

5. CUDA Convolution and Gaussian Blurring

In parallel, use the GPU to implement image convolution, namely Gaussian blurring. Consider grayscale image generated randomly by you with $N \times N$ size (at least 500x500 in pixels). Create Gaussian kernel with variable size $M \times M$ (at least 3x3) and set proper weights. Compare GPU with CPU parallel implementation and any built-in function (for example OpenCV package). Final blurred image must not contain artifacts at the image borders.

Discuss your GPU implementation as follows.

- Compare the speed with the parallel implementation on the CPU
- Comparison of calculation times for CUDA and parallel version as a function of matrix size.