

## Tutorial-5

①

### BFS

- Stands for Breadth first Search.
- Uses queue data structure for finding shortest path.

### DFS

- Stands for Depth First Search.
- Uses ~~Data~~ Stack data structure.

### Applications:

#### DFS

- Topological sort used to schedule jobs ~~tasks~~ from given dependencies uses DFS algo.
- Use to find strongly connected components.
- Game Development.

#### BFS

- Search Engine Crawlers
- Peer-to-peer Networks like bit-torrent, BFS is used to find all neighbour nodes
- GPS navigation system.



Q.3) Dense graph is a graph in which the no. of edges is close to the maximal no. of edges.

Sparse graph is a graph in which no. of edges is close to the minimal no. of edges.

Sparse graph is when  $|E| \ll |V|^2$   
 Dense graph is when  $|E| \approx |V|^2$

- ② (i) Compute in degree for each of the vertex in the graph & initialize the count of node as 0
- (ii) Pick all vertices with in-degree as 0 & add them into a queue.
- (iii) Remove a vertex from the queue.
  - (a) Increment count of visited node
  - (b) Dec. in degree ~~to~~ ~~to~~ 1 for all of its neighbour nodes
  - (c) If in-degree of a neighbouring nodes is reduced to 0, then add it to the queue.
- (iv) Repeat Step 3
- (v) If count of visited node is not equal to no. of nodes in graph, it has cycle.



⑧ ~~Top~~

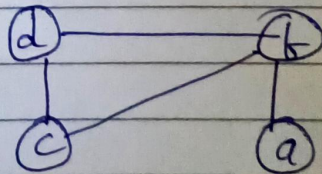
⑩ Min Heap

- In Min-heap the min. key element is present.
- Min-heap uses ascending priority.
- Element first to be popped from heap.

Max Heap

- In Max-heap the max. key element is present.
- Max-heap uses descending priority.
- Element ~~first~~ first to ~~be~~ be popped from heap.

⑨ Connected Component - 4  
Vertices - 10



⑧ Topological sort  $\rightarrow 0-1-2-3-4-5$   
DFS  $\rightarrow 5-2-3-1-0$

4 - cannot be reached.