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D3ITA2

Tut-4

Q4. What do you know about Dijkstra's Algorithm?

Ans. Dijkstra algorithm is a single-source shortest path algorithm. Here, single-source means that only one source is given, and we have to find the shortest path from the source to all the nodes.

In a graph,

$G(V, E)$ → digraph

v_0 = source

c = weighting function

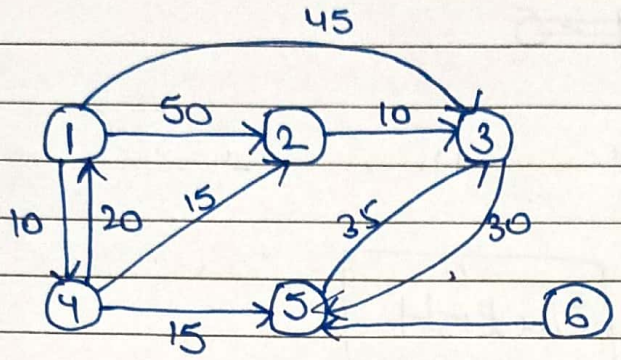
Time Complexity

$$O[(n+E)\log n)$$

n = ~~number of~~ nearest vertex

E = examine edge.

Eg



Single source shortest path

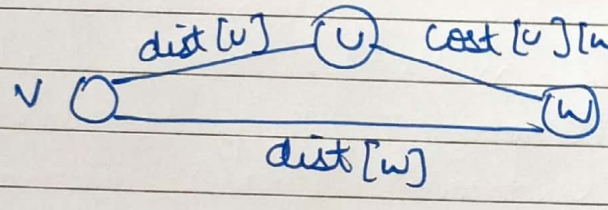
We have to take paths from single start node

Path	Length of path
1,4	10
1,4,5	10+15 = 25
1,4,5,2	X 50 direct edge will have length more than path so we will reject it
1,3	45
or 1,4,5,2,3	10+15+20+10 = 55 → Here path length is more than direct edge so we will choose direct edge

Limitation

→ It does not necessarily give the correct results on the digraph [directed graph] when some or all the edges have negative length.

Algorithm



Cost adjacency matrix

⇒ cost[1:n][1:n]

direct edge

dist[i] = cost[v][i] for i = 1 to n

Boolean array → S[i] = false

For source

v 0

source

⇒ S[v] = true

dist[v] = 0

→ Start node will consider only 0; as no path will be defined

for rest of n nodes

for (num = 2 to num ≤ n)

vertex ⇒ u

S[u] = true

↑

dist[u] minimum

// Path to be find via nearest node

for (w = 1 to n)
if (S[w] == false) && dist[w] > dist[v] + cost[v][w])

it will assign,
dist[w] = dist[v] + cost[v][w]