

Programming Parallel Computers

Aalto 2023

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MF9a: better algorithm ★★★

Please note that you can still submit, but as the course is already closed, your submissions will not be graded.

To get started with the development, [download the code templates](#), unzip the file, edit mf.cc, and run `./grading test` or `./grading benchmark` to try it out – see the [instructions](#) for more details!

Upload your solution as a file here...

Please upload here the file **mf.cc** that contains your solution to task MF9a.

Choose File

No file chosen

... or copy-paste your code here

Submit

Your submissions

Your submissions to MF9a will appear here; you can simply [reload](#) this page to see the latest updates.

What you will need to do in this task

Please read the [general instructions for this exercise](#) first. Here are the additional instructions specific to this task:

Design a better algorithm that does not recalculate the median separately for each pixel. Make it as efficient as possible, also for very large window sizes. You are encouraged to use all resources that you have in the CPU.

What I will try to do with your code

I will first run all kinds of tests to see that your code works correctly. You can try it out locally by running `./grading test`, but please note that your code has to compile and work correctly not only on your own computer but also on our machines.

If all is fine, I will run the benchmarks. You can try it out on your own computer by running `./grading benchmark`, but of course the precise running time on your own computer might be different from the performance on our grading hardware.

Benchmarks

Name	Parameters
benchmarks/1	hx = 10, hy = 10, nx = 500, ny = 500 the input contains 500 × 500 pixels and the window dimensions are 21 × 21 pixels
benchmarks/2	hx = 10, hy = 10, nx = 1500, ny = 1500 the input contains 1500 × 1500 pixels and the window dimensions are 21 × 21 pixels
benchmarks/3	hx = 10, hy = 10, nx = 4000, ny = 4000 the input contains 4000 × 4000 pixels and the window dimensions are 21 × 21 pixels
benchmarks/4	hx = 50, hy = 50, nx = 4000, ny = 4000 the input contains 4000 × 4000 pixels and the window dimensions are 101 × 101 pixels

Grading

In this task your submission will be graded using **benchmarks/4**: the input contains 4000 × 4000 pixels and the window dimensions are 101 × 101 pixels.

The point thresholds are as follows. If you submit your solution no later than on **Sunday, 04 June 2023, at 23:59:59 (Helsinki)**, your score will be:

Running time	Points
≤ 50.000 sec	1
≤ 20.000 sec	2
≤ 10.000 sec	3
≤ 2.000 sec	4
≤ 1.000 sec	5

If you submit your solution after the deadline, but before the course ends on **Sunday, 04 June 2023, at 23:59:59 (Helsinki)**, your score will be:

Running time	Points
≤ 50.000 sec	1
≤ 10.000 sec	2
≤ 1.000 sec	3