FAN, TA'LIM VA AMALIYOT INTEGRATSIYASI

ISSN: 2181-1776

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SOME METHODS OF DIGITAL SIGNAL PROCESSING BY USING BASIZ

Annotation: The article highlights some of the challenges facing the creation of seamless algorithms for digital signal processing and the implementation of multi-core architecture.

Key words: Information - communication technologies, digital processing, spline, basis, continuous algorithm, parabolic spline, nuclear processor, basic spline.

The development of information and communication technologies in the world plays an important role in the recovery of signals, the use of continuous algorithms based on multi-core architecture in solving digital processing problems and the development of high-performance, efficient continuous algorithms to find optimal solutions. Splines as a class of fractional functions are a mathematical tool for creating continuous algorithms for digital processing of signals due to the lack of computations, flexibility of digital processing algorithms, optimal differential and extreme properties, simplicity of parameter calculations, low level of error rounding. In this direction, intensive research is being conducted in developed countries, including the United States, the Russian Federation, China, South Korea, Germany and Japan to improve the technology of continuous digital signal processing and continuous processing and spline functions in signal analysis and recovery.

Development of parallel algorithms and software based on a multi-core architecture, especially in distributed and shared memory types of computers

Problems of technology creation in the world and Uzbek scientific literature much wider coverage.

At the current stage of development of continuous algorithms in the world, the issues of rapid and qualitative analysis of complex processes and the development of methods and

algorithms to increase the speed of real-time processing of large amounts of information and increase the speed of computational processes of modern processors. Qualitative growth of speed can be achieved on the basis of conveyor and continuous generation of orders in the computing process, the creation of new technologies for the execution of large-scale orders. Improving such rapid computational methods and algorithms and developing software tools is one of the pressing issues.

Scientific research is being carried out in our country to create continuous algorithms for solving digital signal processing and to implement processing processes on the basis of multi-core architecture.

In the implementation of these tasks, including the creation of continuous algorithms for multi-core processors based on cubic splines in digital signal processing, rapid data processing, increasing the efficiency of digital signal processing algorithms and methods for determining local characteristics of signals, algorithms, hardware and software development is one of the important tasks.

Resolution of the President of the Republic of Uzbekistan № DP-4947 of February 7, 2017 "On the Action Strategy for the further development of the Republic of Uzbekistan" and DP-5349 of February 19, 2018 "On further development of the field of information technology and communications Decree of the Cabinet of Ministers of the Republic of Uzbekistan dated March 7, 2018 №185 "On measures to further improve the quality of communication, information and telecommunications services", as well as other relevant activities the study of this article to some extent serves to carry out the tasks set out in the normative legal documents.

Parallel methods and algorithms for digital signal processing, algorithms for parallel calculation of spline coefficients using point formulas, methods of operation of scalar and vector processors are studied. Parallel algorithms for digital signal processing have been developed for a multi-core architecture. An analysis of the methods for calculating the convergence coefficients with parabolic splines shows that the problem of constructing spline functions based on experimental results leads to the problem of calculating coefficients. The values of the coefficients in the formula for expressing the spline are given by the function of the samples and the distances between the nodes.

Defects $d = 2$ the algorithm is absolutely stable for splines, but $d = 1$ grinding recurrent splines are stable for limited areas, while interpolation splines are not stable.

Cubic splines have a great mathematical advantage. They are the only function with a minimum flatness function among all the functions that have a second product that interpolates the given points and integrates with the square.

In practice $d = 1$ defective cubic-based splines are more common. Such splines $\lfloor x_i , x_{i+1} \rfloor$ in each of the intervals the cube corresponds to a set of terms. f (x) to approximate the function, cubic-based splines are represented as the sum of four pairs of products. From this f (x) The formula for approximating the function using basic splines can be written as follows:

$$f(x) \cong S_m(x) = \sum_{i=-1}^{m-1} b_i..B_i \quad (x), \ a \ a \le x \le b \qquad (1)$$

in this $S_m(x)$ - m level spline - function; b_i - recovery coefficients;

$B_i(x)$ - B-spline. (1) Based on the formula, the values of the 3-rd level B-spline are calculated according to the following formula:

$$f(x_i) \cong S_3(x) = b_{-1}B_{-1}(x) + b_0B_0(x) + b_1B_1(x) + b_2B_2(x). \qquad (2)$$

Another reason why splines are so widely used in computational mathematics is that the ease with which their values can be calculated on computers, and the fact that processes such as interpolation are well approximated for a wide class of networks. The parallel method of calculating the spline function in a multi-core processor consists of the following sequences.

$b_{-1}B_{-1}(x)\ ni \quad L_j = \sum_{i=0}^{m} b_{i-1}B\ (x)\ ga, \quad b_0B_0(x)\ ni \quad K_j = \sum_{i=0}^{m} b_iB(x)\ ga \quad b_iB_i(x)\ ni$

$P_j = \sum_{i=0}^{m} b_{i+1}B(x)\ ga, \quad b_2\ B_2(x) ni \quad T_j = \sum_{i=0}^{m} b_{i+2}B\ (x)$

Sums up four arrays after one clock of the processor's computing process

calculated in parallel.

$$S_j = L_j + K_j + P_j + T_j\ ,\ j = \overline{0, m+1}$$

Development of a structure for the implementation of parallel algorithms based on cubic-based splines in a multi-core processor, methods of organizing parallel algorithms for multi-core processors using Open MP technology, parallel algorithms for digital processing of seismic signals for multi-core processors using spline methods the issues of creating a software package that will be implemented. The main purpose of the software package for modeling the processes of parallelization of basic splines is the parallel processing of signals using the spline method in multi-core processors.

The software package is designed in the form of a single software package, consisting of parts (procedures) that are interconnected with the specified parameters. All procedures of the software package work in the vectorization method. This will increase the performance of the system and further the results

The parallelism section of the software package is used to determine the time spent on serial and parallel processing of an input signal of size N, including the number of cores of the processor, and the results of approximation of a one-dimensional signal in the form of a diagram.

The general structure of the created software package is as follows: according to research, the structure consists of 2 parts. Part 1 is called serial computing, and part 2 is called parallel computing. Section 1 contains the One-Dimensional Spline Calculation Program and the Error Assessment Program. Section 2 contains "Program for the implementation of parallel algorithms in multi-core processors" and "Program for the implementation of

parallel algorithms based on Open MP technology." process vectorization and digital signal processing can be developed in the JAVA programming language.

This means that the existing library of parallelization of calculations using parallel flows allows the use of the proposed algorithms to increase efficiency in relation to the use of procedures and functions. In view of these considerations, in order to organize and take full control of parallel processes, special procedures were created in the JAVA programming language only for spline-function methods and placed in the library as a system program.

In conclusion, the methods of spline functions in the digital processing of signals on multi-core processors are convenient in that they allow you to multiply any signal by the coefficient of the basic function and display the product in the form of aggregation. allows the creation of efficient algorithms for calculations using a multi-core architecture.

With Open MP software, you can handle references to multi-core processor cores and special memory types. The JAVA programming language has Thread, Runnable, and Stream classes for organizing parallel computing processes, allowing you to control and optimize the time allotted for parallel streaming.

The use of local computational formulas in finding the parameters of the spline eliminates the need to solve a system of algebraic equations. The method of local formulas allows to drastically reduce the number of calculations compared to other methods.

With the help of modern parallel technologies, it is possible to increase the overall system efficiency with the specified accuracy by implementing spline methods of vectoring parallel processing of digital signals based on multi-core processor architecture, increasing the data transfer rate in the process of adaptation, identification, recovery and compression gave.

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