AIM:-

Assignment 14

To Store a graph using adjacency matrix or adjacency list representation and perform Breadth First Traversal.

OBJECTIVE:-

To learn about breadth first search algorithm, nodes and graph.

Theory :-

Breadth First Traversal (Search)

Breadth first search is a graph traversal algorithm that starts traversing the graph from root node and explores all the neighbouring nodes. Then, it selects the nearest node and explore all the unexplored nodes. The algorithm follows the same process for each of the nearest node until it finds the goal.

Algorithm :

Step 1: SET STATUS = 1 (ready state)

for each node in G

Step 2: Enqueue the starting node A

and set its STATUS = 2

(waiting state)

Step 3: Repeat Steps 4 and 5 until

QUEUE is empty

Step 4: Dequeue a node N. Process it

and set its STATUS = 3

(processed state).

Step 5: Enqueue all the neighbours of

N that are in the ready state

(whose STATUS = 1) and set

their STATUS = 2

(waiting state)

[END OF LOOP]

Step 6: EXIT

SOURCE CODE:

#include<iostream>

#include <list>

using namespace std;

// This class represents a directed graph using

// adjacency list representation

class Graph

{

int V; // No. of vertices

// Pointer to an array containing adjacency

// lists

list<int> \*adj;

public:

Graph(int V); // Constructor

// function to add an edge to graph

void addEdge(int v, int w);

// prints BFS traversal from a given source s

void BFS(int s);

};

Graph::Graph(int V)

{

this->V = V;

adj = new list<int>[V];

}

void Graph::addEdge(int v, int w)

{

adj[v].push\_back(w); // Add w to v’s list.

}

void Graph::BFS(int s)

{

// Mark all the vertices as not visited

bool \*visited = new bool[V];

for(int i = 0; i < V; i++)

visited[i] = false;

// Create a queue for BFS

list<int> queue;

// Mark the current node as visited and enqueue it

visited[s] = true;

queue.push\_back(s);

// 'i' will be used to get all adjacent

// vertices of a vertex

list<int>::iterator i;

while(!queue.empty())

{

// Dequeue a vertex from queue and print it

s = queue.front();

cout << s << " ";

queue.pop\_front();

// Get all adjacent vertices of the dequeued

// vertex s. If a adjacent has not been visited,

// then mark it visited and enqueue it

for (i = adj[s].begin(); i != adj[s].end(); ++i)

{

if (!visited[\*i])

{

visited[\*i] = true;

queue.push\_back(\*i);

}

}

}

}

// Driver program to test methods of graph class

int main()

{

// Create a graph given in the above diagram

Graph g(4);

g.addEdge(0, 1);

g.addEdge(0, 2);

g.addEdge(1, 2);

g.addEdge(2, 0);

g.addEdge(2, 3);

g.addEdge(3, 3);

cout << "Following is Breadth First Traversal "

<< "(starting from vertex 2) \n";

g.BFS(2);

return 0;

}

Conclusion:

Hence we conclude that the program to store graph using adjacency matrix and performing BFS was completed successfully.

