Contrast Enhancement Using Thrust Library

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MMI713-Applied Parallel Programming

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Figure 1: Input **??**, CPU Result-**??**, and GPU Result **??**

1 Problem Definition

During the assignment, the contrast enhancement algorithm were developed using the THRUST libary.

2 Algorithm Desciption

I implemented 3 function(for CPU version) and 4 kernel(for GPUversion).

2.1 GPU Algorithm

I used 4 Thrust function to be able to find the expected outcome:

2.1.1 Finding Minimum

fsdfsdf

2.1.2 Finding Maximum

fsdfsdf

2.1.3 Subtract Minimum

dasdasd.

2.1.4 Multiply

dasdsdsda.

3 Benchmarking

sdasda

Table 1: The Time-Consuming Of The Three Algorithms

Algorithm	Minimum (μs)	Maximum (μs)	Average Time (μs)
CPU	15,3902	23,0447	19,01675
GPU	654,743	779,464	703,4921
NPP	784,412	888,618	833,2274

Table 2: Time Consuming-Memory Copy

Source	Destination	Duration (μs)	Size (bytes)
HostUnpinned	Device	21251	262144
Device	HostUnpinned	1121	512
Device	HostUnpinned	576	512
Device	HostUnpinned	20067	262144

Table 3: Kernel Execution Time and Achieved Occupancy

Function Name	Duration (μs)	Achieved Occupancy
MinimumKernel	73,824	0,69
MaximumKernel	74,656	0,69
MinimumKernel	13,152	0,01
MaximumKernel	12,96	0,01
SubtractKernel	22,464	0,78
MultiplyKernel	73,696	0,82

Table 4: Kernel Execution Time and Achieved Occupancy

4 Pros-Cons of Solution

The algorithm uses the device efficiently. But using minimum and maximum kernel second time is the main cons of the solution.

5 Discussion

The one of the main reasons for CPU algorithm is faster than GPU is copy operation. The other reason is the input size is small.

6 Environment

Table 5: Add caption

Properties	Specifications
GPU Name	GeForce GTX 1070
Driver Type	WDDM
PCI Bandwidth (GB/s)	15,754
Frame Buffer Physical Size (MiB)	8192
Frame Buffer Bus Width (bits)	256
RAM Type	GDDR5
Frame Buffer Bandwidth (GB/s)	256,256
Graphics Clock (MHz)	1746,5
Processor Clock (MHz)	1746,5
Memory Clock (MHz)	4004
SM Count	15
CUDA Cores	1920