

* Laboratory Practice II (Artificial Intelligence) - Group A - Experiment No. - 3.

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Title:-

Job Scheduling Algorithm and Single-Source Shortest Path Problem.

Aim:-

Implement Greedy search algorithm for any of the following application

I. Selection Sort

II. Minimum Spanning Tree

III. Single-Source Shortest Path Problem.

IV. Job Scheduling Problem.

V. Prim's Minimal Spanning Tree Algorithm

VI. Kruskal's Minimal Spanning Tree Algorithm.

VII. Dijkstra's Minimal Spanning Tree Algorithm.

Objective:-

1. To Implement greedy search algorithm to solve a single-source shortest path problem.

2. To understand and learn the greedy search algorithm.

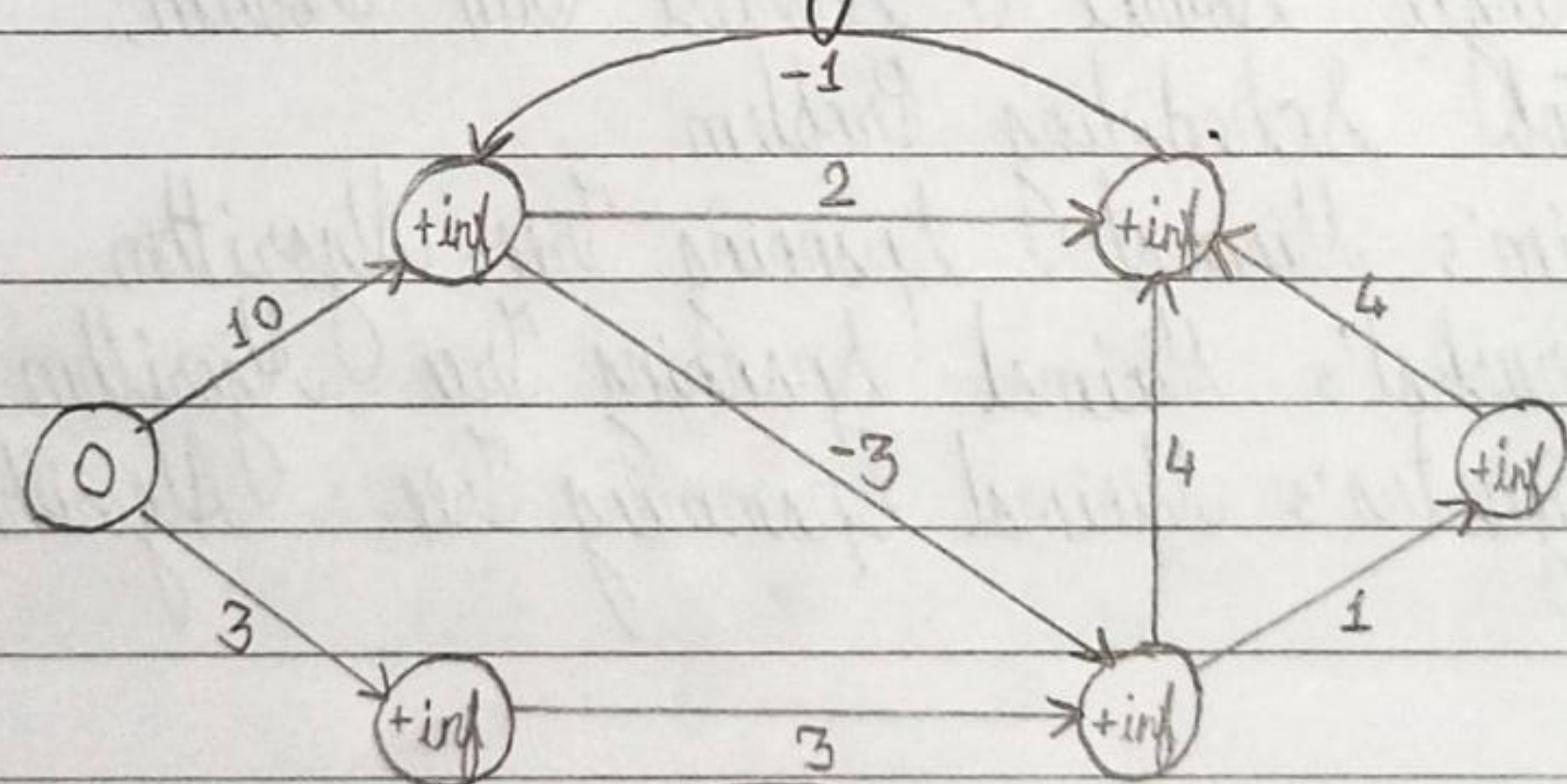
Theory:-

A greedy algorithm is a simple intuitive algorithm that is used in optimization problems. The algorithm makes the optimal choice at each step as it attempts to find the overall optimal way to solve the entire problem.

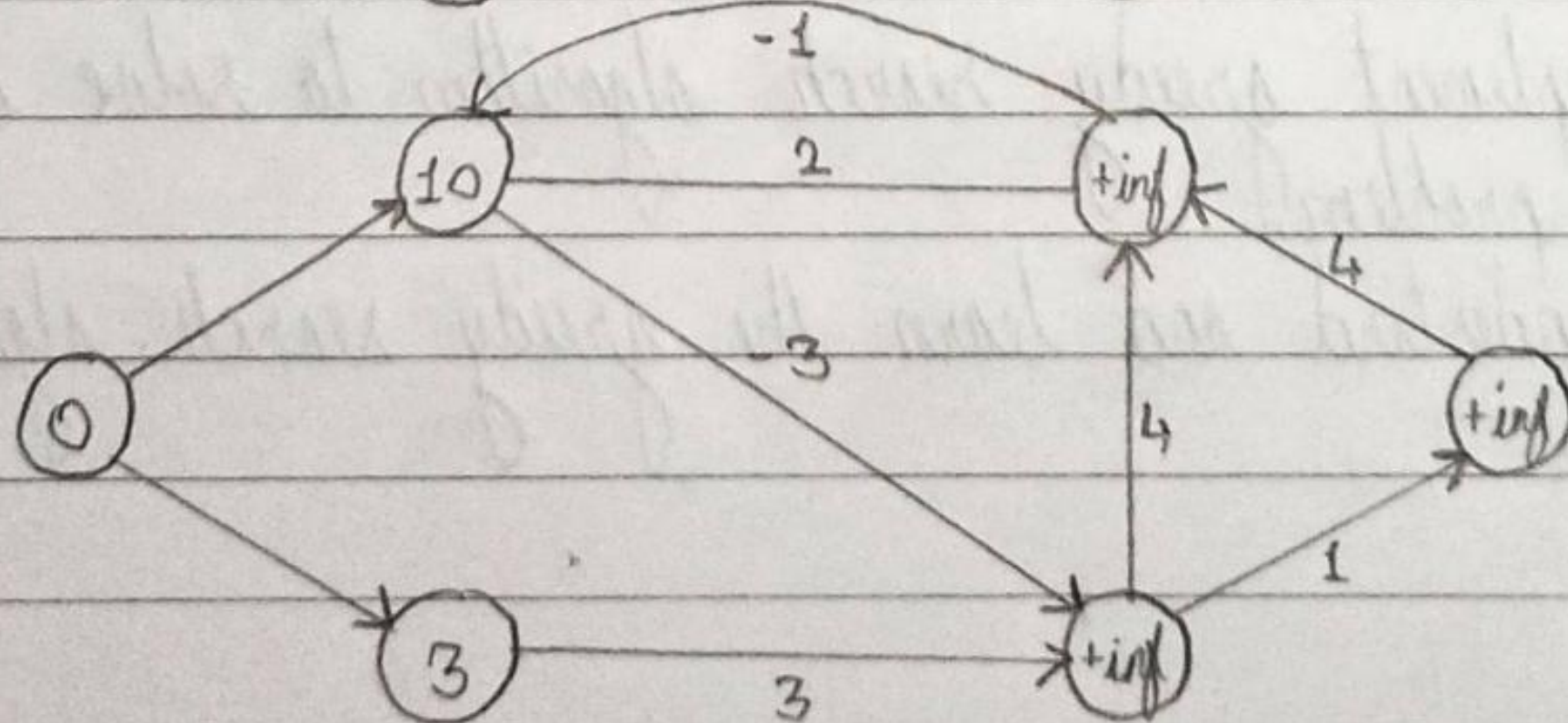
Greedy algorithms are quite successful in some problems, such as Huffman encoding which is used to compress data, or Dijkstra's algorithm which is used to find the shortest path through a graph.

The single source shortest path algorithm (for arbitrary weight positive or negative) is also known as Bellman-Ford algorithm. It is used to find the minimum distance from a source vertex to any other vertex. The main difference between this algorithm and Dijkstra's algorithm is, in Dijkstra's algorithm we cannot handle the negative weight, but here we can handle it easily.

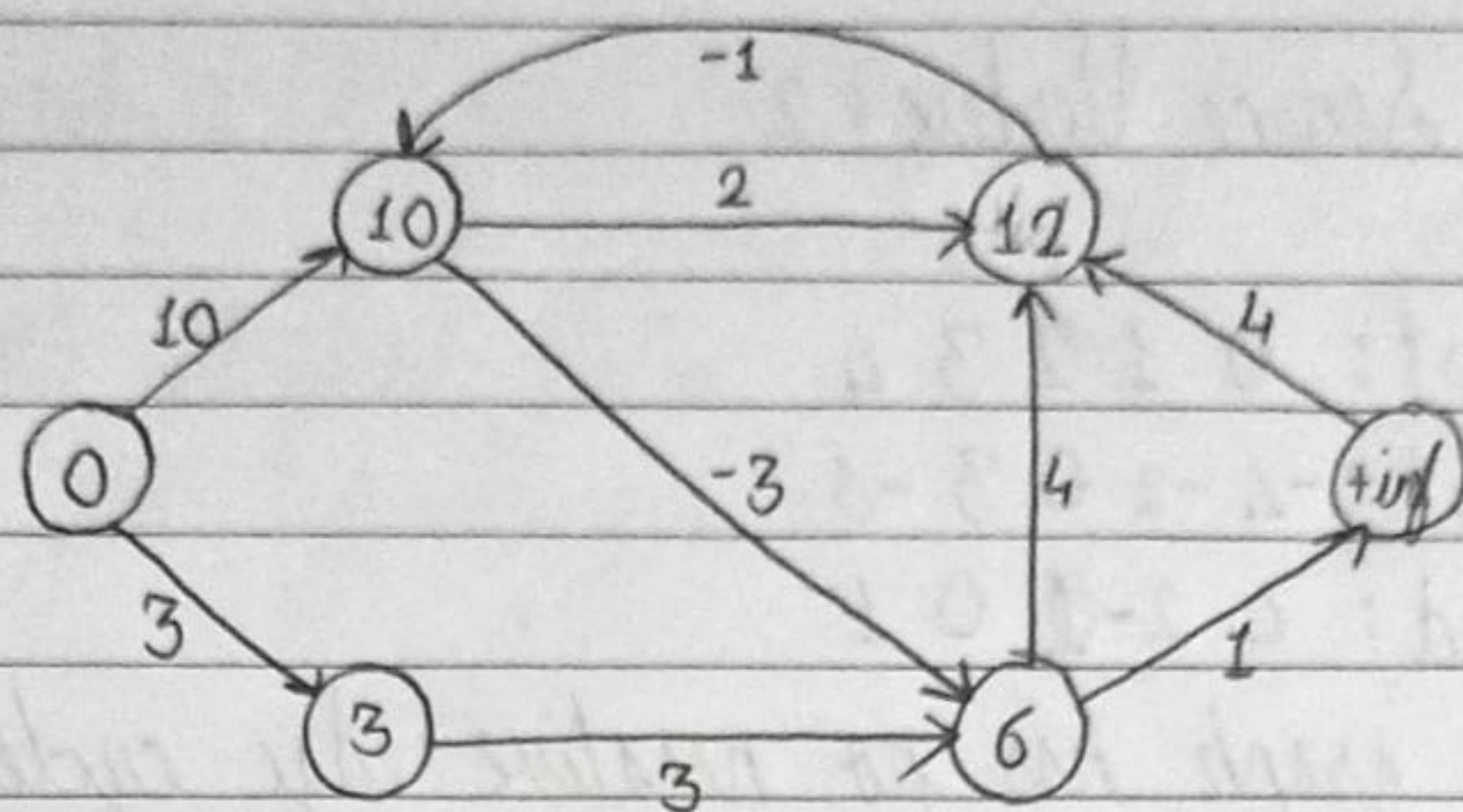
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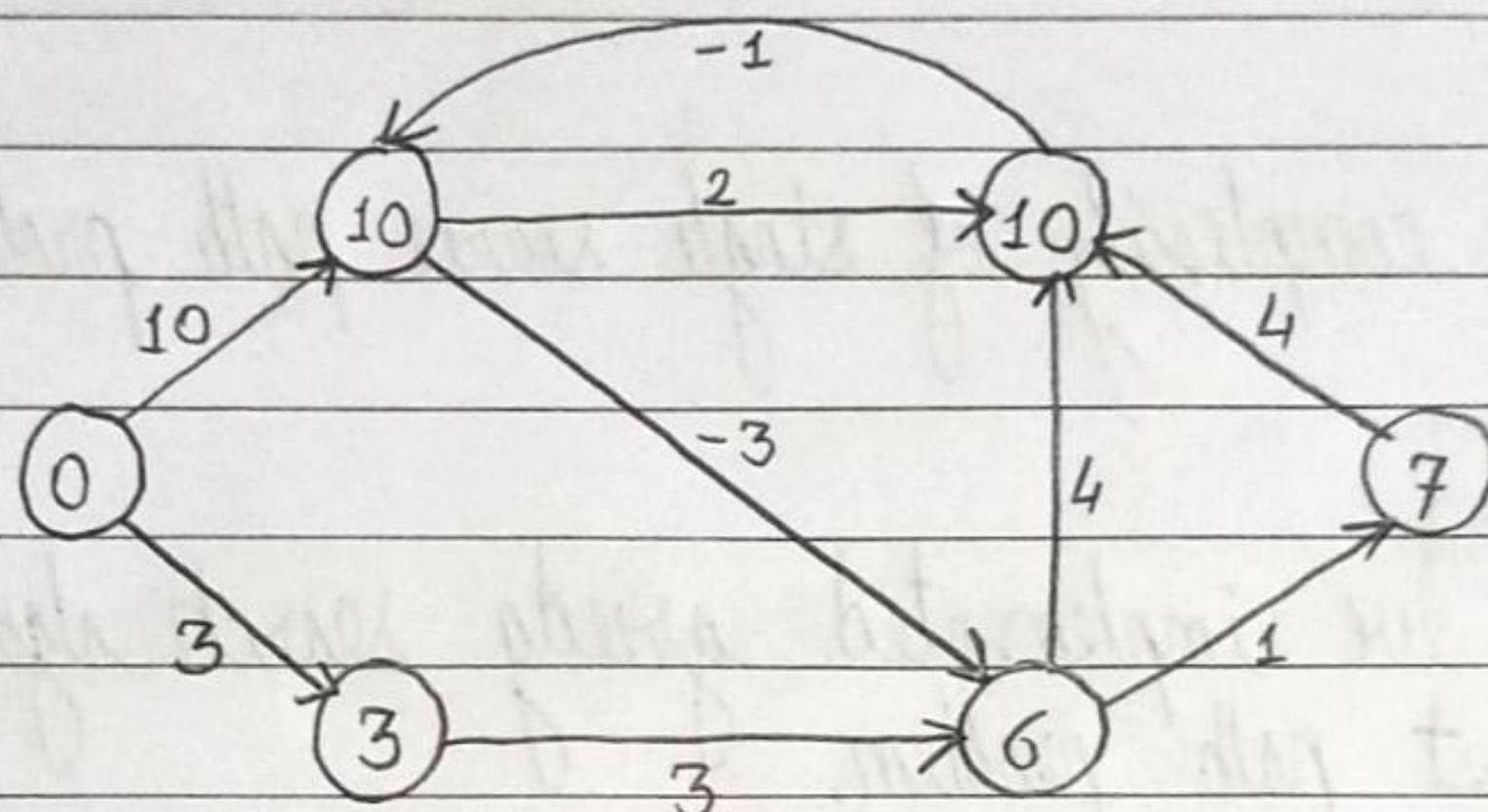
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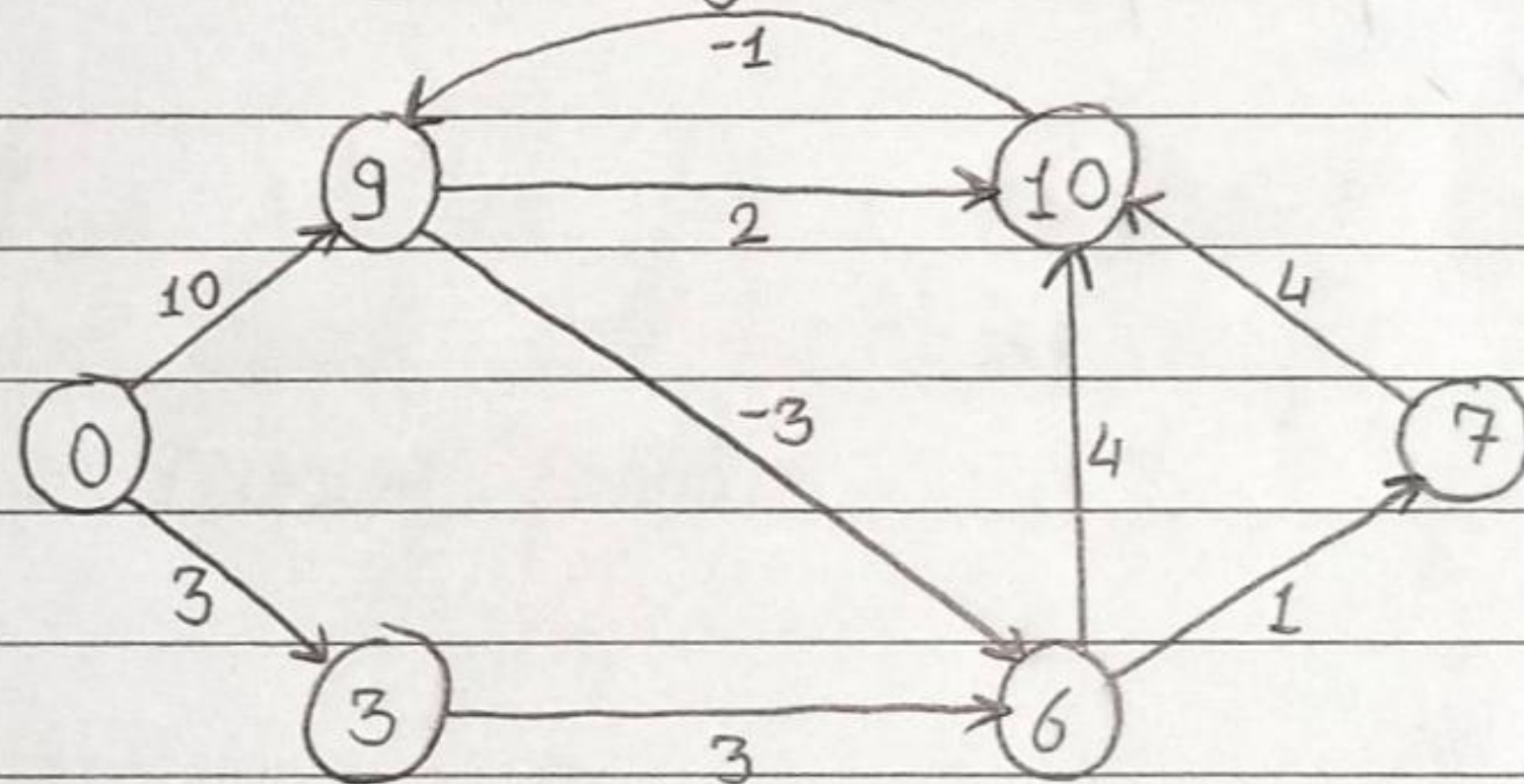
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4.



5.



Bellman-Ford algorithm finds the distance in bottom up manner. At first it finds those distance which have only one edge in the path. After that increase the path length to find all possible solutions.

Input - The cost matrix of the graph:

0	6	∞	7	∞
∞	0	5	8	-4
∞	-2	0	∞	∞
∞	∞	-3	0	9
2	∞	7	∞	0

Output- Source Vertex: 2

Vert: 0 1 2 3 4

Dist: -4 -2 0 3 -6

Pred: 4 2-0 0 1

The graph has no negative edge cycle.

Complexity:-

Time complexity of single source path problem = $O(V.E)$

Conclusion:-

Thus we implemented greedy search algorithm using single source shortest path problem.