Programming Assignment

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1 Execution Time

The following table shows the execution time of different MST Algorithm

Table:-Execution Time in seconds

Algorithm / No. of vertices	Prim's using d-way heap	Prim's using Fibonacci heap	Prim's using splay trees as heap	Tarjan's implementation of Boruvka's algorithm using lazy leftist heaps
V=50 Edges=205	0.113	0.097	0.143	0.094
V=200 Edges=14680	0.179	0.177	0.181	0.169
V=1000 Edges=191434	0.601	0.565	0.584	0.600
V=4000 Edges=7228462	5.500	5.545	5.977	5.693

2 References

Prim's using d-way heap

- void adjust(...):- Adjust the position of node i to correct position from current position till end.
- void build_heap(...):-Build heap in bottom up approach using adjust function.

The functionality of above two functions is implemented exactly as my B.Tech level study materials.

Prim's using splay trees as heap

- struct node* splay(...)
- struct node* rightRotate(struct node* Node)
- struct node* leftRotate(struct node* Node)

Implementation structure of above functions is taken from GeeksforGeeks.
Link:-"https://www.geeksforgeeks.org/splay-tree-set-2-insert-delete/"

Tarjan's implementation of Boruvka's algorithm using lazy leftist heaps

- struct heap_node * meld_proper(..):-Implementation structure is taken from Wikipedia.
  Link:-"https://en.wikipedia.org/wiki/Leftist_tree"
- int find_(...) and void Union(...):-The implementation of union and find operations of Disjoint Set Union find are taken from GeeksforGeeks.
  Link:-"https://www.geeksforgeeks.org/boruvkas-algorithm-greedy-algo-9/"

Others

struct Graph* generate_graph(..):-Create adjacency list representation of graph.The various structures.The grapg representation uses the following structures

- struct AdjListNode
- struct AdjList
- struct Graph

The above components are taken from GeeksforGeeks
Link:-"https://www.geeksforgeeks.org/graph-and-its-representations/"