Program Structures and Algorithms

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**Task :**

To Solve Three Sum Problem using Quadrithimic, Quadratic and Quadratic with Calipers approach (bonus).

**Evidence:**

A screenshot of a computer

Description automatically generated

**Why Quadratic Works :**

Quadratic Time Complexity – O(N^2)

QuadraticWithCalipers Time Complexity – O(N^2)

Quadrirthimic Time Complexity – O(N^2 logN)

Cubic Time Complexity – O (N^3)

Through the time calculation using the stopwatch for various values of N , and as shown on the below excel – we see that

Time Complexity of

Quadratic ~= QuadraticWithCalipers < Quadrithimic < Cubic

Sorting the array in the first space , and then maintaining two pointers to move around the array to find the triplet decreases the need of one extra loop from the Cubic approach which in turn decreased the complexity .

Quadrithimic – having a binary search of an element x in a sorted array (x is a complement of a[i] + a[j] ) will cost O(logN) and to do it for N^2 combinations of a[i] and a[j] after the sorting with complexity O(NlogN) will make it have a complexity of O(N^2logN) – which is higher than quadratic , but less than cubic approach .