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CS325 – Assignment1

**Find the Closest Pair Assignment**

**Pseudo-Code:**

**Brute Force**

for i=0 to coordinates size

coord1 = coordiantes[i]

for k=i to coordinates size

coord2 = coordiantes[k]

dist = distanceFormaula(coord1, coord2)

if dist < smallestDistance

smallestDistance = dist

found.clear

if dist == smallestDist

found.add(coord1, coord2)

return found

**Divide and Conquer**

if n <= 3

return bruteforce(coordList)

else

Compute separation line L

leftPairs = ClosestPair(left)

rightPairs = ClosestPair(right)

leftDist = DistanceForm(leftPairs)

rightDist = DistanceForm(rightPairs)

min = min(leftDist, rightDist)

middleDist = DistanceForm(getL, getR)

smallestDist = min(middleDist, min)

closestPairs.add(smallestDist)

return closestPairs

**Enhanced Pseudo-Code**

**Asymptotic Analysis of Runtime:**

*Please analyze the runtime for the three algorithms. In particular, please provide the recursive relation of the runtime for algorithm 2 and 3 and solve them.*

**Brute Force**

Within the brute force there are two for loops and then many simple operations. The for loops are equal to O(n) each and each other operation is O(c). The complete run time of the Brute Force program is O().

**Divide and Conquer**

**Enhanced**

**Plot the Runtime:**

*Plot the empirically measured runtime of the three algorithms as a function of the input size. Your plot should have clearly labeled axes and legends.*

**Interpretation and Discussion:**

*Discuss the runtime plot. Do the growth curve match your expectation based on their on their theoretical bounds? Discuss and provide possible explanations for any discrepancy between the experimental runtime and the asymptotic runtime.*