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**Project 1-ECE368**

The structure of my program is as follows:- The first function is the load function which loads the numbers from the file . The second function is the save function, this saves all the sorted numbers into a different file . The third function generates a sequence for the shell insertion sort function (2^p \* 3^q). The fourth function is the shell\_insertion sort function which sorts the given array of numbers.

The Fifth function generates the required sequence for the improved bubble sort function (N/1.3^n).

The last Function is the improved bubble sort function, this sort the given array file using an improved version of bubble sort.

For shell\_insertion sort.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| SIZE{N} |  | time(s) | comparisons(#) | moves(#) |  |  |
| 1000 |  | 0.0000 | 249115 | 251113 |  |  |
| 10000 |  | 0.08 | 24806134 | 24826132 |  |  |
| 100000 |  | 7.91 | 244205207 | 254528497 |  |  |
| 1000000 |  | 781.9 | 7910544646 | 1664606560 |  |  |

For improved bubble sort.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| SIZE{N} |  | time(s) | comparisons(#) | moves(#) |
| 1000 |  | 0.0000 | 1349 | 13497 |
| 10000 |  | 0.00 | 12800 | 189927 |
| 100000 |  | 0.3 | 125602 | 2437695 |
| 1000000 |  | 0.22 | 1256735 | 30132165 |

For both the sequence we are using extra memory. Since we need no malloc the size for it and we dont know the size.

\*Shell Sort time growth rate is twice that of bubble sort.

\*\*my shell sort function sorts everything just fine. However, for size of 100000 and 1000000 the time is high(8 seconds and 781 seconds.)

time complexity of insertion sort is O(n^2)

time complexity of bubble sort is O(n^2)

for worst cases.