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CSE DS D1

Exp. 9: Travelling Salesman Problem

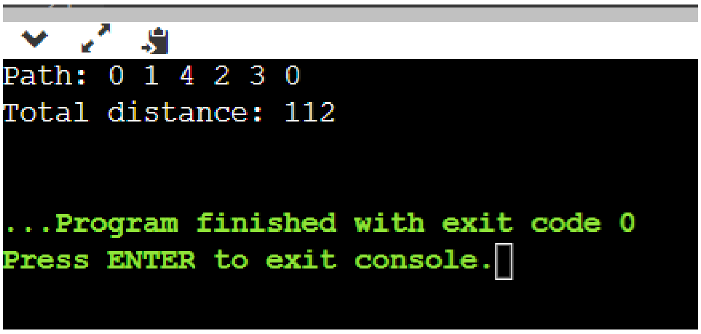
AIM: To implement Approximation algorithms (Travelling Salesman Problem)

PROGRAM:

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

#define N 100

// Global variables
int n=5;
int matrix[5][5] =  { { 0, 10, 18, 40, 20 },
                      { 10, 0, 35, 15, 12 },
                      { 18, 35, 0, 25, 25 },
                      { 40, 15, 25, 0, 30 },
                      { 20, 13, 25, 30, 0 } };
int visited[N];

// Function prototypes
int nearest_neighbor(int start);
void tsp();
```

```
int main() {

    // Solve TSP using nearest neighbor algorithm
    tsp();

    return 0;
}

// Find the nearest unvisited city to a given city
int nearest_neighbor(int city) {
    int min_distance = INT_MAX;
    int nearest_city = -1;
    for (int i = 0; i < n; i++) {
        if (!visited[i] && matrix[city][i] < min_distance) {
            min_distance = matrix[city][i];
            nearest_city = i;
        }
    }
    return nearest_city;
}

// Solve TSP using nearest neighbor algorithm
void tsp() {
    int start = 0;
    visited[start] = 1;
    printf("Path: %d ", start);
    int total_distance = 0;
    for (int i = 0; i < n - 1; i++) {
        int next_city = nearest_neighbor(start);
        visited[next_city] = 1;
        printf("%d ", next_city);
        total_distance += matrix[start][next_city];
        start = next_city;
    }
    printf("%d\n", 0);
    total_distance += matrix[start][0];
    printf("Total distance: %d\n", total_distance);
}
```

OUTPUT:



```
Path: 0 1 4 2 3 0
Total distance: 112


...Program finished with exit code 0
Press ENTER to exit console.
```

CONCLUSION:

In this experiment, I implemented the travelling salesman problem.