



Sunbeam Institute of Information Technology Pune and Karad

Module – Data Structures

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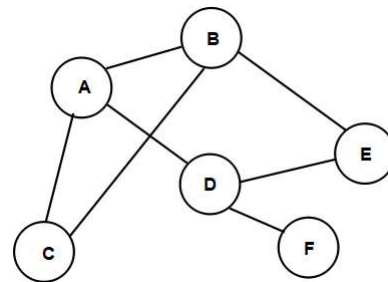


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Graph : Terminologies

- **Graph** is a non linear data structure having set of vertices (nodes) and set of edges (arcs).
 - $G = \{V, E\}$
Where V is a set of vertices and E is a set of edges
 - **Vertex (node)** is an element in the graph
 $V = \{A, B, C, D, E, F\}$
 - **Edge (arc)** is a line connecting two vertices
 $E = \{(A,B), (A,C), (B,C), (B,E), (D, E), (D,F), (A,D)\}$
- Vertex A is set be **adjacent** to B, if and only if there is an edge from A to B.
- **Degree of vertex** :- Number of vertices adjacent to given vertex
- **Path** :- Set of edges connecting any two vertices is called as path between those two vertices.
 - Path between A to D = $\{(A, B), (B, E), (E, D)\}$
- **Cycle** :- Set of edges connecting to a node itself is called as cycle.
 - $\{(A, B), (B, E), (E, D), (D, A)\}$
- **Loop** :- An edge connecting a node to itself is called as loop. Loop is smallest cycle.

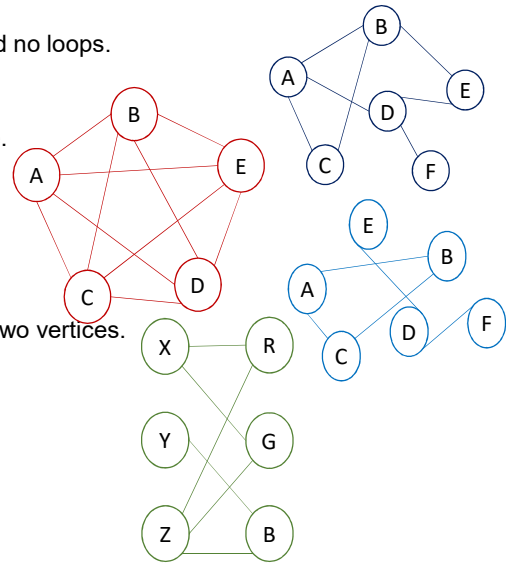


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Graph : Types

- **Simple Graph**
 - Graph not having multiple edges between adjacent nodes and no loops.
- **Complete Graph**
 - Simple graph in which node is adjacent with every other node.
 - Un-Directed graph: Number of Edges = $n(n-1)/2$
where, n – number of vertices
 - Directed graph: Number of edges = $n(n-1)$
- **Connected Graph**
 - Simple graph in which there is some path exist between any two vertices.
 - Can traverse the entire graph starting from any vertex.
- **Bi-partite graph**
 - Vertices can be divided in two disjoint sets.
 - Vertices in first set are connected to vertices in second set.
 - Vertices in a set are not directly connected to each other.

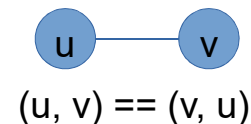


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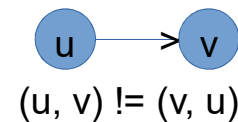
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Graph : Types

- **Undirected graph.**
 - If we can represent any edge either (u,v) OR (v,u) then it is referred as **unordered pair of vertices** i.e. **undirected edge**.
 - **graph which contains undirected edges referred as undirected graph.**



- **Directed Graph (Di-graph)**
 - If we cannot represent any edge either (u,v) OR (v,u) then it is referred as an **unordered pair of vertices** i.e. **directed edge**.
 - **graph which contains set of directed edges referred as directed graph (di-graph).**
 - graph in which each edge has some direction



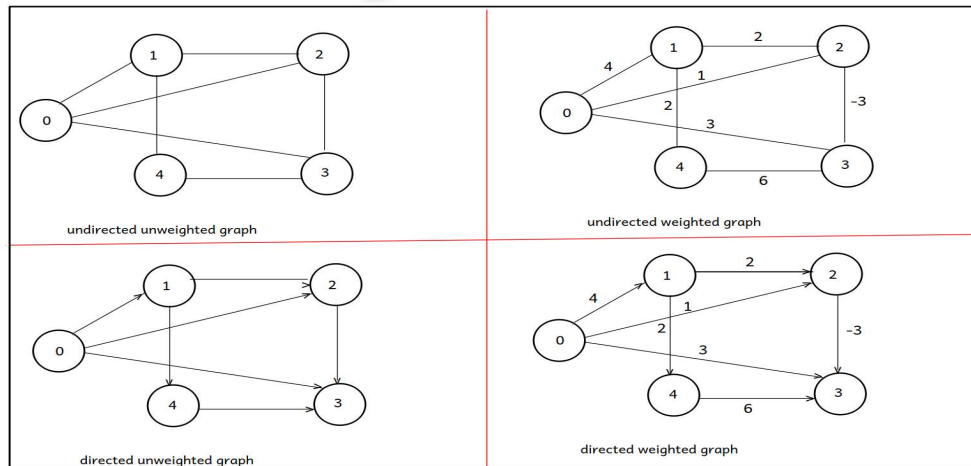
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Graph : Types

- **Weighted Graph**

- A graph in which edge is associated with a number (ie weight)



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Thank you!

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