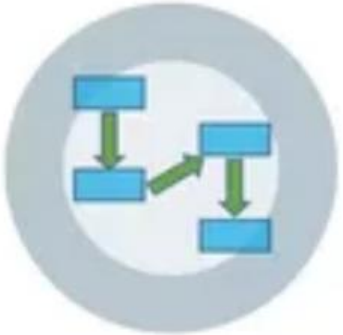
Adjacency matrix
&
Adjacency list
Implementation

Data Structures and Algorithms



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Data Structures and Algorithms
Course Contents:
Abstract data types, complexity analysis, Big Oh notation, Stacks (linked lists and array implementations), Recursion and analyzing recursive algorithms, divide and conquer algorithms, Sorting algorithms (selection, insertion, merge, quick, bubble, heap, shell, radix, bucket), queue, dequeuer, priority queues (linked and array implementations of queues), linked list & its various types, sorted linked list, searching an unsorted array, binary search for sorted arrays, hashing and indexing, open addressing and chaining, trees and tree traversals, binary search trees, heaps, M-way tress, balanced trees, graphs, breadth-first and depth-first traversal, topological order, shortest path, adjacency matrix and adjacency list implementations, memory management and garbage collection

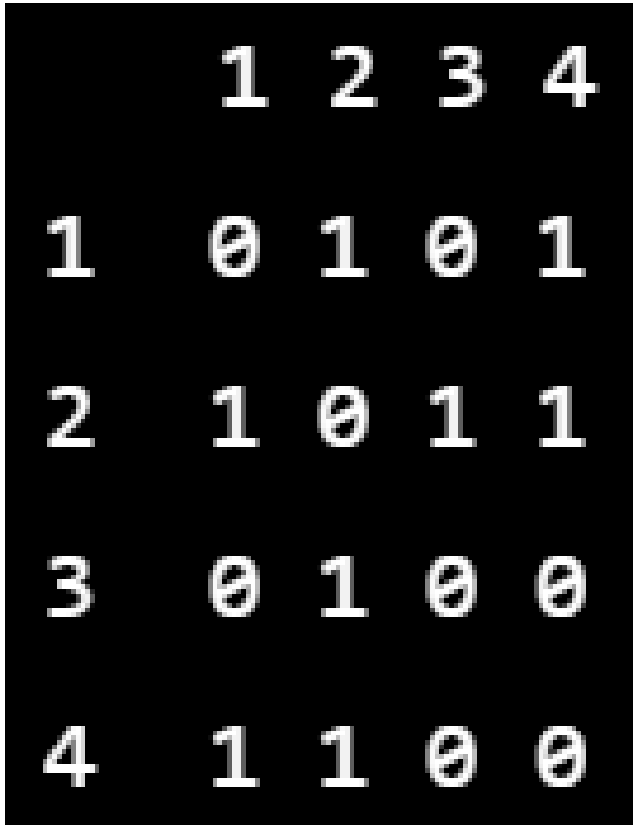
Adjacency Matrix and adjacency list implementation

- An adjacency matrix is a **2D array** (**matrix**) that represents the ***edges*** between ***vertices*** in a **graph**.
- The ***rows and columns of the matrix*** represent the ***vertices***, and the ***values in the matrix*** represent the ***edges***.

Adjacency Matrix and adjacency list implementation cont…

- If there is an edge between vertices i and j, then the value in the matrix at the i-th row and j-th column (or j-th row and i-th column, depending on the graph being directed or undirected) will be 1.
- Otherwise, the value will be 0.
- Here's an example of an adjacency matrix for an undirected graph with 4 vertices:

Adjacency Matrix and adjacency list implementation cont…



	1	2	3	4
1	0	1	0	1
2	1	0	1	1
3	0	1	0	0
4	1	1	0	0

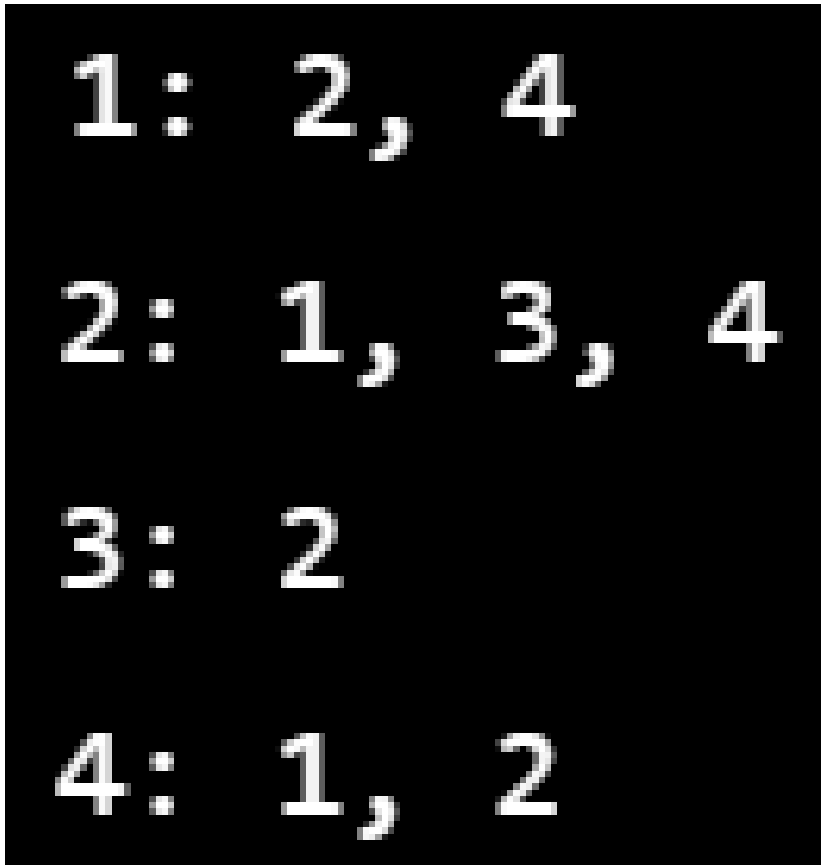
Adjacency Matrix and adjacency list implementation cont…

- An adjacency list is a data structure that represents a graph as a collection of lists, where each list represents the vertices adjacent to a particular vertex.
- Each vertex is assigned a list of its adjacent vertices.
- If there is an edge between vertices i and j, then vertex i will have j in its list, and vertex j will have i in its list.

Adjacency Matrix and adjacency list implementation cont…

- If the graph is directed, then only the out-neighbors are included in the list for each vertex.
- Here's an example of an adjacency list for the same undirected graph as above:

Adjacency Matrix and adjacency list implementation cont…



Adjacency Matrix and adjacency list implementation cont…

- In this example, vertex 1 is adjacent to vertices 2 and 4, vertex 2 is adjacent to vertices 1, 3, and 4, vertex 3 is adjacent to vertex 2, and vertex 4 is adjacent to vertices 1 and 2.