Tutorial-6

(1) A minimum spanning tree is a subset of edges of a connected weighted undirected graph that connects all the vertices together with the min. possible total edge weight.

Application

- Telephone visiting system through different towings.
- Electrical network designing
- ~~Approx. glo~~ Travelling salesperson problem
- Electricity analysis

(2) (a) Kuskal's Algorithm

$TC = O(|E| \log |E|)$

$SC = O(|V|)$

(b) Dijkstra's Algorithm.

$TC = O(V^2)$

$TC = O(E + V \log V)$ Fibonnaci heap

$TC = O(E \log V)$ Binary heap as PQ

(c) Bellman Ford's Algorithm

TC = O(VE)

TC = $O(V^3)$ Complete graph

SC = O(V)

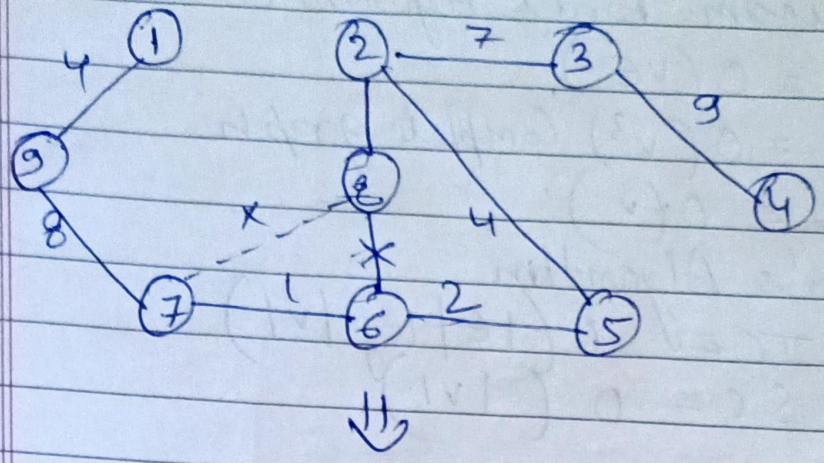
(d) Prim's Algorithm

TC = O(|E| log |V|)

SC = O(|V|)

(3) (a) Kruskal

u (1st node)	v (2nd node)	u-v edge weight
7	6	1
6	5	2
2	8	2
0	1	4
2	5	4
8	6	6
3	3	7
7	8	7
0	7	8
1	2	8
3	4	9
5	4	10
1	7	11
3	5	14



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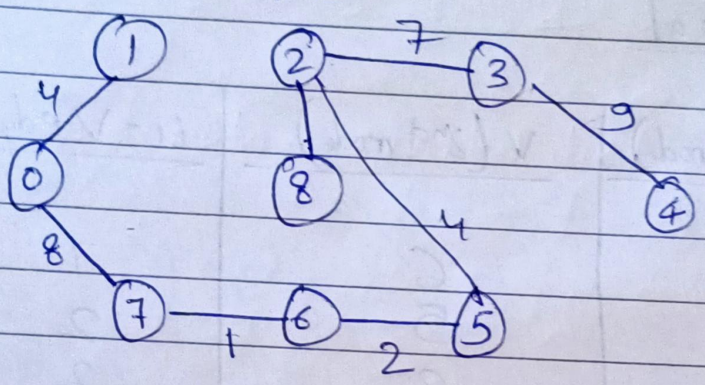

∴ Total weight = 37

(5) Dijkshs Algo

Node	Should distributed for
u	8
v	9
x	5
y	7

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Bellmonn

Node / Vector	S	u	v	x	y
1	0	~~∞~~ 8	∞ 9	∞ 5	~~∞~~ 7
2	0	8	9	5	7
3					
4					

Q6) Floyd Warshall algo

	1	2	3	4	5
1	0	∞	6	3	∞
2	3	0	∞	∞	∞
3	∞	∞	0	2	∞
4	0	1	1	0	∞
5	∞	4	∞	2	0

$$dist\,1 = \begin{bmatrix} 0 & 4 & 4 & 3 & \infty \\ 3 & 0 & \infty & \infty & \infty \\ \infty & \infty & 0 & 2 & \infty \\ 0 & 1 & 1 & 0 & \infty \\ \infty & 4 & \infty & 2 & 0 \end{bmatrix}$$

$$dist\,2 = \begin{bmatrix} 0 & 4 & 4 & 3 & \infty \\ 3 & 0 & 2 & 6 & \infty \\ \infty & \infty & 0 & 2 & \infty \\ 0 & 1 & 1 & 0 & \infty \\ \infty & 4 & \infty & 2 & 0 \end{bmatrix}$$

$$dist\,3 = \begin{bmatrix} 0 & 4 & 4 & 3 & \infty \\ 3 & 0 & 7 & 6 & \infty \\ 2 & 3 & 0 & 2 & \infty \\ 0 & 1 & 1 & 0 & \infty \\ \infty & 4 & \infty & 2 & 0 \end{bmatrix}$$

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$$dist4 = \begin{bmatrix} 0 & 4 & 4 & 3 & \infty \\ 3 & 0 & 2 & 6 & \infty \\ 2 & 3 & 0 & 2 & \infty \\ 0 & 1 & 1 & 0 & \infty \\ \infty & 4 & \infty & 2 & 0 \end{bmatrix}$$

$$dis\,q2 = \begin{bmatrix} 0 & 4 & 4 & 3 & \infty \\ 3 & 0 & 7 & 6 & \infty \\ 2 & 3 & 0 & 2 & \infty \\ 0 & 1 & 1 & 0 & \infty \\ 2 & 3 & 3 & 2 & 0 \end{bmatrix}$$ Ans:

find matrix shortest dist b/w every pair