The brute force algorithm was slightly modified. Now instead of starting from zero and searching every single point, the inner loop starts at the current index and searches the remaining point. This can be done because all prior points have already been compared and found their closest point. The inner loop also has a method for exiting before reaching the full length of the data set. If the delta Y distance between two points is greater than the minimum distance already recorded, the loop immediate exits. This is because if the delta Y is larger than the minimum, there is no possible why the two points are closer than the current two closest points.

The Big-O runtime of this algorithm is . The merge sort used to sort the data is of . since it subdivides the array in half with ach iteration through. This is run with updated closest pairs algorithm which decreases the total number of loops ran as n gets larger and does not loop through the entire data set of n for each inner loop, which is . Together this is 2 but the constant is dropped.

|  |  |  |
| --- | --- | --- |
| n | Brute Force | Sorted |
| 100 | Screen%20Shot%202018-02-26%20at%2010.30.02%20AM.png | Screen%20Shot%202018-02-26%20at%2010.30.12%20AM.png |
| 1000 | Screen%20Shot%202018-02-26%20at%2010.30.52%20AM.png | Screen%20Shot%202018-02-26%20at%2010.31.06%20AM.png |
| 10000 | Screen%20Shot%202018-02-26%20at%2010.45.35%20AM.png | Screen%20Shot%202018-02-26%20at%2010.45.44%20AM.png |