

Aalto 2023

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IS6a: fast CPU solution for 1-bit images ★★★

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 `is.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 `is.cc` that contains your solution to task IS6a.

Choose File

No file chosen

... or copy-paste your code here

Submit

Your submissions

Your submissions to IS6a 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:

In this task, the input is always a monochromatic image: each input pixel is either entirely white with the RGB values (1,1,1) or entirely black with the RGB values (0,0,0). Make your solution to IS4 faster by exploiting this property. It is now enough to find a solution for only one color channel, and you will also have much less trouble with rounding errors. In this task, you are permitted to use single-precision floating point numbers.

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	<code>nx = 100, ny = 100</code> the input is a structured black-and-white image with 100 × 100 pixels
benchmarks/2a	<code>nx = 199, ny = 199</code> the input is a structured black-and-white image with 199 × 199 pixels
benchmarks/2b	<code>nx = 200, ny = 200</code> the input is a structured black-and-white image with 200 × 200 pixels
benchmarks/2c	<code>nx = 201, ny = 201</code> the input is a structured black-and-white image with 201 × 201 pixels
benchmarks/3	<code>nx = 400, ny = 400</code> the input is a structured black-and-white image with 400 × 400 pixels
benchmarks/4	<code>nx = 600, ny = 600</code> the input is a black-and-white image with 600 × 600 pixels

Grading

In this task your submission will be graded using **benchmarks/4**: the input is a black-and-white image with 600 × 600 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
≤ 8.000 sec	1
≤ 5.000 sec	2
≤ 3.000 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
≤ 5.000 sec	1
≤ 3.000 sec	2
≤ 1.000 sec	3

Contest

Your submissions to this task will also automatically take part in the [contest](#), and you can receive **up to 2 additional points** if your code is among the fastest solutions this year!

Running time	Extra points
≤ 1.20 × fastest	1
≤ 1.05 × fastest	2