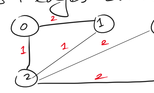
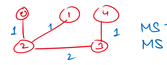
Prim's Algo to print MST sum & MST edges both :→



sum = 5

dist, node, P
0 , 0 , -1



MST-sum = 5
MST edges = {(0,1), (1,2), (2,3), (3,4)}

Imp Question :→

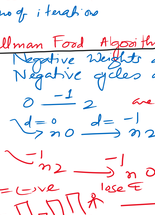
Q. Why do we consider the priority-queue (min-heap) or the self data structure to find the shortest path while using the Dijkstra's Algorithm ?

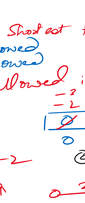
Ans :→ We do so because if we consider the queue data structure, we are forced to consider all the distances, rather than like pq → min heap or set → u where we always consider the lowest / minimum distance for traversal.

Less no of iterations

Bellman Ford Algorithm → Shortest Path

* Negative Weights are allowed
* Negative cycles are not allowed





Bellman Ford Algorithm :→

N = 6 ; (N-1) times

* Relax all the edges (N-1) times sequentially
* Ideal behind relaxation

if (dist[u] + wt < dist[v])
dist[v] = dist[u] + wt

(u, v, wt)

dist[5] + 6 < dist[2] (3, 2, 6)
dist[5] + 1 < dist[4] (5, 3, 1)
dist[0] + 5 < dist[1] (0, 1, 5)
dist[1] + 3 < dist[5] (1, 5, -3)
dist[1] + 2 < dist[2] (1, 2, -2)
dist[3] + 2 < dist[4] (3, 4, -2)
dist[2] + 3 < dist[4] (2, 4, 3)

dist[ ] =

0	5	3	3	2
0	1	2	3	4

How Bellman Ford completes in N-1 iterations. Also, how we detect negative cycles in this algo ?

N-1 = 4

No cycle

(u, v, wt)

dis[3] + 1 < dis[4] 3, 4, 1
dis[2] + 1 < dis[3] 2, 3, 1
dis[1] + 1 < dis[2] 1, 2, 1
dis[0] + 1 < dis[1] 0, 1, 1

distance array[ ]

0	✗	✗	✗	✗
0	1	2	3	4

5 nodes → 4 iterations

N iterations → negative cycle

Note : At the Nth iteration, if the relaxation is still giving us reduced distances, it means that there is a cove cycle in the graph in the Bellman Ford Algorithm.

Because the relaxation of all the nodes should complete in the (N-1)th iteration.

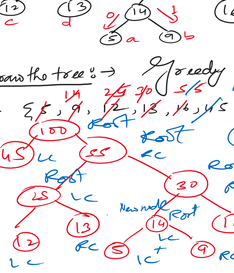
What is the time complexity of Bellman Ford ?

Best Case → O(E) Worst Case → O(VE)

Huffman Encoding :→ Left → 0 Right → 1

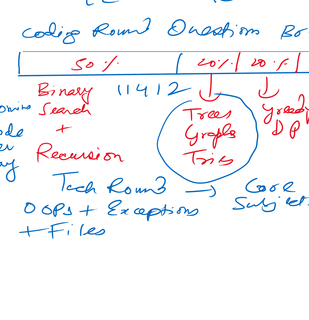
f → 0
e → 1 1 1
c → 1 0 0
d → 1 0 1
a → 1 1 0 0
b → 1 1 0 1

i/p → s = "abcdef"
freq = {5, 9, 12, 13, 16, 45}



How to draw the tree :→ Greedy Approach

freq = {5, 9, 12, 13, 16, 45} min heap



Coding Round Question Breakage

50 %	20 %	20 %	10

Binary Search + Recursion

Some 1 code per day

Tech Round → OOPs + Exceptions + Files

Trees, Graphs, Tries

Greedy, DP

Case Subjects

Arrays, Strings, Special Algos, Bit Masking