

CS2023 - Data Structures and Algorithms

In-class Lab Exercise

Week 12

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Index: 200476P

Question 1

1.1)

	0	1	2	3	4	5
0	0	10	0	0	15	5
1	10	0	10	30	0	0
2	0	10	0	12	5	0
3	0	30	12	0	0	20
4	15	0	5	0	0	0
5	5	0	0	20	0	0

1.3)

```
"D:\Semester 4\CS2023 - Data Structures and Algorithms\In Class labs\In-class Lab 12\SSSP_Dijkstra\Es_Algorithm\bin\Debug\SSSP_Dijkstra\Es_Algorithm.exe"
```

```
The shortest time between 0 and 0 is: 0
```

```
The shortest time between 0 and 1 is: 10
```

```
The shortest time between 0 and 2 is: 20
```

```
The shortest time between 0 and 3 is: 25
```

```
The shortest time between 0 and 4 is: 15
```

```
The shortest time between 0 and 5 is: 5
```

```
Process returned 0 (0x0)   execution time : 0.039 s
```

```
Press any key to continue.
```

```
"D:\Semester 4\CS2023 - Data Structures and Algorithms\In Class labs\In-class Lab 12\SSSP_Dijkstra\Es_Algorithm\bin\Debug\SSSP_Dijkstra\Es_Algorithm.exe"
```

```
The shortest time between 1 and 0 is: 10
```

```
The shortest time between 1 and 1 is: 0
```

```
The shortest time between 1 and 2 is: 10
```

```
The shortest time between 1 and 3 is: 22
```

```
The shortest time between 1 and 4 is: 15
```

```
The shortest time between 1 and 5 is: 15
```

```
Process returned 0 (0x0)   execution time : 0.035 s
```

```
Press any key to continue.
```

```
"D:\Semester 4\CS2023 - Data Structures and Algorithms\In Class labs\In-class Lab 12\SSSP_Dijkstra\Es_Algorithm\bin\Debug\SSSP_Dijkstra\Es_Algorithm.exe"
The shortest time between 2 and 0 is: 20
The shortest time between 2 and 1 is: 10
The shortest time between 2 and 2 is: 0
The shortest time between 2 and 3 is: 12
The shortest time between 2 and 4 is: 5
The shortest time between 2 and 5 is: 25

Process returned 0 (0x0)   execution time : 0.036 s
Press any key to continue.
```

```
"D:\Semester 4\CS2023 - Data Structures and Algorithms\In Class labs\In-class Lab 12\SSSP_Dijkstra\Es_Algorithm\bin\Debug\SSSP_Dijkstra\Es_Algorithm.exe"
The shortest time between 3 and 0 is: 25
The shortest time between 3 and 1 is: 22
The shortest time between 3 and 2 is: 12
The shortest time between 3 and 3 is: 0
The shortest time between 3 and 4 is: 17
The shortest time between 3 and 5 is: 20

Process returned 0 (0x0)   execution time : 0.044 s
Press any key to continue.
```

```
"D:\Semester 4\CS2023 - Data Structures and Algorithms\In Class labs\In-class Lab 12\SSSP_Dijkstra\Es_Algorithm\bin\Debug\SSSP_Dijkstra\Es_Algorithm.exe"
The shortest time between 4 and 0 is: 15
The shortest time between 4 and 1 is: 15
The shortest time between 4 and 2 is: 5
The shortest time between 4 and 3 is: 17
The shortest time between 4 and 4 is: 0
The shortest time between 4 and 5 is: 20

Process returned 0 (0x0)   execution time : 0.037 s
Press any key to continue.
```

```
"D:\Semester 4\CS2023 - Data Structures and Algorithms\In Class labs\In-class Lab 12\SSSP_Dijkstra\Es_Algorithm\bin\Debug\SSSP_Dijkstra\Es_Algorithm.exe"
The shortest time between 5 and 0 is: 5
The shortest time between 5 and 1 is: 15
The shortest time between 5 and 2 is: 25
The shortest time between 5 and 3 is: 20
The shortest time between 5 and 4 is: 20
The shortest time between 5 and 5 is: 0

Process returned 0 (0x0)   execution time : 0.041 s
Press any key to continue.
```

1.4)

- Average time for city 0: $\frac{10+20+25+15+5}{5} = 15$
- Average time for city 1: $\frac{10+10+22+15+15}{5} = 14.4$
- Average time for city 2: $\frac{20+10+12+5+25}{5} = 14.4$
- Average time for city 3: $\frac{25+22+12+17+20}{5} = 19.2$
- Average time for city 4: $\frac{15+15+5+17+20}{5} = 14.4$
- Average time for city 5: $\frac{5+15+25+20+20}{5} = 17$

According to these calculated values, 1, 2, and 4 cities have the shortest average time for other cities. So, they are the most suitable cities to place the hospitals so that ambulances can reach other cities in a short time.

Link to the Git hub repository: [hashirupramuditha/CS2023---Data-Structures-Algorithms \(github.com\)](https://github.com/hashirupramuditha/CS2023---Data-Structures-Algorithms)