
Department of Computer science and Engineering
PES UNIVERSITY
UE19CS202: Data Structures and its Applications (4-0-0-4-4)

Applications of BFS and DFS

Abstract

Finding the path in a network using dfs and bfs traversal method.

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Applications of BFS and DFS:

- The different applications of DFS are
- Detecting whether a cycle exist in graph.
- Finding a path in a network
- Topological Sorting: Used for job scheduling
- To check whether a graph is strongly connected or not: A directed graph is said to be strongly connected if there exist a path between every pair of vertex.

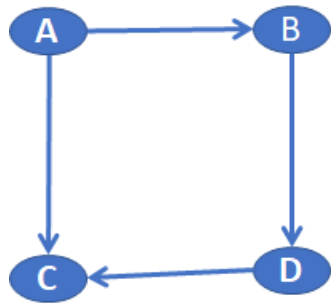
Applications of BFS are

- Finding the shortest path
- Social Networking websites like twitter, Facebook etc.
- GPS Navigation system
- Web crawlers
- Finding a path in network
- In Networking to broadcast the packets.

Application of DFS and BFS

Finding the path in a Network

Given an graph with N vertices and E edges and two vertices(x,y) from the graph, we need to print the path between these two vertices if the path exists and no otherwise .



The path from A to D=1.A→B→D

There exists no path from C to A

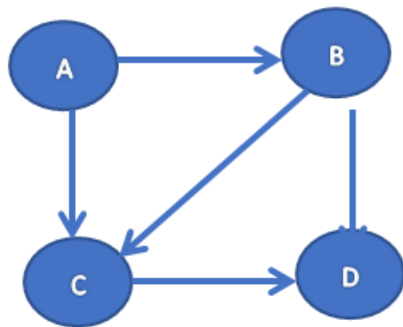
This can be achieved in 2 ways

- 1.DFS (Depth First Search)
- 2.BFS (Breadth First Search)

Function to traverse the graph using bfs

Finding all path in a network

- Path is defined as route between any two nodes. For Example given a directed graph, a source vertex s and a destination vertex d, print all the paths from s to d.
For Example



Directed Graph

	A	B	C	D
A	0	1	1	0
B	0	0	1	1
C	0	0	0	1
D	0	0	0	0

Output:

Path from A to D: A->B->D

A->C->D

A->B->C->D

/*Program to print all the paths from a given source to vertex using dfs-matrix representation*/

```
#include<stdio.h>
```

```
#include<stdlib.h>
```

```
int a[10][10],n,p=0;
```

```
void read_ad_mat()
```

```
{
```

```
    for(int i=0;i<n;i++)
```

```
    {
```

```
        for(int j=0;j<n;j++)
```

```
        {
```

```
            scanf("%d",&a[i][j]);
```

```
        }
```

```
}  
  
}  
  
void printall(int u,int d,int visited[10],int path[10])  
{  
    visited[u]=1;  
    path[p]=u;  
    p++;  
    if(u==d)  
    {  
  
        for(int i=0;i<p;i++)  
        {  
            printf("%d ",path[i]);  
        }  
        printf("\n");  
    }  
    else{  
        for(int v=0;v<n;v++)  
            if(a[u][v]==1 && visited[v]==0)  
            {  
                printall(v,d,visited,path);  
            }  
    }  
}
```

```
p--;

visited[u]=0;
}

void printpath(int s,int d)
{
    int visited[10];
    int path[10];
    int p=0;
    for(int i=0;i<n;i++)
        visited[i]=0;
    printall(s,d,visited,path);
}

int main()
{
    int i,so,de;
    printf("enter the number of nodes\n");
    scanf("%d",&n);
    printf("enter the adjacency list\n");
    read_ad_mat();
    printf("enter the source and destination\n");
    scanf("%d%d",&so,&de);
    printpath(so,de);
```

```
}
```

```
/*program to find all the paths from a given source to destination using dfs  
list representation*/
```

```
#include<stdio.h>
```

```
#include<stdlib.h>
```

```
struct node
```

```
{
```

```
    int info;
```

```
    struct node *link;
```

```
};
```

```
typedef struct node *NODE;
```

```
NODE a[10];
```

```
int p=0;
```

```
NODE getnode()
```

```
{
```

```
    NODE x;
```

```
    x=(NODE) malloc(sizeof(struct node));
```

```
    if(x==NULL)
```

```
    {
```

```
        printf("out of memory\n");
```

```
        exit(0);
```

```
    }
```

```
    return(x);
```

```
}
```

```
NODE insert_rear(int ele,NODE first)
```

```
{
```

```
    NODE temp;
```

```
    NODE cur;
```

```
    temp=getnode();
```

```
    temp->info=ele;
```

```
    temp->link=NULL;
```

```
    if(first==NULL)
```

```
        return temp;
```

```
    cur=first;
```

```
    while(cur->link!=NULL)
```

```
        cur=cur->link;
```

```
    cur->link=temp;
```

```
    return first;
```

```
}
```

```
void read_ad_list(NODE a[],int n)
```

```
{
```

```
    int i,j,m,ele;
```

```
    for(i=0;i<n;i++)
```

```
    {
```

```
        printf("enter the number of nodes adjacent to %d\n",i);
```

```
        scanf("%d",&m);
```

```
        if(m==0)
```

```
        continue;

        printf("enter the nodes adjacent to %d\n",i);
        for(j=0;j<m;j++)
        {
            scanf("%d",&ele);
            a[i]=insert_rear(ele,a[i]);
        }
    }
}
```

```
void printall(int u,int d,int visited[10],int path[10])
{
    visited[u]=1;
    path[p]=u;
    p++;
    if(u==d)
    {

        for(int i=0;i<p;i++)
        {
            printf("%d ",path[i]);
        }
        printf("\n");
    }
    else{
```

```
        for(NODE temp=a[u];temp!=NULL;temp=temp->link)
            if(!visited[temp->info])
            {
                printall(temp->info,d,visited,path);
            }
        }
        p--;
        visited[u]=0;
    }
```

```
void printpath(int s,int d,int n)
{
    int visited[10];
    int path[10];
    int p=0;
    for(int i=0;i<n;i++)
        visited[i]=0;
    printall(s,d,visited,path);
}
```

```
int main()
{
    int i,so,de;
    printf("enter the number of nodes\n");
```

```
scanf("%d",&n);  
printf("enter the adjacency list\n");  
read_ad_list(a,n);  
printf("enter the source and destination\n");  
scanf("%d%d",&so,&de);  
printpath(so,de,n);  
}
```