Home Assignment 3 Part 2 (7 points)

Description

Using CUDA C to complete the following coding requirement for practice. This assignment, from my point of view, needs at least 10 hours to be finished if you are not quite familiar with C language. Please start the assignment as soon as you can. Due date of the assignment: **Nov. 15th, 11:00pm, Eastern Time.**

Coding the Following Question

- Write CUDA C based codes to conduct the following multiple matrix muliplication operations. Given N matrixes $A_1, \cdots, A_N$, and ONE matrix B, the N matrixes $C_1, \cdots, C_N$ could be obtained by the following equations.

$$\begin{aligned} C_1 &= A_1 * B \\ C_2 &= A_2 * B \\ &\vdots \\ C_N &= A_N * B \end{aligned} \tag{1}$$

  where $A_1, \cdots, A_N$ have the same shape, and the matrixes A and B are randomly generated.

- Students MUST use CUDA C to conduct the operation. Other coding environments/libraries such as PyCuda, MATLAB, CuPy are NOT allow to use. However, students could use cuBLAS library to complete the assignment as cuBLAS is one of the most important libraries in CUDA.

- The CUDA run-time should be report in the assignment.

- Please run your codes under the following three conditions. i) $A_1, \cdots, A_N \in R^{500\times500}$, $B \in R^{500\times400}, N = 100$; ii) $A_1, \cdots, A_N \in R^{50\times20}$, $B \in R^{20\times50}, N = 5000$; iii) $A_1, \cdots, A_N \in R^{6\times4000}$, $B \in R^{4000\times9}, N = 1000$;

Requirement

- All the provided codes will be run by Instructor based on the following two environment. i) Google Colab. If students use Google Colab, please indicate it in the assignment so I will copy your code and run it in the Google Colab. ii) otherwise, all the codes will be run in the Visual Studio 2019/2017 environment.

- If the codes could not successfully run in the above environments, at least 80 percent of points will be cut off. Please make sure your code could be run in the environment, no additional files will be allow to upload or submit after the due date.
- If students use libraries such as PyCuda, CuPy to conduct the assignment, all the points will be cut off.
- No late submission policy.
- If similar codes have been found, the assignment will be marked as Zero and will report to the University.
- The matrixes A and B should be randomly generated to make sure the codes are reproducibly.