

CS-206 - Programming Assignment 1

Java threads

1 Parallel image processing

In homework 2, we saw a method of parallelizing the sobel algorithm. In this assignment, you will use your newly acquired knowledge of Java Threads to create a multi-threaded implementation. You are given a program that takes a filename, a threshold number and a number of threads; it reads the image from the given file, converts it to a 2D matrix, applies the `sobel` method to the matrix and writes the result as an image to an output file, while printing the execution time of `sobel`.

Your task is to implement the `sobel` method:

```
int[][] sobel(int[][] img, int threshold, int nOfThreads);
```

where:

img A 2D matrix containing the color values of the input image pixels (between 0 and 255).

threshold The threshold parameter of the algorithm.

nOfThreads The number of threads we want to run the algorithm with. Assume that the number of threads will always be a divisor of the number of `img` rows.

Return value A 2D matrix containing the color values of the edge image pixels (either 0 or 255).

1.1 Hints

- It is much easier to first implement a single threaded version of the algorithm, and then parallelizing it. This way, you can decouple the debugging of the algorithm from the debugging of the parallelization.
- To make sure that your program is running correctly, look at its execution time. You should observe speed-ups as you increase the number of threads, but at some point the overhead of creating threads will be too high and you will see a slight slow-down.

2 Submission

Deadline: 24.03.2015

Submit all source files in a zipped folder - be careful not to change anything in the `main` method of the `SobelMain` class.