Introduction

Thursday, January 9, 2025 11:45 AM

Algorithm Design → CSCI 211 - 01
↑ this section

Professor Lu → Parmly 412

112 – efficiency
121 – discrete

Today
1. About the Course
2. Do a little problem. (very easy)
3. Syllabus
4. Do a less little problem

① Algorithm Design
↓
series of step to solve a problem

problem-solving

practice !! ↑ common techniques
↘ ideas

Input: List of numbers.

$-2, 37, 481, 92, -5, 39, 3$ ⟶ L

$|L| = n$ numbers

Question: Find the smallest difference between two numbers in L.

$x, y \in L$ s.t. $|x-y|$ is minimal.

2 37, 37

$L = \{ a, b, c \ldots \}$

Give an algorithm for min. difference?

ALG 1 Try all possible pairs.

1. Let the min. diff be $|a-b|$
2. For every $x \in L$, loop through all the other $y \in L$. And check whether this is the smallest.
3. Return the smallest diff.

$\Theta(n^2)$

~~$O(n^2)$~~

ALG 2

1. Sort the numbers, ascending — $O(n \log n)$
2. Check every adjacent pair of numbers. — $O(n)$
3. Return the min. diff.

"the smallest diff must be an adjacent pair"

suppose $|a-b|$ is smallest, but a, c, b

$|a-c| \leq |a-b|$

~~$O(n \log n)$~~ ← merge sort.

(3) Syllabus

website — canvas.wlu.edu

Grading

55% HW → 7? 8? → Fri → Fri; HW0 → Mon.

30% Exams → 2

30%	Exams → 2
15%	Final → 1
2%	others
100%	total

Materials

① come to class

② Lecture notes

③ Textbooks ← no required textbook.

Algorithms → by Jeff Erickson. ↗ nine

online ↗

Introduction to Algorithms → CRLS

④ Homeworks → ask me for answers.

④ Input: A list of points in 2D.

(-1,1), (0,0), (1,2), (4,5), (-1,2) → L

(-1,1)
(0,0)

$d = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$

Question: Find the minimum distance between two points in L.

$x, y \in L$ s.t. $|x - y|$ is minimal.

($|x - y|$: distance)

ALG 1: Try all pairs. $\rightarrow O(n^2)$

- make a graph somehow?
- sort by "quadrants"?!
- average point?!
