of software development, to make full use of mathematical algorithm for mathematical modeling, and optimize the algorithm, so as to meet the needs of different tasks.

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