01118

Time & Space Complexity Analysis for Assignment -1

Algorithm	Time Complexity	Space Complexity
1) addElement()	Every time while adding element we have to check if that element is already present in the set or not. Hence asymptotic time complexity of algorithm will be O(n)	The algorithm doesn't require any additional data structure. Hence it is constant space algorithm. i.e O(1).
2) UnionSet()	While going through each element of 2nd set we have to check for duplicate (i.e. comparing each element of 2nd set with elements of first set which gives times complexity as O(mn)	We require additional data structure to store the UnionSet of the two given sets. Hence the space complexity of algorithm will be O(m+n)
3) IntersectionSet()	Same as Union, in this case also we have to check for every element whether it appeared in both sets. Hence asymptotic time complexity will be O(mn).	We require additional data structure to store elements of intersection set. In worst case all elements of the set will be equal. Hence space complexity will be min(O(m), O(n))
4) DifferenceSet()	The algorithm takes	We require additional

each element of first set, check in 2nd set & do the works. Hence it has to go with every element of 2nd set for each element of 1st set. Also the algorithm takes union of sets in final steps. In asymptotic terms time complexity of algorithm will be O(mn)

data structure to store Difference set. The asymptotic space complexity of algorithm will be O(m+n)

Note: here m,n are the number of elements in 1st set & 2nd set respectively.