Daffodil International University

CSE 215

Algorithm Lab

"ASSIGNMENT"

Lab Task 2

SUBMITTED BY:

Abruna Afrin

191-15-12303

Date : 13.06.2020

191-15-12303

Insertion Sort

```
Void - insertion_sort (int A[], int n)
{
  int i, j, item;
  for( i=1, i<n; i++)          ——— n
    item = A[i];               ——— n
    j = i-1;                   ——— n
    While (j>=0 && A[j] > item)  — n x n
      A[j+1] = A[j]            ——— n x n
      j = j-1;                 ——— n x n
    End while
    A[j+1] = item;             ——— n x n
                                   4n^2+3n
  End for
  End insertion_sort
```

Analysis

Best case:

For sorted Array.

For an Array, both loop will cheak for each element. Any element of the array won't swap. Always n numbers of the element of an array will cheak both loop for n times.

∴ The complexity of best case time is : $O(n)$

191-15-12303

Wrost case:

From the code,
we get,
the complexity function of an algorithm is: $f(n) = 4n^2 + 3n$

∴ The time complexity of wrost case time is: $O(n^2)$

Average case:

Both loop will be executed for n times. All possible values are average time.

$$\text{Avg time} = 1+2+3+\cdots+(n-2)+(n-1)+n$$

$$= \frac{n(n+1)}{2} = \frac{n^2+n}{2}$$

∴ The time complexity of Average case time is: $O(n^2)$

191-15-12303

Selection sort

```
Void selection_sort (int A[], int n)
  int i, j, min, temp;
  for(i=0; i<n-1; i++)                    ---- n
    min = i;                              ---- n
  for (j=i+1; j<n, j++)                   ---- n x n
    if (A[j] < A[min])                    ---- n x n
      min = j;                            ---- n x n
    end if                                ---- n
    end for
    if (min != i)                         ---- n
      temp = A[i]                         ---- n
      A[i] = A[min]                       ---- n
      A[min] = temp
    end if
    end for
    end selection_sort
```

191-15-12303

Analysis

Best case:

For sorted Array, both loop will cheak for each element. for best case, 2nd loop won't executed minimum one time but loop will cheak for each element. Always n number of element of an array will cheak for n times.

∴ The time complexity of best case time is: $O(n)$

Wrost case:

From the code,

we get,

the complexity function of an Algorithm is: $f(n) = 3n^2 + 7$

∴ The time complexity of wrast case time is: $O(n^2)$

191-15-12303

Average case:

All possible values of are average time. Both loop will executed for n times.

$$\text{Avg time} = 1+2+3+\cdots+(n-2)+(n-1)+n$$

$$= \frac{n(n+1)}{2} = \frac{n^2+n}{2}$$

$\therefore$ The time complexity of Average case time is: $O(n^2)$