Bipartite graph checking algorithm

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A bipartite graph is one that can be colored with two colors when no two neighboring nodes have the same color. Bipartite graphs exhibit a number of intriguing characteristics. In this section, we'll go over some of the most significant properties of a bipartite graph.

1. If a graph is bipartite, it will have even cycles.
2. A bipartite graph's subgraphs are also bipartite.
3. In graph coloring problems, 2-colorable means that we can color all of the vertices of a graph with two different colors, with no two neighboring vertices having the same color.
4. Any bipartite graph with 'n' vertices can contain no more than (1/4) x n2 edges.
5. The maximum number of edges in a bipartite graph with 'n' vertices Equals (1/4) x n2.

Algorithm:
Using a depth-first search, it is feasible to determine whether a graph is bipartite and return either a two-coloring or an odd cycle if it is not in linear time. We apply BFS for the problem in the presentation section. However, DFS can address the problem. One of the two endpoints of every non-forest edge in a depth-first search forest is an ancestor of the other endpoint, and when the depth-first search detects an edge of this type, it should ensure that these two vertices have distinct colors. If they don't, the path in the forest from ancestor to descendant, together with the discolored edge, produces an odd cycle, which the method returns along with the finding that the graph is not bipartite. If the method fails to discover an odd cycle of this type, then every edge must be properly colored, and the coloring is returned together with the finding that the graph is bipartite.

Bipartite matching has a variety of real-world applications. The majority of them resemble some sort of assignment or grouping. One such distinction is between job opportunities and job candidates. Although each applicant filed for a subset of vacancies, each position can only be filled by one person. A graph of football players and clubs with a connection if the player has played for that club. In social network analysis, this graph notion is also applied. Following that is functional dependence, in which one attribute uniquely predicts another. The most well-known application of factor graphs is simultaneous localization and mapping, which requires determining the location of a vehicle over time as well as the location of a set of landmarks.