CSE 560 - Winter 2021
Assignment 1: Adaptive Histogram Equalization
Due date: 23:59:59, 29th January 2021

In image processing, histogram equalization is used to automatically enhance contrast of images. See: https://en.wikipedia.org/wiki/Histogram_equalization
Global histogram equalisation has a tendency to overexpose certain regions of image. Adaptive Histogram Equalization (AHE) performs a local contrast enhancement. See https://en.wikipedia.org/wiki/Adaptive_histogram_equalization

Go through the above links to understand the method and read the code to understand the provided CPU implementation of AHE. Compile (use CMAKE) and run the given code on two images. Note the time taken by the CPU implementation.

1. Write a CUDA version of the AHE computation (implement both steps; see CPU code). Use constant memory to store computed mappings. [10 marks]
2. Document your approach to the problem. [3 marks]
3. Report CPU vs GPU (kernel and overall) timing results for both images. [2 marks]

Total marks for this assignment: 15 marks

Bonus marks to a maximum of 3 can be awarded for the following:
4. Use texture memory to read the image. Report CPU vs GPU (kernel and overall) timing results. [3 marks]

Note: A report is mandatory along with code submission to receive any credit.

Disclaimer: Your code should be written by you and be easy to read. You are NOT permitted to use any code that is not written by you. (Any code provided by the TA/ instructor can be used with proper credits within your program).