Top 10 Algorithm

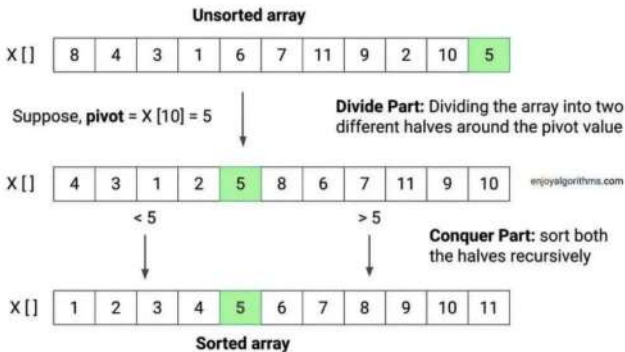1. **Binary Search:** An efficient search algorithm that finds the position of a target value within a sorted array. It repeatedly divides the search interval in half until the target value is found or the interval is empty.

Binary Search

	0	1	2	3	4	5	6	7	8	9
Search 23	2	5	8	12	16	23	38	56	72	91

	L=0	1	2	3	M=4	5	6	7	8	9
23 > 16 take 2nd half	2	5	8	12	16	23	38	56	72	91

	0	1	2	3	4	L=5	6	M=7	8	H=9
23 < 56 take 1st half	2	5	8	12	16	23	38	56	72	91

	0	1	2	3	4	L=5, M=5	H=6	7	8	9
Found 23, Return 5	2	5	8	12	16	23	38	56	72	91

2. QuickSort: A popular sorting algorithm that follows the divide-and-conquer strategy. It selects a pivot element and partitions the array into two sub-arrays such that elements less than the pivot are on one side and elements greater than the pivot are on the other side. It then recursively sorts the sub-arrays.

Unsorted array

| X [] | 8 | 4 | 3 | 1 | 6 | 7 | 11 | 9 | 2 | 10 | 5 |

Suppose, **pivot** = X [10] = 5

Divide Part: Dividing the array into two different halves around the pivot value

| X [] | 4 | 3 | 1 | 2 | 5 | 8 | 6 | 7 | 11 | 9 | 10 |

< 5   > 5

Conquer Part: sort both the halves recursively

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| X [] | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |

Sorted array

3. Depth–First Search (DFS): A graph traversal algorithm that explores as far as possible along each branch before backtracking. It's often used in problems involving connectivity, cycle detection, and topological ordering.
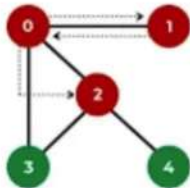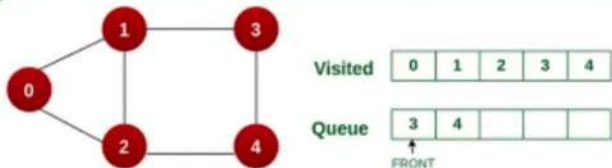

| 0 | 1 | 2 | | | Visited |

| 4 | 3 | | | | Stack |

DFS on Graph

4. Breadth–First Search (BFS): Another graph traversal algorithm that systematically explores all neighbor nodes at the present depth before moving to the nodes at the next depth level. BFS is commonly used to find the shortest path in unweighted graphs.


Visited	0	1	2	3	4

Queue	3	4			

FRONT

BFS on Graph

5. Dijkstra's Algorithm: A shortest path algorithm that finds the shortest path between nodes in a graph with non-negative edge weights. It maintains a set of tentative distances to all nodes and repeatedly selects the node with the smallest tentative distance, updating the distances of its neighbors accordingly.
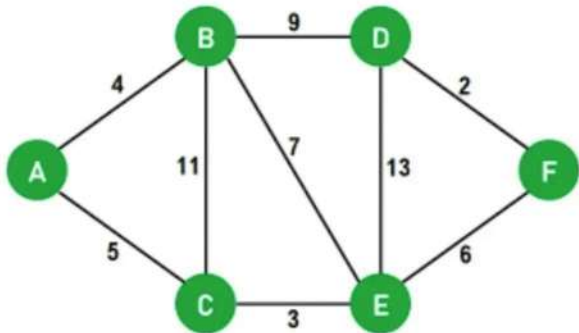
6. Floyd–Warshall Algorithm: An all-pairs shortest path algorithm that finds the shortest paths between all pairs of vertices in a weighted graph. It works for both positive and negative edge weights (but with no negative cycles) and is based on dynamic programming principles.
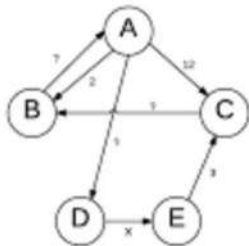
	A	B	C	D	E
A	0	2	10	5	7
B	3	0	13	8	10
C	7	4	0	12	14
D	12	9	5	0	X
E	10	7	3	15	0

7. A Search Algorithm*: A heuristic search algorithm used in pathfinding and graph traversal. A* extends Dijkstra's algorithm by using a heuristic function to estimate the cost of reaching the goal from a particular node, guiding the search towards the most promising paths first.