

Graphs

Objective

The objective of this lab is to understand the implementation of Graph data structure. Implement graph as adjacency list and adjacency matrix. Furthermore, understand its time and space complexity.

Task

1. Develop a program that investigates your friend's network. Create a graph where each vertex represent person and edge between vertices represents their friend's relationship.
 - a. Create an adjacency list to represent the Graph and perform operations.
 - b. Create an adjacency matrix to represent the Graph and perform operations.

Procedure

- a. **Adjacency list:** Store graph as adjacency list where one dimensional array stores vertices and for every vertex adjacency list stores a list of adjacent vertices to it.

```
class vertex{
    String name;
    int age;
LinkedList<vertex> friendsList = new LinkedList<vertex>();
    vertex(String d, int a){
        name=d; age=a;
    }
}
```

```
public class GraphAdjacencyList {
```

```
    vertex[] adjList;
    int vertexCount;
    GraphAdjacencyList(int s){
        adjList=new vertex[s];
        vertexCount=0;
    }
```

```
    public void AddVertex(String n, int a){ ...}
```

```
    public void AddEdge(String n1,String n2) {...}
```

```
    public vertex FindVertex(String n){...}
```

```
    public void deleteVertex(String n){...}
```

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```
public void deleteEdge(String n1,String n2){...}
```

```
public String toString(){...}  
}
```

- b. **Adjacency matrix:** Store graph as one dimensional array for set of vertices and two dimensional array for set of edges.

```
class Vertex{
    int num;
    String label;
    public Vertex(String lab, int n) {
        label = lab;
        num = n;
    }
}

public class GraphAdjMatrix {
    Vertex vertexList[]; // array of vertices
    int adjMat[][]; // adjacency matrix
    int vertexCount;
    GraphAdjMatrix(int s){
        vertexList=new Vertex[s];
        vertexCount = 0;
        adjMat = new int[s][s];
    }

    public void addVertex(String L) {...}

    public void addEdge(String L1, String L2) {...}

    public void display() {...}

}
```