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Reading Material

Hence, the time complexity of the bubble sort algorithm is $O(n^2)$

3.4 analysis of sorting algorithm - Selection Sort

In the selection sort algorithm, the first element is assumed to be the minimum. Every other element is compared with this element - if it is lesser than the first element then that element is set as minimum. This operation is continued for all the elements. The new element which is set as minimum is swapped with the first element. The smallest element is now at the first location. This process is repeated till all the elements of the array are sorted.

The algorithm is described in more detail in Figure-12

```
Step 1: Begin
Step 2: For i = 1 to n-1 do
        2.1    set min = i
        2.2    For j = i+1 to n do
                 2.2.1 If (a[j] < a[min]) then set min = j
        2.3    If (i ≠ min) then swap a[i] and a[min]
Step 3: End
```

FIGURE 4: SELECTION SORT

Let us now determine the time complexity of the selection sort algorithm

The innermost for loop executes n - (i+1) + 1 number of times.

Number of operations inside the outer *for loop* =

[Number of operations done in the inner *for loop*] + *if* statement.

At the worst case, the *if* statement will do **1** swap operation every time, so

Number of operations done in the inner *for loop* =

[n - (i+1) + 1] + 1 = n – i + 1

The outer for loop executes from 1 to n-1, so the number of operations performed by the outer loop is

(n-1+1) + (n-2+1)+(n-3+1)+….. + (n-(n-1)+1)

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