

This is the manhattan minimum spanning tree problem, which can be solved in $O(n \log n)$ time using segment tree.

An alternative $O(n \log n)$ solution by computing the $O(n)$ edges in the Delaunay graph (which is guaranteed to contain the MST) and run MST: [\[1\]](#).

References

- [1] Der-Tsai Lee. Two-dimensional voronoi diagrams in the lp-metric. *Journal of the ACM (JACM)*, 27(4):604–618, 1980.