Problem 2493: Divide Nodes Into the Maximum Number of Groups

Problem Information

Difficulty: Hard
Acceptance Rate: 67.13%
Paid Only: No
Tags: Depth-First Search, Breadth-First Search, Union Find, Graph

Problem Description

You are given a positive integer `n` representing the number of nodes in an **undirected** graph. The nodes are labeled from `1` to `n`.

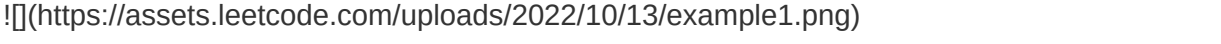
You are also given a 2D integer array `edges`, where `edges[i] = [ai, bi]` indicates that there is a **bidirectional** edge between nodes `ai` and `bi`. **Notice** that the given graph may be disconnected.

Divide the nodes of the graph into `m` groups (**1-indexed**) such that:

* Each node in the graph belongs to exactly one group. * For every pair of nodes in the graph that are connected by an edge `[ai, bi]`, if `ai` belongs to the group with index `x`, and `bi` belongs to the group with index `y`, then `|y - x| = 1`.

Return _the maximum number of groups (i.e., maximum_`m` _) into which you can divide the nodes_. Return `-1` _if it is impossible to group the nodes with the given conditions_.

Example 1:



Input: n = 6, edges = [[1,2],[1,4],[1,5],[2,6],[2,3],[4,6]] **Output:** 4 **Explanation:** As shown in the image we: - Add node 5 to the first group. - Add node 1 to the second group. - Add nodes 2 and 4 to the third group. - Add nodes 3 and 6 to the fourth group. We can see that every edge is satisfied. It can be shown that that if we create a fifth group and move any node from the third or fourth group to it, at least on of the edges will not be satisfied.

Example 2:

Input: n = 3, edges = [[1,2],[2,3],[3,1]] **Output:** -1 **Explanation:** If we add node 1 to the first group, node 2 to the second group, and node 3 to the third group to satisfy the first two edges, we can see that the third edge will not be satisfied. It can be shown that no grouping is possible.

Constraints:

* `1 <= n <= 500` * `1 <= edges.length <= 104` * `edges[i].length == 2` * `1 <= ai, bi <= n` * `ai != bi` * There is at most one edge between any pair of vertices.

Code Snippets

C++:

```
class Solution {
public:
int magnificentSets(int n, vector<vector<int>>& edges) {

}
};
```

Java:

```
class Solution {
public int magnificentSets(int n, int[][] edges) {

}
}
```

Python3:

```
class Solution:
def magnificentSets(self, n: int, edges: List[List[int]]) -> int:
```