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INSTITUTE OF COMPUTER SCIENCE

CMSC 180: Introduction to Parallel Computing
Second Semester 2022-2023

Laboratory Exercise 01 Part 2

Interpolating the elevations into a higher resolution digital elevation matrix **M** given a lower resolution digital elevation matrix **N**

Research Activity: Using your computer program from the previous exercise, answer the following questions.

Research Question 1: What do you think is the complexity of interpolating the point's elevation of a $n \times n$ square matrix with given/randomized values at grid points divisible by 10? (*hint: CMSC 142*)

A. Fill in the following table with your time reading:

n	Time Elapsed (seconds)			Average Runtime (seconds)	Complexity*
	Run 1	Run 2	Run 3		
100					
200					
300					
400					
500					
600					
700					
800					
900					
1,000					
2,000					
4,000					
8,000					

16,000					
20,000					

*What does your answer to **Research Question 1** say?

C. Using graphing software (such as Google Sheets or Libre Office Calc), create a line graph of n versus **Average Runtime** obtained from the Table above. On the same graph, plot n versus **Complexity** (at least up to the n where your program worked).

Research Question 3: Do the two lines agree, at least in the form? If not, provide an explanation why so?

Research Question 4: Discuss ways on how we can make it better (lower average runtime) without using any extra processors or cores (notice that the word “ways” is in plural form).

Lab Report Guidelines

Submit a report on your answers to the research questions posted in this exercise. All laboratory reports and term projects must be written in a technical way. That means each must have the following sections:

1. Introduction,
2. Objectives,
3. Methodology,
4. Results and Discussion,
5. Conclusion,
6. List of Collaborators, *(Yes, you can collaborate with other students but make sure that you can explain your work)*
7. References, and
8. Appendices.

You will include in the appendices the respective fully commented source codes of your programs. Submit your report through the Google Classroom Laboratory Exercise 01 PART 2 portal.