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CSE 100 HW 4

Report

1) The Union Find implementation is faster. My Union Find implementation takes around 2700 milliseconds, and the BFS implementation takes around 5000 milliseconds. So Union Find is around twice as fast as BFS implementation.
2) The Union-Find data structure will significantly outperform BFS whenever no structure of path is needed. Union-Find data structure would be more efficient in whether or not the actors are connected; it holds no structure regarding path, just whether or not they are connected.
3) For Union-Find, when a find method is called it will simply look up the sentinel node which represents the set that contains all the nodes that are connected. However for BFS, every time you want to know if the two nodes are connected, you would have to iterate through all the paths available and see if there is a path that connects them. BFS could take up to a worst case of O(E) where E is a number of edges that are present in the connected graph. However for Union-Find, I would unite the different sets as they become connected, and at the end when I look up the sentinel, the worst case would be O(N) where n is the number of actors. And we know that each actor has appeared in at least one movie, and each movie has at least one actor, so the number of edges would be significantly larger than the number of actors. So Union-Find would be undoubtedly faster when simply looking up whether or not it's connected.