CS2023 - Data Structures and Algorithms

In Class Lab Exercise

Week 12

Index Number: 200105F

GitHub Link: https://github.com/UlinduP/CS2023/tree/main/In%20Class%20Labs/Lab%2012

1.

$$\begin{bmatrix} 0 & 10 & 0 & 0 & 15 & 5 \\ 10 & 0 & 10 & 30 & 0 & 0 \\ 0 & 10 & 0 & 12 & 5 & 0 \\ 0 & 30 & 12 & 0 & 0 & 20 \\ 15 & 0 & 5 & 0 & 0 & 0 \\ 5 & 0 & 0 & 20 & 0 & 0 \end{bmatrix}$$

3.

Time taken from city 0:

```
PS D:\_FoE\_Fourth Sem> cd "d:\_FoE\_Fourth Semester\D
$?) { .\sssp_dikstra }
6 8
0 1 10
0 4 15
0 5 5
1 2 10
1 3 30
2 3 12
2 4 5
3 5 20
0
Time taken from source city to city 0: 0
Time taken from source city to city 1: 10
Time taken from source city to city 2: 20
Time taken from source city to city 3: 25
Time taken from source city to city 4: 15
Time taken from source city to city 5: 5
```

Time taken from city 1:

```
PS D:\_FoE\_Fourth Sem> cd "d:\_FoE\_Fourth Semester\Data St
$?) { .\sssp_dikstra }
6 8
0 1 10
0 4 15
0 5 5
1 2 10
1 3 30
2 3 12
2 4 5
3 5 20
1
Time taken from source city to city 0: 10
Time taken from source city to city 1: 0
Time taken from source city to city 2: 10
Time taken from source city to city 3: 22
Time taken from source city to city 4: 15
Time taken from source city to city 5: 15
```

Time taken from city 2:

```
                    > cd "d:\_FoE\_Fourth Semester\Data Structures and Algo\
$?) { .\sssp_dikstra }
6 8
0 1 10
0 4 15
0 5 5
1 2 10
1 3 30
2 3 12
2 4 5
3 5 20
2
Time taken from source city to city 0: 20
Time taken from source city to city 1: 10
Time taken from source city to city 2: 0
Time taken from source city to city 3: 12
Time taken from source city to city 4: 5
Time taken from source city to city 5: 25
```

Time taken from city 3:

```
 12\" ; if ($?) { g++ sssp_dikstra.cpp -o sssp_dikstra } ; if ($?) {
6 8
0 1 10
0 4 15
0 5 5
1 2 10
1 3 30
2 3 12
2 4 5
3 5 20
3
Time taken from source city to city 0: 25
Time taken from source city to city 1: 22
Time taken from source city to city 2: 12
Time taken from source city to city 3: 0
Time taken from source city to city 4: 17
Time taken from source city to city 5: 20
```

Time taken from city 4:

```
 12\" ; if ($?) { g++ sssp_dikstra.cpp -o sssp_dikstra } ; if ($?) { .\sssp_dikstra }
6 8
0 1 10
0 4 15
0 5 5
1 2 10
1 3 30
2 3 12
2 4 5
3 5 20
4
Time taken from source city to city 0: 15
Time taken from source city to city 1: 15
Time taken from source city to city 2: 5
Time taken from source city to city 3: 17
Time taken from source city to city 4: 0
Time taken from source city to city 5: 20
```

Time taken from city 5:

```
PS D:\_FoE\_Fourth Semester\Data Structures and Algo\Labs\CS2023\In Class Labs\Lab 12> cd
 12\" ; if ($?) { g++ sssp_dikstra.cpp -o sssp_dikstra } ; if ($?) { .\sssp_dikstra }
6 8
0 1 10
0 4 15
0 5 5
1 2 10
1 3 30
2 3 12
2 4 5
3 5 20
5
Time taken from source city to city 0: 5
Time taken from source city to city 1: 15
Time taken from source city to city 2: 25
Time taken from source city to city 3: 20
Time taken from source city to city 4: 20
Time taken from source city to city 5: 0
```

4.

$$Average\ time\ taken\ from\ city\ 0: \frac{10 + 20 + 25 + 15 + 5}{5} = 15$$

$$Average\ time\ taken\ from\ city\ 1: \frac{10 + 10 + 22 + 15 + 15}{5} = 14.4$$

$$Average\ time\ taken\ from\ city\ 2: \frac{20 + 10 + 12 + 5 + 25}{5} = 14.4$$

$$Average\ time\ taken\ from\ city\ 3: \frac{25 + 22 + 12 + 17 + 20}{5} = 19.2$$

$$Average\ time\ taken\ from\ city\ 4: \frac{15 + 15 + 5 + 17 + 20}{5} = 14.4$$

$$Average\ time\ taken\ from\ city\ 5: \frac{5 + 15 + 25 + 20 + 20}{5} = 17$$

The best cities to build the hospital: City 1 or City 2 or City 4