Segmentation via Graph Cuts – Prep Reading

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Segmentation

- **Segmentation** refers to the process of partitioning a digital image into multiple segments ie. sets of pixels.

- Image segmentation is typically used to locate objects and boundaries like lines, curves, etc. in images.

- Important property of segmentation is that adjacent regions are significantly different with respect to the same characteristic(s)

Important Definitions in Graphs

Edge Connectivity:

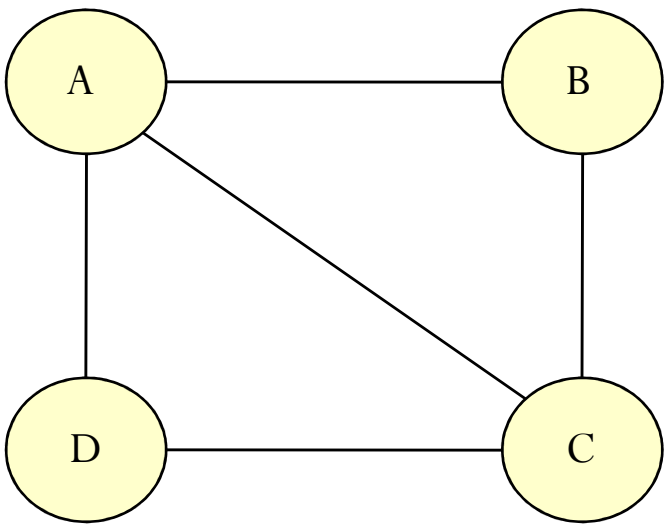
- It is the minimum number of edges whose removal results in a disconnected graph. It is denoted by k(G).

- For a graph G, if k(G) = l then G is called an l-connected graph.

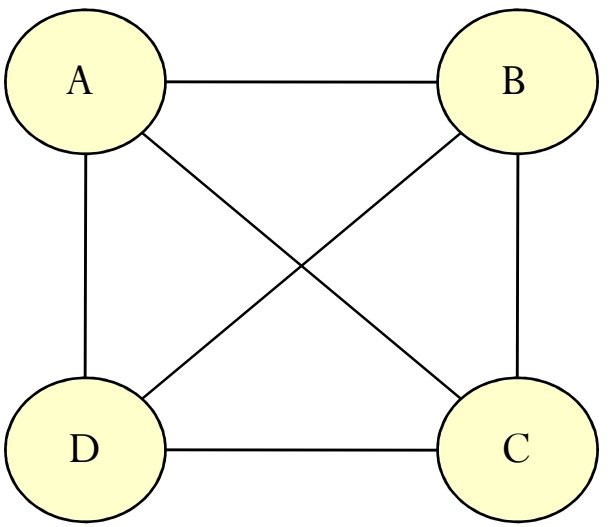
Important Definitions in Graphs

Example:

GRAPH 1



GRAPH 2



The edge connectivity for the GRAPH 1 is 2.

The edge connectivity for the GRAPH 2 is 3.

Important Definitions in Graphs

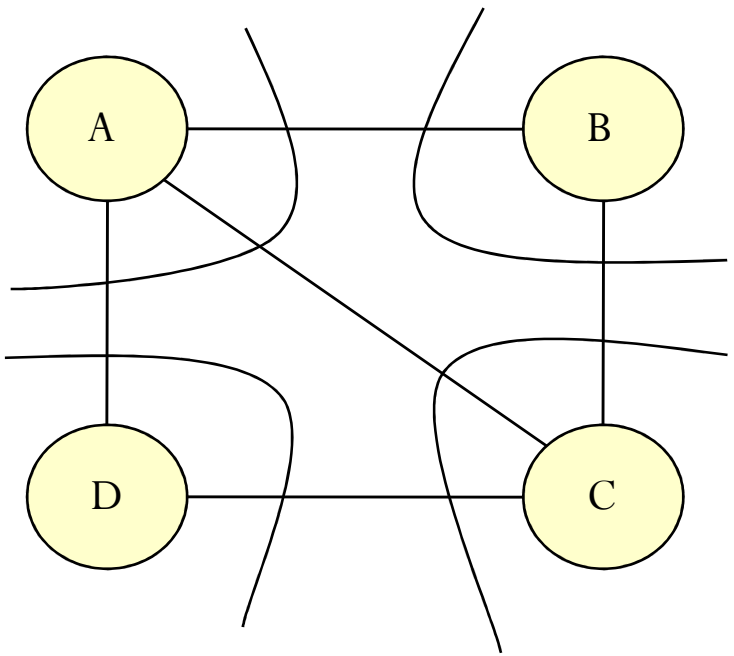
Cut:

- A cut in a graph is a set of edges whose removal disconnects the graph.
- A minimum cut is a cut with a minimum number of edges. It is denoted by S.
- For a non-trivial graph G iff $|S| = k(G)$.

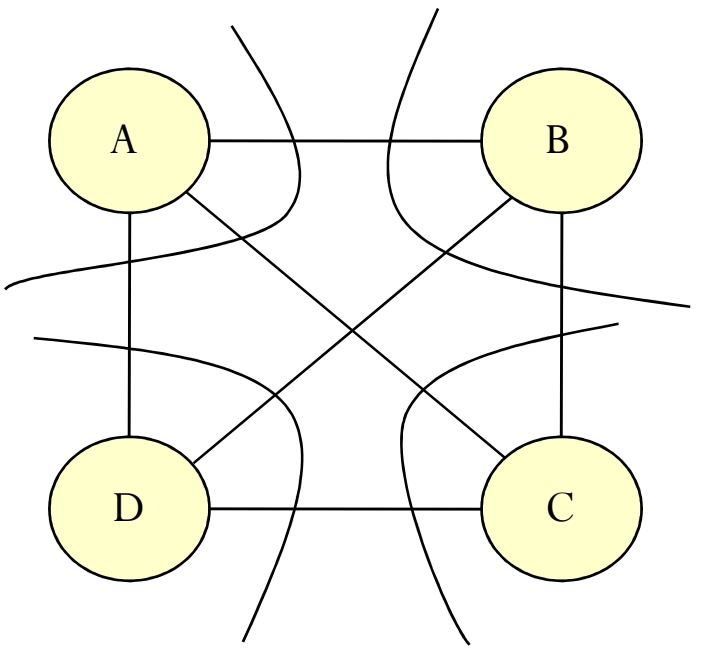
Important Definitions in Graphs

Example:

GRAPH 1



GRAPH 2



The min-cut for GRAPH 1 is across the vertex B or D.

The min-cut for GRAPH 2 is across the vertex A,B,C or D.

Important Definitions in Graphs

Distance d(u,v):

- The distance d(u,v) between vertices u and v in G is the minimum length of a path joining u and v.

- The length of a path is the number of edges in it.

Important Definitions in Graphs

Diameter of a connected graph:

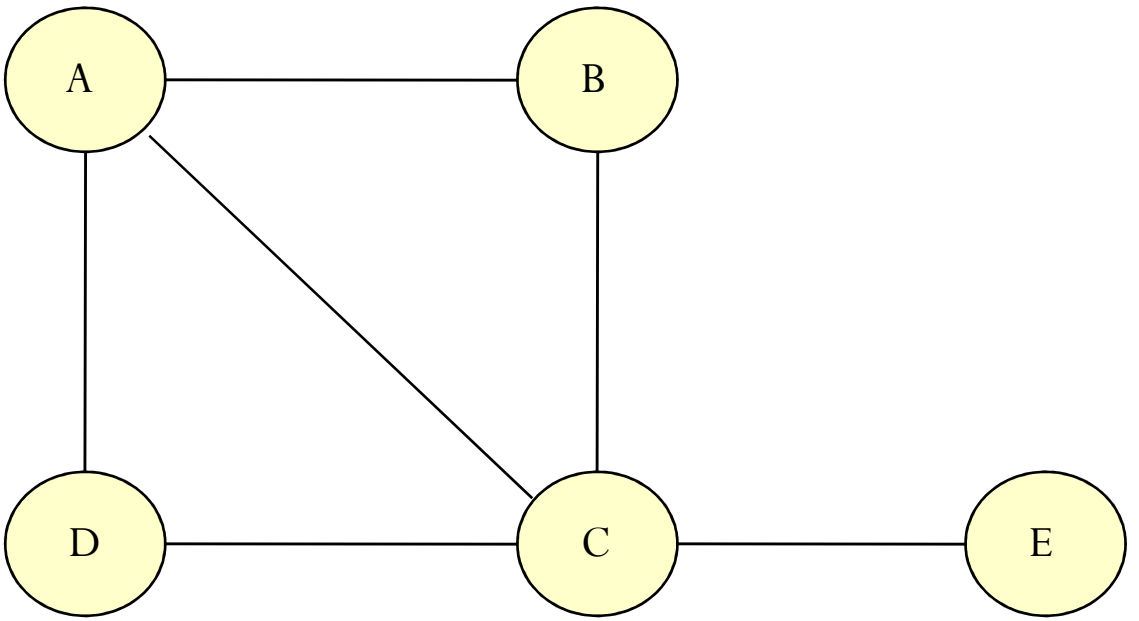
- It is the longest distance between any two vertices in G. It is denoted by diam(G).

Degree of vertex:

- Its is the number of edges incident with the vertex v. It is denoted by deg(v).
- The minimum degree of a vertex in G is denoted by delta(G).

Important Definitions in Graphs

Example:



d(A,D) = 1 d(B,D) = 2 d(A,E) = 2

Diameter of the above graph = 2

deg(A) = 3 deg(B) = 2 deg(E) = 1

Minimum degree of a vertex in G = 1

Thank You!!