

Data Structures

Q&A Day

CS 225

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December 9, 2024



UNIVERSITY OF
ILLINOIS
URBANA - CHAMPAIGN

Department of Computer Science



Happy holidays!

Announcements

Fill out ICES forms! (There's a third option too!)

Interested in being a CA? Apply for CS 225 or CS 277!

CS 277: <https://opportunities.cs.illinois.edu/courses/positions/>

CS 225: <https://forms.gle/WFJgBhTygCKg78zB7>

Today is Q&A

Open office hour for questions!

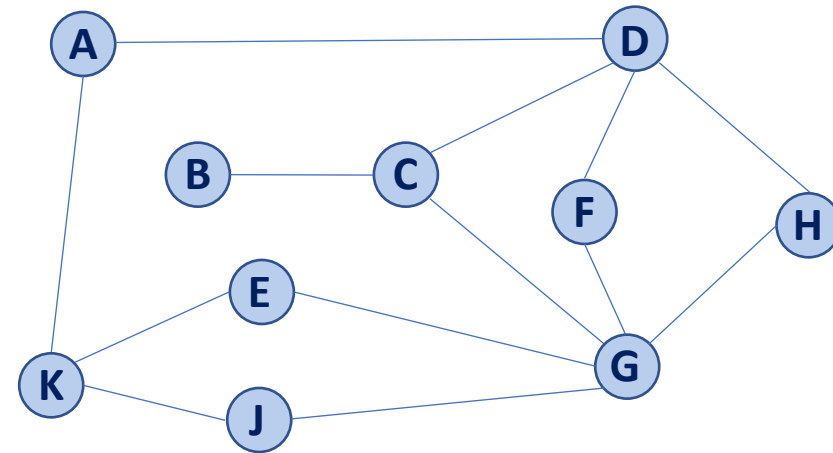
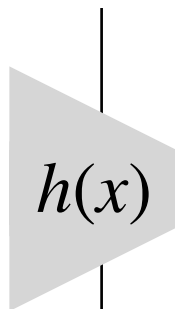
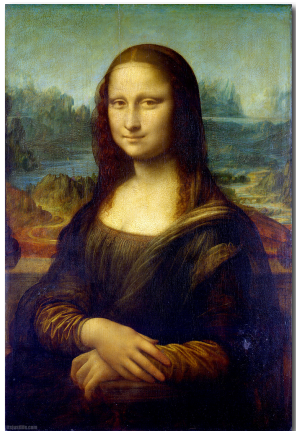
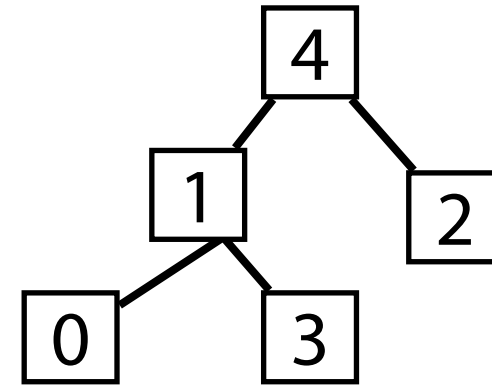
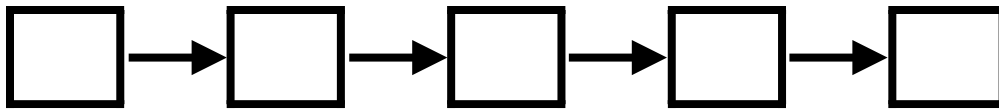
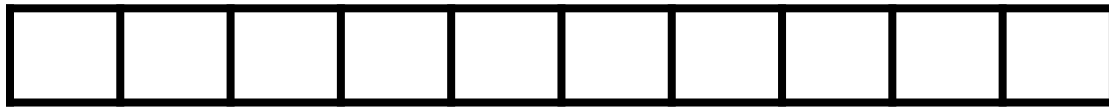
Conceptual questions as a whole class priority

Practice exam questions are valid 

Exam questions will be one-on-one and only if no other questions

CS 225 — Course Goals

Understand foundational data structures and algorithms



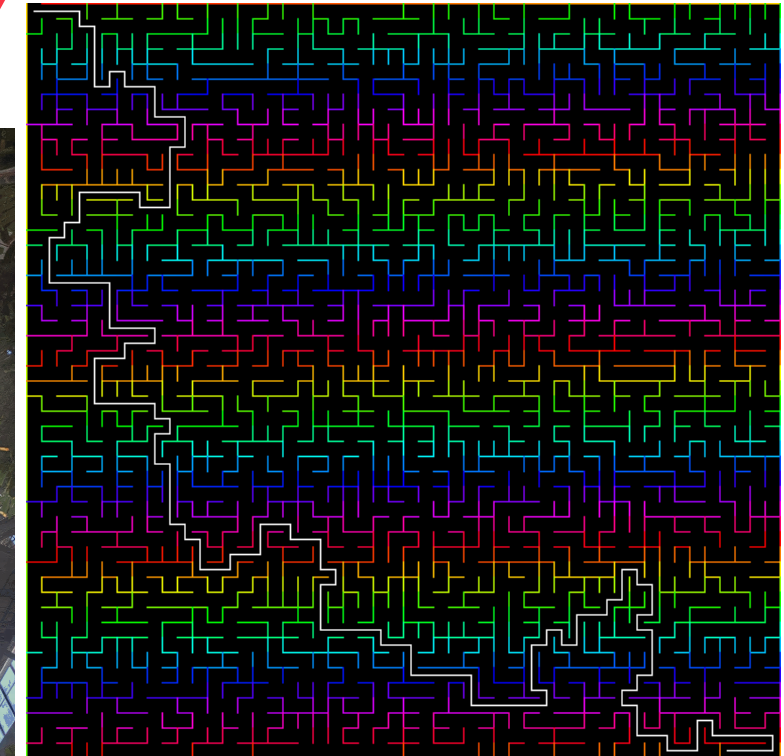
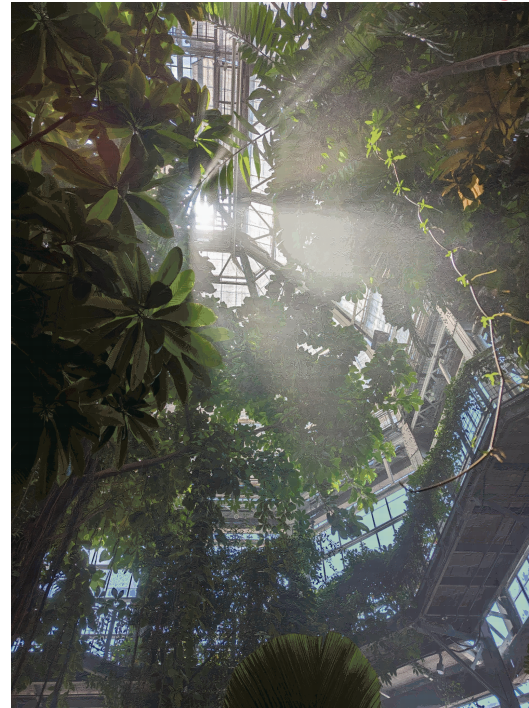
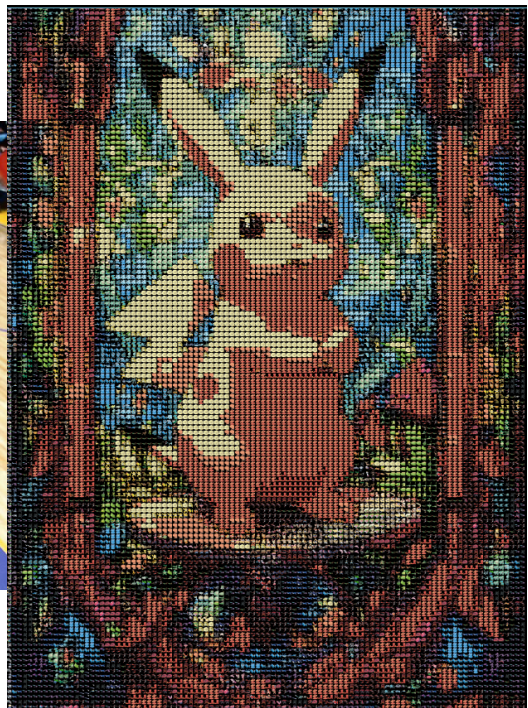
CS 225 — Course Goals

Justify appropriate algorithms for complex problems

Decompose problem into supporting data structures

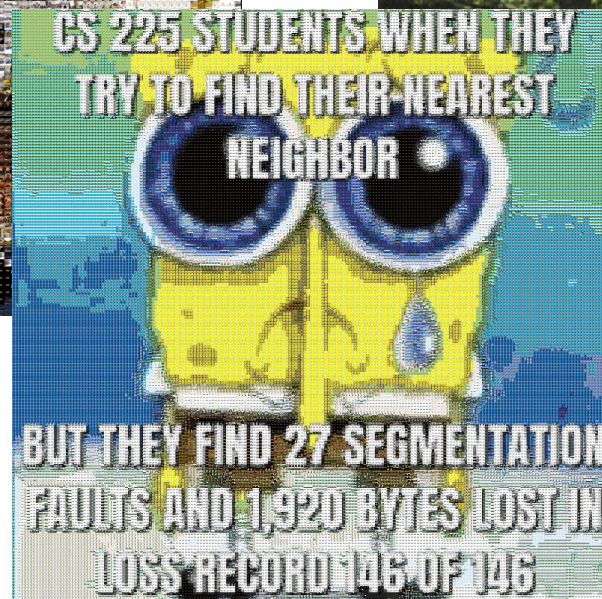
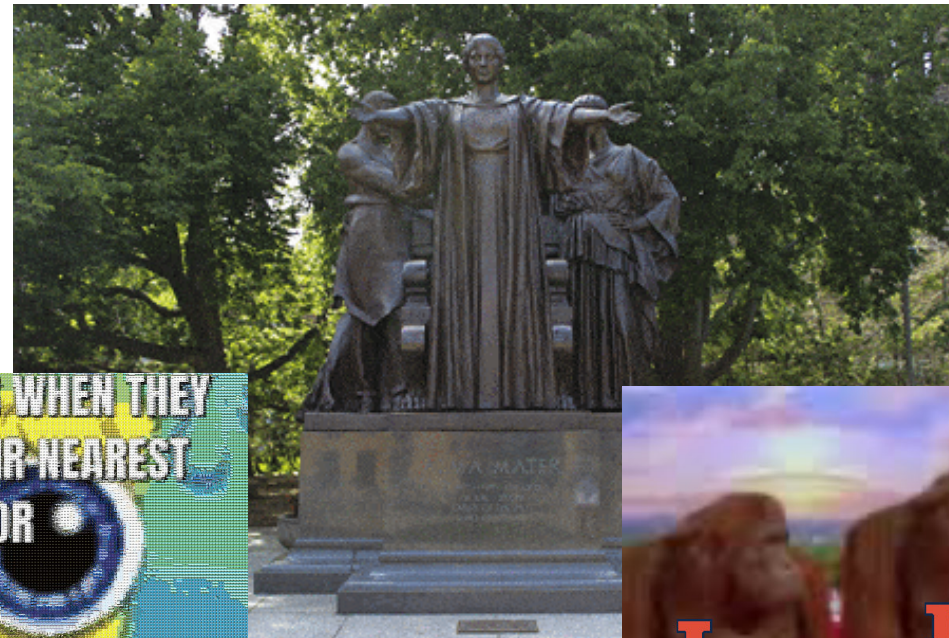
Analyze efficiency of implementation choices

IS a mosaic



CS 225 — Course Goals

Implement intermediate difficulty problems in C++



CS 225 — Course Goals

Understand foundational data structures and algorithms

Justify appropriate algorithms for complex problems

Implement intermediate difficulty problems in C++

Improve your foundation of CS theory



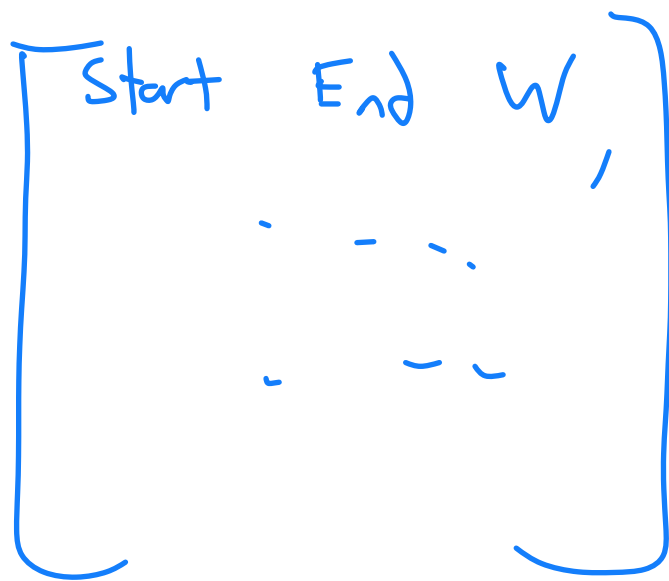
Good luck on your finals!

Graphs

↳ Diff btwn edge list & adjacency list

Edge list

↳ A list of edges



Adj List

Vertex

v_1 , length of list, $[*] \rightarrow [*] \rightarrow [*]$

v_2

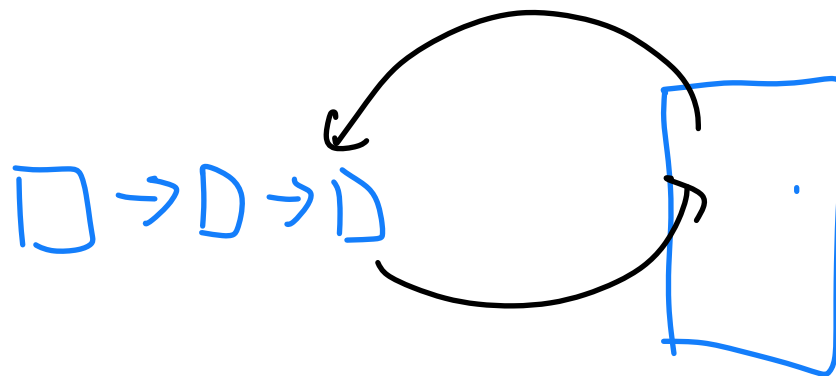
v_3

⋮

Edge

start, end, w

start* end*



Double Hashing

$$h_1(x)$$

$$h_2(x)$$

$$h_1(x) = 1 \quad +1 \quad +2 \quad +3 \dots$$

$$h_1(y) = 1$$

$$+2 \quad +4 \quad +8 \quad +16 \dots$$

∴

These probing methods
are bad

Start w/ $h_1(x)$

$$h_1(x) + h_2(x)$$

$$h_1(x) + 2 * h_2(x)$$

$$h_1(x) + 3 * h_2(x)$$

$$h_1(x) = 1 \quad h_2(x) = 2$$

$$h_1(y) = 1 \quad h_2(y) = 5$$

Hash function's Deterministic - Always return same value for same input

$O(1)$ calculations

SHA - uniform \leftarrow equal prob hashing any value
independent \leftarrow all items hash indep