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Programing Homework 1 Report

The program, nearest\_neighbor.py, can calculate the distance between the closest pair of points in the input file which created by the program generate\_test.py.

The result will be output to an output file.

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| --- | --- | --- |
| Input Files | Brute Force  Run-time (s) | Divide and Conquer  Run-time (s) |
| input.txt | 0.00005984 | 0.00004315 |
| input10.txt | 0.00005602 | 0.00003504 |
| input15.txt | 0.00010704 | 0.00006890 |
| input100.txt | 0.00352716 | 0.00169086 |
| input1005.txt | 0.34105300 | 0.17418098 |

For the theoretical run time of Brute Force,

For the theoretical run time of Divide and Conquer, in step 1, get the middle of x coordinate, , and split the points into two groups L and R is . Step2, finding the smallest distance of L and R is . Step 3 is . And for step 4, let to be the number of points in , so the theoretical run time of step 4 is . Therefore, for the theoretical run time of Divide and Conquer, . Since , .