PARALLELIZATION OF DIGITAL PROCESSING PROCESSES FOR COLOR IMAGES

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Abstract: In this article The parallelization of digital workflows to color images is an important area of research in modern computer graphics and image processing. These processes include various tasks such as image sharpening, color transformation, segmentation and filtering. High-resolution and large-scale color images require computing power, which is aimed at using parallel computing technologies to increase the efficiency of processes.

Keywords: Color image, digital processing, parallelization, GPU, MPI, image sharpening, color transformation, segmentation, filtering, multi-core processor, computing speed, efficiency, scalability.

Enter

Attention to the development of information and telecommunication technologies and science began to increase from the moment our country gained independence. According to the Law of the Republic of Uzbekistan "On Informatization" [1], the task of the state policy in the field of informatization is to regulate products, services and information technologies in the information market, to stimulate the production of software products, to train specialized personnel and it consisted of improving their quality and, of course, stimulating the requirements for scientific research.

In the decision of the President of the Republic of Uzbekistan "On measures for the wider introduction and development of modern information and communication technologies" [2] normative documents for the use of modern information technologies, the introduction of computer equipment and telecommunication tools to the economic and vital public was determined.

Currently, the policy of our state in the field of informatization should organize the information technology and system, taking into account the current state of the computer technology development trend in the creation of the national information system.

Intellectualization of the process of digital processing of images by foreign scientists, including R. Agrawal, T. Imielinski, A. Swami, R. Srikant. A. Savasere, E. Omiecinski, and S. Navathe, JS Park, M.-S. Chen, and SY Philip, J. Hipp, U. Guntzer, and G. Nakaeizadeh . many results are given in their works.

Research methodology

Digital processing of color images is now of great importance in many fields, including medicine, artificial intelligence, video processing, and many others. With the help of parallel computing technologies, in particular, GPU (Graphic Processors) and MPI (Message Parallel Computing), image processing processes can be significantly accelerated. GPUs are capable of processing large amounts of data simultaneously with their multi-core architecture. MPI, on the other hand, allows you to distribute the computing load among several processors or computers, which is very useful when working with large images.

By using parallel computing technologies, operations such as image sharpening, color transformation, segmentation and filtering can be performed efficiently and quickly. The implementation of these technologies not only increases the speed of calculation, but also allows the maximum use of resources. As a result, it will be possible to make significant advances in medical diagnostic imaging, artificial intelligence image processing algorithms, and many other areas.

Analysis results

A color model is a calculated method used to identify colors. The CMYK model is used in the printing industry. Computer monitors, graphics packages for the Internet use the RGB model. It is very important to choose the right model for the job . Today, there are many color models, including RGB, CMYK, GrayScale, HSV, HIS, HSB, HSL, YUV, Lab models.

Based on the DSP processing algorithm, a parallel spectral analysis application was developed. The program was created using the "Single Dual Core Application" method. The single application dual base approach produces one application with one build process. The program is divided into three components: Two separate cores and shared memory. (for some purposes (b treats all shared memory as one.) Only the application dual approach base (known as single / binary) allows more complex applications to be created. Three main components work in one process. This process data cores from data elements or functions which allows to use, code and allows to insert kernels from the shared memory network.

This sharing process is typically used for single-core applications, or in high-demand high-end devices. These additional functions can provide a direct learning experience for those new to the cross-system content. Therefore, a / idual approach adopted a number of contracts to help in the development of two-core prilozeny..ldf files Visual DSP ++, for the sake of simplicity, relies on their contract. An alternative approach can be chosen using fully dedicated .ldf files for improved developers. The following are accepted:

- As shown in Figure 1, Applications are placed as the last application in the top-level project, such as the target hierarchy. This is a high-level target of type "DSP executable".
- There are four types of high-level targets: Core A, Core V shared internal l2 memory, and shared external memory space. These are the "DSP library" types.
- Partial massads corea. dlb, coreb.dlb sml2. dlb and sml3. create separate files named dlb.
- High-level target libraries allow all symbols through the entire system, merge against the generated targets and produce three output files : r0.dxe, p1. dxe and L2_and_L3_common_memory.sm. These files can be placed inside the Blackfin CPU.

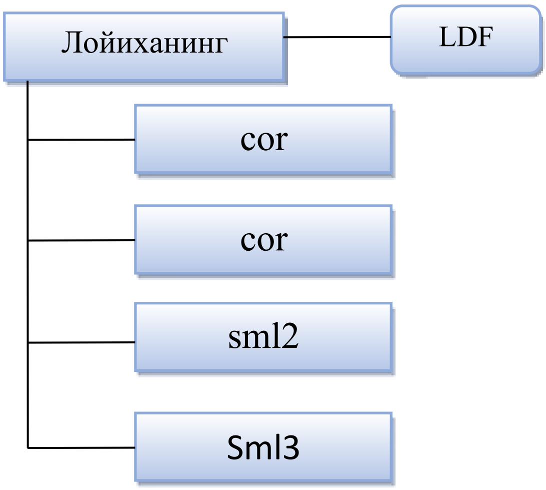


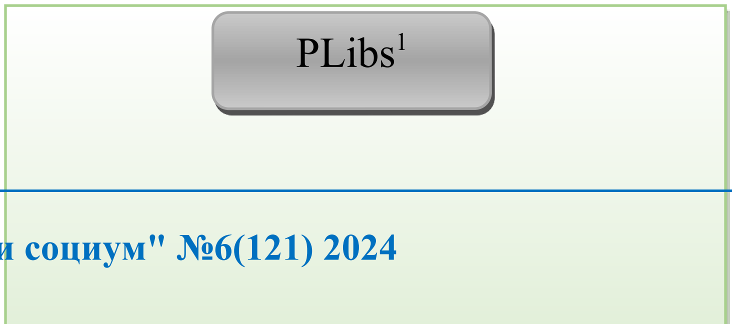
Figure 1. Applications are arranged like target hierarchies .

With applications partitioned into separate libraries, part of the application resides within a specific core within a specific or shared memory framework. It means that you can use am.ldf to produce a mass in a mass by setting a proportionality for file names (p0.dxe, sml2.dlb, etc.).

If File, New, Project... is selected, you can create these projects using the Master project. Select Dual Core on binary bases: use one application using both cores . Project master special. ldf file, and run the code.

Each core processor defines separate and shared memory (internal memory and floating memory L2) two locations, the COMMON_MEMORY pointer. Plot area COMMON_MEMORY is a dual-processor instruction area for external references through COMMON_MEMORY, processor directives can be combined against libraries with COMMON_MEMORY.

The PLibs library is directly mapped to the PROCESSOR directive. If this resource is allowed to use libraries, one private memory main core A or V is displayed. Libraries specified as CLibs are displayed in the COMMON_MEMORY field. A one-time binary base implementation is guaranteed to have library execution time using correct synchronization using a multi-threaded switch.



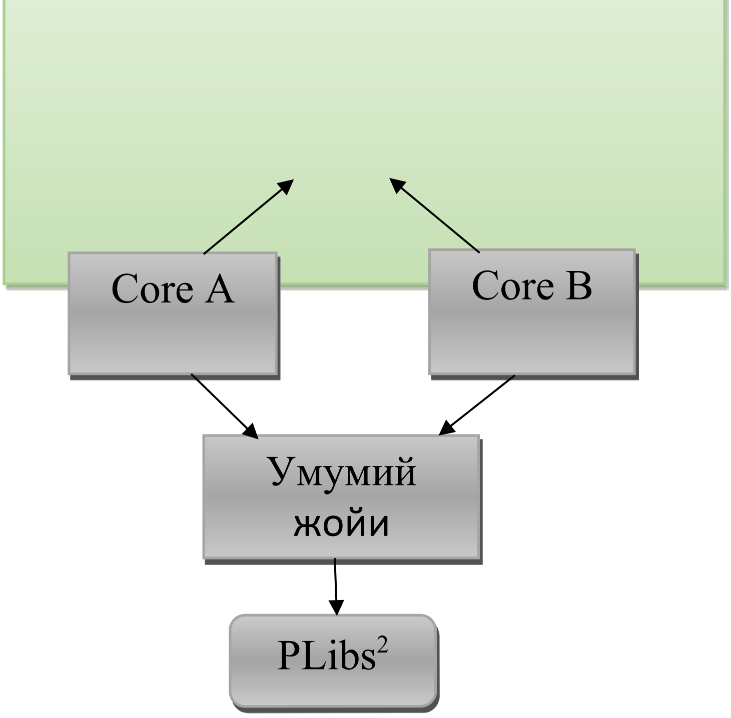


Figure 2 Two-wire base connection.

Create a .ldf file.

The .ldf file requires a single two-way approach. Because this .ldf file is designed for dual-core Blackfin processor single-valued, more robust and simple approaches. There is no need to modify the .ldf file file that was ever created. There is no need for .ldf files under Projects. The easiest way to create a user .ldf file is to use the Project Wizard:

File, New, Project... Under Dual-core Settings, select Dual core:

Single application using both cores. A custom .ldf file is created along with the project project hierarchy. Alternatively, you can create a user file .ldf through the top-level design project Options, which will run code/LDF. Make sure that kernel A and operation B are selected in the LDF setup.

Shared memory (SharedMemory). Code and data are represented in L2 internal memory, and the sml2..ldf part file places them and merges the COMMON_MEMORY area against the library from which the part file was created. Common parts (program, data, etc.) are represented as l2_sram.

The code and data are mirrored in the external memory and the sml3 part is mirrored in the target.

Shared Data (SharedData). To share data elements between two cores, do the following:

• Define initial module shared elements that contain only shared elements (ie, do not contain code or data belonging to one of the cores);

• Accept the part project sml2 or sml3 module input as the corresponding part.

• Within the initial module, specify the attribute to be used with the MustShare value of the file attribute, that is, #pragma file_attr ("sharing=MustShare")

Sharing Code (SharingCode). The program code can be used in conjunction with the following two cores. If the runtime needs to use the library functions together, the library containing them must be included in the CLibs library list (as shown in Figure 16) . In other words, they don't need to be in the library list to match against compatible processor libraries. The program performs forward and reverse permutations of the eight reports of the input signal based on a parallel algorithm. This is where sawtooth substitutions are used and calculation errors are detected.

• Declare that these data elements are energy dependent.

Blackfin ADSP-BF561 processor

Table 1. Screen results of the program execution:

N o. N o	Basic function	Work and work			
		Parallel case		Consecutive status	
		That 's right	The opposite	right	The opposite
1 1	People	0.619 mil	0.778 mil	0.643 mil	0.860 mil
2 2	Haara	0.630 mil	0.758 mil	0.664 mil	0.822 mil

2 3	Saw-shaped	0.594 mil	0.754 mil	0.624 mil	0.837 mil
4 4	Wavelet	0.524 mil	0.724 mil	0.552 mil	0.702 mil

2 . Results of the program
Sharq ADSP -21062 processor

No	Basis function	Working time	
		right	The opposite
1	People	0.859 mil	1,314 mil
2	Haara	0.869 mil	1,323 mil
3	Saw-shaped	849 mix	1,304 mil
4	Wavelet	860 mix	1,314 mil

Table 3. Results of the program
TargerSharc ADSP-201 processor

No	Basic function	Work and work	
		right	The opposite
1	People	0.105 mil	0.160 mil
2	Haara	0.105 mil	0.160 mil
3	Saw-shaped	0.105 mil	0.160 mil
4	Wavelet	0.106 mil	0.161 mil

Table 4. Results of the program
Sharc ADSP -21062 processor

No	Basic function	Work and work	
		right	The opposite
		2,881	3,197

1	People	mil	mil
2	Haara	2,849 mil	5,661 mil
3	Saw-shaped	2,896 mil	5,687 mil
4	Wavelet	2,867 mil	3,156 mil

5 . Results of the program TargerSharc ADSP -201 processor

No	Basic function	Work and work	
		right	The opposite
1	People	0.374 mil	0.727 mil
2	Haara	0.370 mil	0.721 mil
3	Saw-shaped	0.367 mil	0.718 mil
4	Wavelet	0.364 mil	0.708 mil

The program performs forward and reverse transformations of the original signal eight times based on a parallel algorithm. This is where sawtooth transformations are used and miscalculations are detected.

Conclusions and suggestions

this article, the structure of color images and algorithms for their processing, image formats, spaces and their models, areas of application, methods and algorithms used in mastering digital images were analyzed.

In obtaining spectral values of images, parallelization algorithms were created on multi-core signal processors and practical results were obtained on them. As a result of the use of different spectral transformation algorithms, image spectra were parallelized based on mathematical algorithms.

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