CS218 HW 5 Programming

due Thursday, May 30, 23:59 PM

Problem A // ID: 261584849

I build a minimum spanning tree (MST) for this problem. The cities are nodes, the edges have weights associated with the gas needed. I use Kruskal's algorithm to create the MST. I sort the edges in ascending z value as to pull the smallest weight edge each iteration. Largest weight, meaning the last edge added, of one of these edges added to the MST will be the output.

Runtime: $O(m * log\, m)$ due to sorting the edges in ascending weight order; Space Complexity: $O(n + m)$, storing n cities and storing all m edges.

Problem B // ID: 261585897

Bipartite matching, Hopcroft-Karp algorithm. Given n students, and m shelters, compute the time to reach shelter, if within b distance, then there's an edge between student and shelter in bipartite graph. Output will be $n - matching$, where matching is the maximum number of students connected to a shelter.

Runtime: $O(n^{1.5} * m)$ due to BFS running $O(\sqrt{n})$ times with runtime $O(n+m+n*m)$, overall, $O(n^{1.5} * m)$; Space Complexity: $O(n * m)$, storing adjacency list.