Ravi sajjanar

1BM19CS127

PROGRAM 13: Floyd’s algorithm

Implement All Pair Shortest paths problem using Floyd’s algorithm.

ALGORITHM: floyds(a[1….n,1….n])
//Implements Floyd’s algorithm for all-pairs shortest path problem
//Input: cost matrix a[1….n,1….n] of size nXn
//Output: Shortest distance matrix a[1….n,1….n] of size nXn

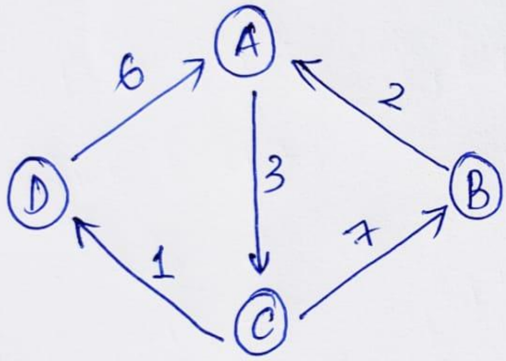
```
for k□1 to n do
   for i□1 to n do
      for j□1 to n do
         a[i,j]□min(a[i,j],a[i,k]+a[k,j])
      end for
   end for
end for
write ‘all pair shortest path matrix is’
for i□1 to n do
   for j□1 to n do
      write a[i,j]
   end for
end for
```

Program:

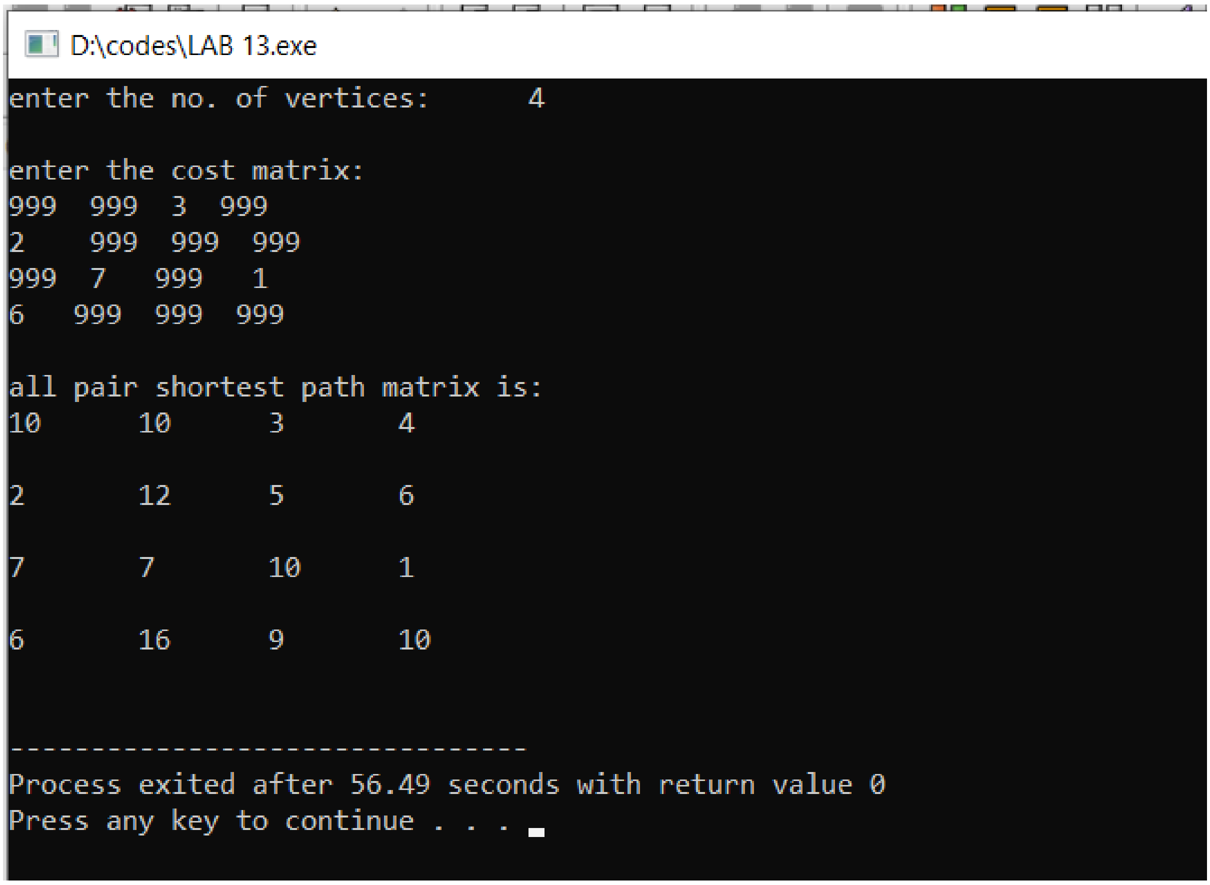
```
#include<stdio.h>
#include<conio.h>
int a[10][10],n;
void floyds();
int min(int,int);
void main()
{
 int i,j;
 clrscr();
 printf("\nenter the no. of vertices:\t");
 scanf("%d",&n);
 printf("\nenter the cost matrix:\n");
 for(i=1;i<=n;i++)
 {
  for(j=1;j<=n;j++)
  {
   scanf("%d",&a[i][j]);
  }
 }
 floyds();
 getch();
}

void floyds()
{
 int i,j,k;
 for(k=1;k<=n;k++)
 {
  for(i=1;i<=n;i++)
  {
   for(j=1;j<=n;j++)
   {
    a[i][j]=min(a[i][j],a[i][k]+a[k][j]);
   }
  }
 }
 printf("\nall pair shortest path matrix is:\n");
 for(i=1;i<=n;i++)
 {
  for(j=1;j<=n;j++)
  {
   printf("%d\t",a[i][j]);
  }
  printf("\n\n");
 }
}

int min(int x,int y)
{
 if(x<y)
 {
  return x;
 }
 else
 {
  return y;
 }
}
```

Output

```
Enter the no. of vertices:  4

Enter the cost matrix:
9999   9999      3   9999
     2   9999   9999   9999
9999      7   9999      1
     6   9999   9999   9999

All pair shortest path matrix is:
10     10      3      4
  2     12      5      6
  7       7    10      1
  6     16      9    10
```



$$\begin{array}{c|cccc} & A & B & C & D \\ \hline A & \infty & \infty & \boxed{3} & \infty \\ B & \boxed{2} & \infty & \infty & \infty \\ C & \infty & \boxed{7} & \infty & \boxed{1} \\ D & \boxed{6} & \infty & \infty & \infty \end{array}$$



```
enter the no. of vertices:      4

enter the cost matrix:
999  999  3  999
2    999  999  999
999  7    999   1
6   999  999  999

all pair shortest path matrix is:
10      10      3       4

2       12      5       6

7       7       10      1

6       16      9       10



--------------------------------
Process exited after 56.49 seconds with return value 0
Press any key to continue . . .
```