

COSC 480 – Lab #4

A Bit More Parallel Design

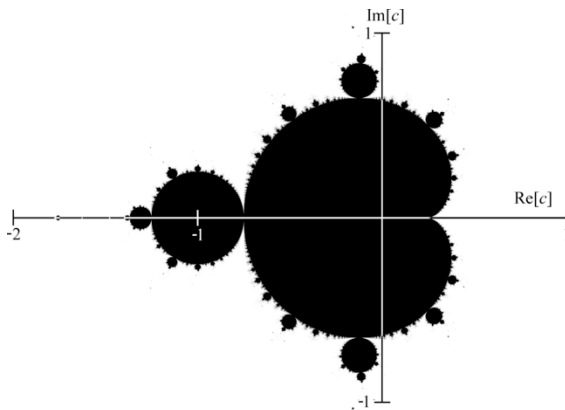
*This lab may be worked on in pairs. You may code the algorithm problems, but I'm really just looking for pseudocode!

ALGORITHM Q's

1.) Mandelbrot set is a recursively defined set of complex numbers defined by the function:

$$z_{n+1} = z_n^2 + c$$

Where $z_0 = 0$, and c is a complex number. Properly called a fractal, if you map the complex numbers generated, you get a picture like:



It happens to be an algorithm that is “embarrassingly parallelizable.” There are a variety of algorithms for generating the set that you can look up, but I'd like you to create a parallel version. You do not need to provide the pseudocode to draw the set points.

2.) Quicksort is a classic sorting algorithm that every young up-and-coming computer scientist should know. Classically, it is also a fantastic example of an algorithm that can be parallelized via recursive decomposition. Give the parallel algorithm for quicksort. You must include all parts of the algorithm.

CONCEPT Q's

3.) Massively parallel algorithms are featured quite frequently as potential solutions to work intensive AI problems. We talked about one such problem (game-playing via search graphs), but there are many more. One domain in specific that can exploit parallel computation is genetic algorithm design. Write a brief, 250-500 word description of how parallel algorithms could be used in implementing a genetic algorithm, including an example.

Submit your solution (only one submission per pair, one document), to Blackboard. Due 9/28 at 11:59pm.