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CS472

4/19/2024

Assignment 8

2. Every number x is mapped to (x, x^2) on the parabola y=x^2. Because this parabola y=x^2 is convex, every point on it needs to be on the convex hull. Neighboring points on this hull will have neighboring x values due to the parabola being symmetric on the y-axis. If these points are ordered on the convex hull by their x coordinates, we get a sorted list of the original numbers. O(n log n) operations are required for sorting n numbers. Any algorithm that can compute the convex hull needs to at least be as efficient as the sorting algorithm it is based on. Computing the convex hull of n points in less than O(n log n) time makes it possible to sort n numbers in a shorter amount of time.

3. Let G be a planar graph

For each edge e in G, e will be split in 2 edges, e1 and e2, creating graph G'

Let e1 and e2 = 1 in G'

We need to find the partition of the vertices of G into 2 sets. The total weight of the edges between both sets is maximized.

Now to find the shortest tour in G' that will visit each edge at least once. This is the same as finding the shortest path that visits each edge of G at least once

4. The amount of iterations required by the algorithm is comparable to the value of n. The algorithm iterates through all numbers from 2 to the floor of n/2. Using an input n, the number of iterations required to finish the algorithm increases with the value of n. As n grows larger, so do the number of iterations. The Big O notation for this algorithm is O(n) with n being the size of the

input. The definition of the complexity class P is not satisfied due to the time complexity of the algorithm being linear in the size of the input.. It also requires polynomial-time algorithms .