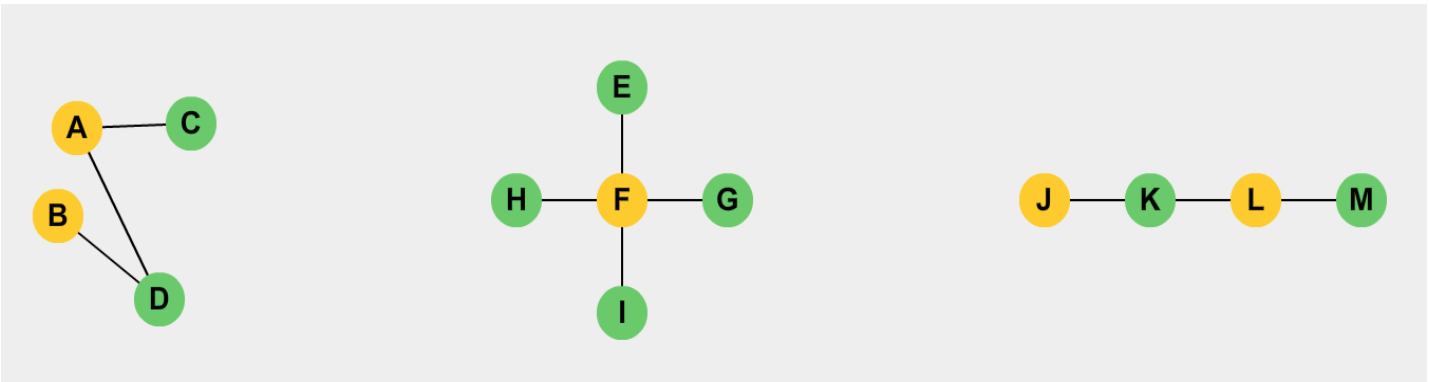
What is a Bipartite Graph?

This lesson is about Bipartite Graphs and their key features. We will also take a look at Complete Bipartite graphs along with some examples.

We'll cover the following

Introduction

🔍 ***A Bipartite Graph*** is a special kind of Graph, in which the vertices can be divided into two disjoint sets U and V such that no vertex of U is adjacent to any other vertex in U and no vertex of V is adjacent to any other vertex in V. Vertices in U have edges that connect it to vertices in V.



Bipartite Graphs

Note: All the cycle graphs, i.e graphs that consist of a single cycle, or some number of vertices (at least 3) connected in a closed chain, are bipartite.

Explanation

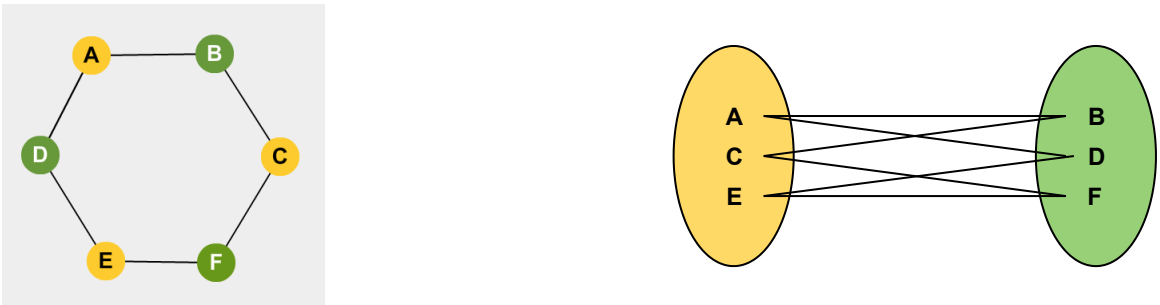
The above graphs are Bipartite.

1. Yellow-colored vertices belong to a disjoint set U.
2. Green colored vertices belong to a disjoint set V.

One can observe in the above graphs that no vertex of U is adjacent to any other vertex in U, and no vertex of V is adjacent to any other vertex in V.

Can a Cycle Graph be Bi-Partite with Even Vertices?

The illustration below shows a ***cycle graph*** with an even number of vertices.



Bipartite Graphs and its Two Disjoint Sets

But is the above graph Bipartite? **Yes!**

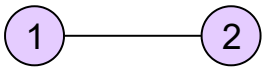
How? You can see that the graph on the left has an even number of nodes, which means that they can be divided into two disjoint sets, shown on the right side, with non-adjacent vertices.

Note: A graph cannot be Bipartite if there are an odd number of vertices and has an odd cycle i.e., a cycle between the odd number of vertices.

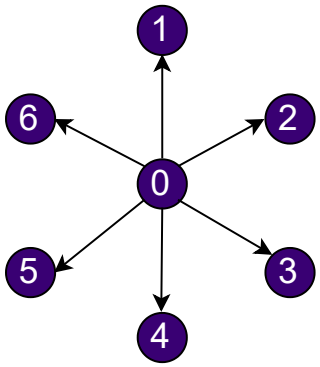
Types of bipartite graphs

Some other types of Bipartite graphs are listed below:

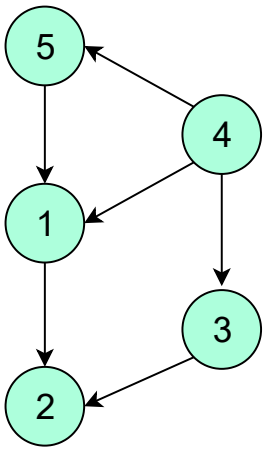
- **Complete Bipartite Graphs:** A complete Bipartite graph connects each vertex from set V1 to each vertex from set V2.
- **Star Graphs:** A star graph is a complete bipartite graph if a single vertex belongs to one set, and all the remaining vertices belong to the other set.
- **Acyclic Graphs:** A graph with no cycles is called an acyclic graph.



Complete Graph



Star Graph



A-Cyclic Graph

In the next lesson, we will discuss different types of Graph traversals and take a look at two famous Graph algorithms.

Back

Complexities of Graph Operations

Next

Graph Traversal Algorithms

Mark as Completed

Report an Issue

Ask a Question (https://discuss.educative.io/tag/what-is-a-bipartite-graph__graphs__data-structures-for-coding-interviews-in-java)