**SUMMARY OF THE INSERTION SORT ALGORITHM**

Insertion sort is a simple sorting algorithm that builds the final sorted array (or list) one item at a time. It is much less efficient on large lists than more advanced algorithms such as quicksort, heapsort, or merge sort. Used for data that is already sorted or almost sorted. Append data to be sorted to sorted data and then sort the array.

Basic Idea: Insert an element into a sequence of ordered elements of size I, such that, the resulting sequence of size i+1 is also ordered.

Insertion sort works in the similar way as we sort cards in our hand in a card game.

We assume that the first card is already sorted then, we select an unsorted card. If the unsorted card is greater than the card in hand, it is placed on the right otherwise, to the left. In the same way, other unsorted cards are taken and put at their right place

A similar approach is used by insertion sort

Insertion sort is a sorting algorithm that places an unsorted element at its suitable place in each iteration.

* Best case scenario has a time complexity of O(n) i.e. when the elements are already sorted hence the while loop is never executed.
* Worst case scenario O(n2) and happens when the array is sorted in decreasing order and needs to be sorted in increasing order and in this case every element has to be moved in order for n elements to be sorted properly.
* In the case where the time complexity for insertion sort is O(n2), selection sort can achieve the same result but in fewer swaps since for e.g. if our elements are sorted in decreasing order, by swapping the larger elements with the lower ones at the end, you’d realize that it will take half the number of swaps needed for the insertion sort, hence making it relatively shorter and easier.
* We run once through the outer loop, inserting each of n elements; this is a factor of n
* On average, there are n/2 elements already sorted
* An inner loop looks at (and moves) half of these
* This gives a second factor of n/4
* Hence, the time required for an insertion sort of an array of n elements is proportional to n2/4
* Discarding constants, we find that insertion sort is O(n2)