Project 1

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# Problem Statement

We are required to analyze the following program/code sample.

for (int i = 1 to n) {

for (int j = i to n) {

for (int k = j\*j to n) {

Sum += a[i]\*b[j]\*c[k]

}

}

}

# }Theoretical Analysis

Explain your theoretical estimate in 3-4 sentences.

*The time complexity is O()*

*The outer loop’s time complexity is O(n),because variable i goes 1 to n, stride is 1*

*The medium loop’s time complexity is O(n),because, for each loop, variable j goes i to n, stride is 1*

*The inner loop’s time complexity is O(), because, for j is less than , variable k goes to n, stride is 1, for j is greater than , the inner loop doesn’t execute.*

*So, the overall time complexity is O()*

# Experimental Analysis

## Program Listing

(Feel free to include only selected portions if you like. For example, I would like to know which values of “n” you ran the program for.)

I use python

The values of n are 250 500 100 2000 4000

## Data Normalization Notes

Do you normalize the values by some constant? How did you derive that constant?

## Output Numerical Data

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| N | Experimental | Theoretical | Adjusted  Experimental Result | Scaling constant | Adjusted Theoretical Result |
| 250 | 0.013963461 | 1 | 13.96346 |  | 3.919936 |
| 500 | 0.057843447 | 5.656 | 57.84345 |  | 22.17116 |
| 100 | 0.228414536 | 32 | 228.4145 |  | 125.4379 |
| 2000 | 0.914746523 | 181 | 914.7465 |  | 709.5084 |
| 4000 | 3.660083771 | 1024 | 3660.084 |  | 4014.014 |
| Average | 0.975010347 | 248.7312 |  | 3.919936 |  |

## Graph

## Graph Observations

As we can see in the graph, the adjusted theortical result is slightly increase faster can the adjusted experimental result. So,with the increasing with the number, the the adjusted experimental result is slightly less than the the adjusted experimental result.

# Conclusions

The lines of adjusted experimental result and the adjusted theortical result indicate that the time complexity of the code is *O(). The* experimental result is slightly less than the theortical, because the middle loop and inner loop is less than the theortical. However, it is not influence the result, the time complexity of the code is *O().*