CSC447-CUDA Parallel Programming Project

Project Name: Optimized Cuda batch Image processing

Due Date: 15 May

Work Team: 2 Students

The aim of this project is to develop GPU-CUDA image processing tools capable of handling a batch of jobs specified in an input text file. Each job comprises an input file name, processing algorithm name, and output file name. Several image processing algorithms are to be considered, with their CPU host implementation provided alongside all the necessary code for job reading and initialization. Students are tasked with creating a CUDA GPU version of these algorithms, focusing on techniques that optimize the usage of GPU multicore architecture, including shared memory per SM (Tiling), and striving to optimize memory transfers between the Host and the device.

Jobs are stored in a data structure passed to the GPU launcher, and they are executed sequentially, one by one. However, scheduling optimizations are permitted to reduce memory management overhead for GPU memory allocation and copying. It is assumed that jobs are independent and can proceed in any preferred order. Each job contains a "filename" property that could be used to identify different jobs with the same image input data.

We recommend using "nvprof" tools to profile your implementation and obtain accurate timing measurements of your execution. Additionally, we suggest comparing the output images generated by the CPU algorithm with those generated by your GPU implementation to validate your concept.

The engine code of the Jobs launcher wil be provided on blackboard.

Good Luck