

## LABORATORY WORK BOOK

Geraph Tsuversal.

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Class Semester 03							Roll Number							
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	Exercise Number	EXERCISE NAME	- Aye	Algorithm	Source Code Calculations and Graphs		Program Execution Results and Error Analysis		n Vive	T	Total			
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2	12.2	Depth First Search	HT S	+ 0	tenen		> 0	17	3	tov	Peg.			
3	12.3	Best First Search			b		1	100		of l	(Du)			
4	12.4	Breadh First Traversal	. ().	Mag	lent.	h a	N :		dae	DE D				
5	12.5	Depth First Search for Disconnected graph	( )	7			,			U	\$			
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Green Traversal.
    Breadth First Search:
12.1
     AIM: - Write a Program foi a given graph &,
     Print BFS traversal from a given Dounce Vertex.
     PROGRAM:-
     import ioua. util. *;
     Public class Graph &
                                        Charles and thouse 1.2
        Private Map < Integer, List < Integer >> graph;
       Public Graph() &
          graph = new HashMap <>();
       Public void add Edge (int u, int v) 6
         graph. compute If Absent (u, K-> new Array list <> ()).
         odd(v):
       Public void BFS (int Start) &
         Set < Integer > Vivited = new Hash Set < 7 ():
         pueue < Integer > queue = new linkedlist <> ();
         queme. add (Start).
```

```
Visited. add ( Otart);
   While ( ! queue. io Empty ()) {
    int node = queue. poll();
    System. out. pount (10de 4"");
List < Integer > neighbors = graph. get Or Default
      ( node, new Array Last < >());
   for (int neighbor : neighbors) (
    if (! Vivited. contains (neighbor)) ?
       vueue. add (neighbor);
       Vivited. add (neighbon);
                                    -: TUGTUO
 Public Øtatic void main (String [] avgs) {
   Champer & new Scamper (System.in);
   Graph graph = new Grapher;
  System. out. pountln (" Enter the number of edges:");
   int edges & Ocamner. next Int();
  System. out. pountln ("Enter the edges (uv):");
  for (int i=0; i < colges; itt) {
```

```
int u = Oscamner · next Int(); (bod) habo · bodies
   int v = Ocompen. next Inting
   graph. add Edge ( u, v); mag a many - store & mi
                    Costem. out. point ( ) ske +
 System. out. pointln ("Enter the Starting Vertex for BFS:");
 int start = scamper. next Int();
 System. out. pountly (" Following in Breadth First
  Traversal ( Starting from vertex "+ Start + "): ");
 graph . BFS ( stout);
                vuene . odal (relation) :
 Øcamner. <lose ();
                     Visited. add (neighbor);
 3
3
OUTPUT : -
Enter the number of edges: $5
                                that not than or
Enter the edges (uv): 0
                   - () 1000 2 mg = /
2)
                      2 3 3 month to opin the
Enter the Starting Vertex for BFS: 2
Following is BFS (Starting from Vertex 2): 2031
```

```
Depth First Search :-
AIM: - Write a Program for a given gruph G,
Print DFS traversal from a given Dource Vertex.
PROGRAM : -
import java. util. *;
-daro Graph 1
 Private Map < Integer, List < Integer > 7 graph;
 Public Graph() &
 graph = new HashMap<7();
 Public void add Edge (int w, int v) (
  graph. compute If Absent (u, K -> new Array list <> ()).
    add (v);
 Private void DESUtil (int V; Set < Integer 7 Visited) 6
  visited. add (v);
  System. out. pount (x+"").
  for (int neighbor: graph. get Or Default
     (V, new Array list <>())) {
```

if (! visited. contains (neighbor)) &

```
DES Util (neighbor, visited);
3
   gim: - With a Program for a given gracer
Public void DFS (Int Start) {
 Set < Integer > visited = new HashSet < 7() 5 1 MANAGER
 DESUE ( Start, visited);
                            . * . lite . punt bogmi
Public Static void main (String[] args) &
 Scanner Deanner = new Scanner (System in);
 Graph graph = new Graph ();
 System. out. println (" Enter the number of Vertices: ");
 int n = \triangle camper. nextInt();
 System. out. println ("Enter the number of edges:").
int e = Ocanner. next Int();
 System. out. println (" Enter the edges (4 v);");
for (int i= 0; i < e; i++) {
                          (v) blio . hotich
   int u = occamner, nextInt();
   int v = Deanner. next Int();
   Gruph. add Edge (u, v);
         if ( ! welted . contours ( neighbor) ) f
```

```
System. out. println (" Enter the obtaining vertex
                      for DFS:");
int stad = scanner. nextInt();
 System. out. pountln (" DES from Verter" +
                    Øtat + ":");
  graph. DES (Start);
                        " . Atte . and deep
  obcanner. alove();
                  I proved trait took walls story
 3
I so tail part a page of page of all a tail a tail
OUTPUT : -
Enter the number of Vertices: 5
Enter the number of edges: 5
Enter the edges (u v):
 0 1
 0 2
 1 3 (toos the x tol x tol ) sphaline him with
                            Brook, get (4), colot
 14
               graph, get (3), add (spen pain ( 4, 2
3 4
Enter the Starting Vertex for DFS: O
DFS from Vertex 0: 01342.
```

```
12.3
      Best First Search (Informed Search): -
      AIM: - The idea of BFS is to use an evaluation
      function to decide which adjacent is most promising
      and then explore.
     PROGRAM:-
     import java. util. *;
                                  · Oscals . reprosi
     Public class Best First Search &
       Statie List < List < pair>> graph = new Array List <7();
       Static class pair &
                                              -: TUGTUO
         int node, cost;
         pair (int node, int cost) 1
           this . node = node;
                               (v al) copps out path)
          this. cost = cost;
      Static void add Edge (int x, int x, int cost) &
        graph. get (x). aold (new pour (Y, cost));
       gouph. get (y). add (new Pair (x, cost)).
```

Otatio void best First Search (Int Source, int target) (

```
Priority gueue < pair > pq = new Priority gueue <>
 ( Comparator. compound Int (p-> p. cost));
boolean[] Visited = new boolean [graph. Dize()];
Pr. add (new pain ( source, 0));
Virited [ Dource] = true;
While (! Pay. in Empty(1) 6
  Pair convert = Par poll();
 int <urrent Node = <urrent. node;
 System. out. print ( zwient Node + " ");
 if ( convert Node = = target) {
  System. out. pountln ("In Good node" + target +"
                  reached. ");
return;
               for ( int ? = 0; ? < edgeo; i++)
for (Pair neighbor: goraph. get (current Node)) {
 if (! visited [neighbor. node]) &
  visited [neighbon. node] = tiue;
  Par. add (neighbor);
 potent, out , pointly (" Enter the moving nuck;")
```

```
System. out. pountly ("In Goal node" + target + " not
B
       · reachable");
Public Static void main (String [] args) &
 Scanner Scanner = new Scanner (System.in);
System. out. pountly ("Enter the number of vertices: ");
int vertices = Occamner. next Int ();
System. out. pountln (" Enter the number of edges; ");
int edges = Scanner. next Int().
for (int =0; i < vertices; i++) 1
  Graph. add ( new -Array list <7());
3 * + towat + "stop book 11
clystem. out. pountln ("Enter the edges (4 v cost):");
for (int i= 0; iz edges; itt) 1
  int u = Deanner. next Int();
  int v = \emptyset commer next Int();
  int cost = Sconner. nextInt();
  add Edge ( w, v, cost);
 3
System. out. pointln (" Enter the source node: ");
```

```
int Source = Scanner. next Int();
  System. out. pointln ("Enter the target node:");
  int target = scanner. next Int();
  elystem. out. pountln (" Best First Search traversal:");
  hest Furst Search ( Dource, target);
Deamner. < lose ().
  ge lowerer Triet Atlant ob at at that of
                  on mort problem of from O.
OUTPUT : -
Enter the number of vertices: 6
                             * , Sitir , suit trage
Enter the number of edges: 7
Enter the
        edges (4 v cost):
                                V Jor Jacob
   1
      1
               The se report a tail a tail atoms
   2 4
                               ) (v +18) fami
   3 2
   45
 1
                     selve talyout we to be
   4 1
 2
                ( the (++1 ) vai : 0=9 +111) 101
 353
 452
 Enter the Source node: 0
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11/16

Enter the target node: 5 Best First traversal: 0135 Goal node 5 reached.

12.4 Breadth First Traversal Of A Graph: -

AIM: - Write a program for a directed graph that the task is to do Breadth First Traversal of the graph starting from O.

Erter the number of testing: 6

Enter the number of edges: 7

tes the edges ( & v cost):

PROGRAM : -

import java. util . \*;

-lass Graph &

Private int V;

Private List < Integer >> adj;

Graph (int v) 2

V = V;

adj = new Arraylist < >();

for (int P=0; icv; i++) adj. add (new Array lister()); 3

void add Edge (9nt v, 9nt w) (

```
adj. get (v). add(w);
 3
 Void BFS (int start) 1
  boolean [] visited = new boolean [V];
  gueue < Integer > q = new linked list <7();
  q. add ( start);
  Visited [ start] = true;
                                  -: TUOTUO
  System. out. pount (" BFS Traversal: ");
  while (! 4. is Empty (7) }
    int node = q. poll();
    System. out. pount (node + " ");
    for (int neighbor: adj. get (node)) {
     if (! visited [neighbor]) &
y odd (neighbor);
                               1215 Just Fun
: Public Static void main (String [] angs) &
  Scanner &c = new Scanner (System . in):
  System. out. pountly ("Enter Vertices and eages: ");
```

13/16

12.5

```
Graph g = new Graph (dc. next Int ());
   int edges = esc. next Int();
  Mystem. out. printle ("Enter Starling Vertex:");
   J. BES ( sc. next Int ());
  do. closels.
                           · (treste ) boo · p
                    a want - [ trada ) hat i'v
3
          out, out, print (* BES Marenson : "
OUTPUT : -
Enter Vertices and eolges: 5 4
Enter edges (from to):
             Stem, out, plant ( node + " ");
 0
    1
        for (int gentless: adj. get (node)) &
   2
                A (Tred form) Ladiely ! ) }
0
   3
               visited (neighbor) = true
Enter Starting Ventex: 0
BFS Traversal: 0 1 2 3 4
Depth First Search for Disconnected Graph: -
ATM: - Given a Disconnected Graph, the task is
to implement DFS Algorithm.
```

```
PROGRAM :-
import java. util. *;
                  10,600 mm = 4 150
class Graph 6
 Private Map < Integer, List < Integer >> adj;
                and a country of the
Public Graph () (
  adj = new Hash Map < > ();
 Void add Edge (intu, int v) 6
  adj. put If Absent (4, new Arraylist <7());
  adj. Put If Absent (v, new Array lit < > ());
  adj. get(4). add(v);
  adj. get (v). adol (u);
 g
 Private void DFSUIL (int v, booleam [] Visited) (
   Visited [V] = true,
  System. out. pointly + 11 11);
  for (int neighbon: adj. get Or Default (v, new Array lister()),
    if (! visited [neighbor]) DESUtil (neighbor, Visited);
  3
 3
```

```
Public Otatic void main (String [] args) & -: MASSON
   Scanner Dc = new Scanner (System. in);
    Graph g = new Graph();
   Eystem. out. printly ("Enter number of Verties & edges:");
   int v = do. nextInt(), E = do. nextInt();
   Oystem. out. psuntln ("Enter edges (u v);");
   for (int i=0; iz E; i++) g. add Edge ( Oc. next In+(),
    &c. next Int(1);
  System. out. pountly ("DFS Traversal: ")
  g. DFS():
                             id; . get (16) , add (10);
  do. dose(1;
                             oni . get (v) . adol (u) .
  3
3
OUTPUT : -
       best is void DESITE ( int v biolcom [] Visited
Enter number of vertices de edges: 65
Enter edges ( u v):
    for (int neighbor; and, of Or Defoult (v. year than
(6 Trans redigion) 1902-10 ([redigion] battain;) +i
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16/16

DRS Traversal:

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VIVA VOCE :-

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Define Breadth First Search (BFS)?

It is a graph traversal algorithm that explores all neighbors of a node before moving to the next level neighbors. It uses a queue to ensure nodes are visited in level order, making it soutable for finding the shortest path in an unweighted graph.

Define Depth First Search (DFS)?

Bt is a graph traversal algorithm that explores a Path fully before backtracking to explore other paths. Bt uses a Stack or recursion and is ideal for tasks like pathfinding, cycle stetetion, and connected

component identification.

How Loes DFS handle Disconnected
Graph?

In a Disconnected Graph, DFS sterates over all Vertices and performs IFS forom any unvisited Vertex, ensuring that all components are explored.

What date Structure is typically used in Best First Search?

A Priority queue (or heap) is used in Best First Search to Store and retrieve godes based on the evaluation function value (cost).

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