Computation of CPU and GPU

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Abstract :-

The Compute Unified Architecture (CUDA) is a new parallel processing technique used in most currentGraphics Processing Units (GPU) from NVIDIA.NVIDIA develops CUDA FOR parallel operations which has the set of C and C[++]instruction. Using GPU any image processing increases the operating speed and reduces the operating time also.In this paper an efficient GPU based implementation of NLM filtration is considered for filtering the medical ultrasound image.The NLM filtration method using GPU for medical ultrasound achieves the frame rate manymore times faster than the CPU .The result for GPU get compared with CPU result in terms of visual qualityand progressive runtime

Keywords- CUDA Software, GPU (GT 520, 48 core,1.3 Ghz each core , 2GB RAM), operation;NLM filter

1. Introduction :-

Image processing is any type of signal processing for which i/p image is as photograph , the o/p of image processing may be either an image or set of character/parameter. Most image processing technique involves treating the image as two dimensional signal andapplying standard signal processingtechnique to it. Image filtering does typically involve filtering an image using various types of filter.Different types of filters use for image filtering are bilateral filter, median filter,Gaussian filter etc. Here we use bilateral filter since it is non-linear,edg preserving ,noise reducing and smooth filter..In bilateral filtering intensity values of each pixel in an image is replaced by a weighted average of intensity values from nearby pixels. Images are often corrupted by random variations in intensity,illumination,poor contrast

2. Bilateral Filtering

Conventional linear filter workswell in smooth regions, however it substantially blurs the edges of an image. A bilateral filter proposed by Mr. C. Tomasi and Mr. R.Manduchi is an edge preserving and noise reducing filter.As most of others filters,this filter replaces the intensity values at each pixels in an imagewitha weightedaverage of intensity values from apixels in some neighborhood.. However, the weight depends not only on Euclidian distance, but alsodepends in the intensity range, that allows to preserve sharp edges, while removing a noise on smooth Image areas

3. NLm filtering:

in image processing,bilateral filter provides smooth image with preserving the edge ,in place of bilateral filter if we will used NLM filter then the visual quality of o/p image is more clear.In this paper first the bilateral filtering and NLM filtering operations are carried on CPU and then the same operations are carried on CPU with GPU.The both operations carried out on CPU and on GPU are illustrated in following fig.

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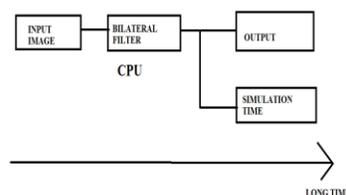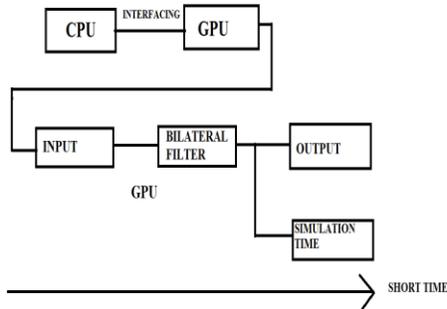
Fig1:bilateral/NLm filering on CPU

Fig2:bilateral/NLm filtering on CPU with GPU

1. Review over GPU

From the last 2-3 decades computer plays vital role in human life, we can say that for each commercial purpose we have a need of computers eg. .for storing data , data calculation, internet application, billing etc.As application gets increases there is need to increase the speed of operation perform by the computer. The modifications are carried out in computer by increasing the operating frequency basically but the operating speed is now limited to 3.2GHz. This is the one problem associated with CPU. Suppose there is one CPU (single processor) and we have to perform any operation eg. a+b=c and p+q=f then time required to perform this operation is same.But when there is a dual core processor, a+b=c, p+q=f operations are independent then time required to perform operation is less than single processor. But if operations are dependent then time required to perform operation is same and equal as that of single processor.To remove the problem here a new technology CPU with GPU (Graphics Processing Unit) is introduce .As stated earlier CPU perform one function at a time, Dual processor takes half time for performing operation and quad prcessoor takes less time than dual processor but as the processor quantity increased, the cost of CPU is also increased, and it is very costly.Here we introduce CPU with GPU, (Graphics Processing Unit) has more than one core which can be operated parallel GPU use NLm and bilateral filtering to remove the noise from the image. As GPU has more than one core, it can perform many operations in parallel.Moreover it's clock frequency is around 5GHz-6GHz.Here we take the algorithm first that is operated using CPU and then operated on CPU with GPU and observe the result, it shows that more than one operations are carried out in

GPU in short time.While filtering the image on CPU with GPU,GPU get interface with CPU
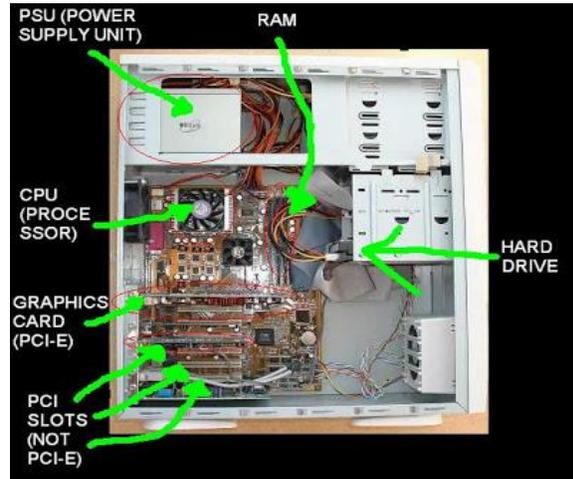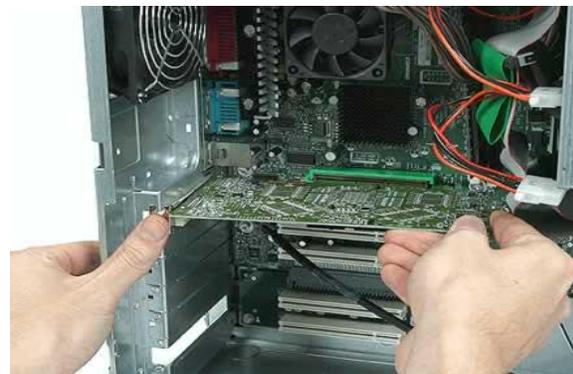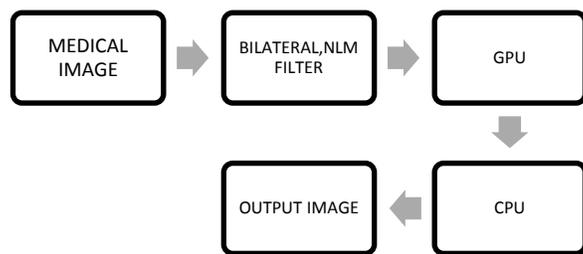

.Fig.3:a) hardware structure of CPU & GPU

Fig.3b):hardware structure of CPU &GPU

2. Proposed system

In this paper we review the performance of bilateral filter and NLM filter for filtering the real time medical ultrasound image with GPU on CPU.Here we are taking any medical image and perform the filtering operation on CPU and the same image get filtering on CPU with GPU and take the output in terms of visual quality and operating time.

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MEDICAL          BILATERAL,NLM          GPU
IMAGE      →      FILTER        →

                                        ↓

OUTPUT IMAGE   ←                        CPU
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Graphics Processing Units (GPUs) are used rendering for and computer graphics acceleration.However, they are essentially a SIMD processing units consisting of parallel computational elements accessible with some effort for arbitrary, not necessary graphical computation. This approach of solving general-purpose problems on GPUs is known as general-purpose computing on graphics processing units (GPGPU). The model for GPU computing is to use aCPU and GPU together in a heterogeneous co-processing computing model where sequential part of the application runs on the CPU and the computationally-intensive part is accelerated by the GPU.

3. Objective of present work

The main objective of present work is to design and develop the system which filter the medical image with efficient visual effects taking much less time than the CPU using NLM filter.

4. Work plan and methodology

The first step of my project is to take real time medical ultrasound image and filter it using bilateral filter on CPU.After this the same image will be filter using NLM filter and compare the output result. In the next stage,the same image will be filtered using bilateral and NLM filter on CPU with GPU.At last the result obtained from first operation will be compared with second operation in terms of visual display and operating time

5. .Acknowledgment

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