DAA ASSIGNMENT
ON
MST

GROUP -8

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PROBLEM STATEMENT

We are given an un-directed weighted graph.
our goal is to find build minimum spanning tree using **kruskal's algorithm.**

Minimum Spanning Tree- A sub graph(basically a tree)made from set of edges of input graph G(m,n) such that the graph still remains connected and sum of weights of all edges is minimum.

ALGORITHM DESIGN

Firstly,we sort all edges with respect to weights in ascending order.Then we consider each edge sequentially and check if those 2 vertices forming that edge are in same set or not.

If they are in same set,then including that edge creates a cycle which we don't want, since those 2 vertices are already connected,including that edge is useless.Hence we exclude that edge.

If they belong to 2 different sets ,we include that edge in our MST and combine those 2 sets.
We use disjoint-set-union(DSU) data structure to work with sets.

TIME COMPLEXITY-

sorting step -O(m ∗ log(m)).

For each check if both vertices belong to same set or not(find() in dsu) and combine 2 sets (union() in dsu) if they belong to different sets.

In our implementation of DSU,we used both
RANK-HEURISTIC and **PATH COMPRESSION TECHNIQUE**.

Hence find() and union() works in α(m, n) time, where α(m, n) is inverse ackermann function.
It doesn’t cross ’5’ for any practically large real input.

Hence time taken=**O(m ∗ log(m) + m ∗ α(m, n)).**

AUXILLARY SPACE-

We used rank[] and parent[] arrays to work with sets ,which are linear.

Hence,Auxillary space =**O(m + n)**

Thank You