Python Bubble Sort Algorithm

About

The bubble sort algorithm, also referred to as the sinking sort algoritm, is one of the simplest sorting algorithms. A sorting algorithm is an algorithm that orders elements of a list. The order of the elements can be numerical or lexicographical.

How it works

The bubble sort algorithm works as follows:

1) The algorithm starts the sorting at the beginning of the data set.

2) It compares the first two elements:

- (**9 5** 7 3 1)

3) If the elements are in order, the algorithm does not change the order of the elements. However, if the first element is greater than the second element, the elements are swapped:

- (**9 5** 7 3 1) -> (**5 9** 7 3 1)

4) Next, the algorithm compares the second and the third element and swaps them if they are not in order:

- (5 **9 7** 3 1) -> (5 **7 9** 3 1)

5) The process is repeated until the end of the data set:

- (5 7 **9 3** 1) -> (5 7 **3 9** 1)
- (5 7 3 **9 1**) -> (5 7 3 **1 9**)
- (**5 7** 3 1 9) -> (**5 7** 3 1 9)
- (5 **7 3** 1 9) -> (5 **3 7** 1 9)
- (5 3 **7 1** 9) -> (5 3 **1 7** 9)
- (5 3 1 **7 9**) -> (5 3 1 **7 9**)
- (**5 3** 1 7 9) -> (**3 5** 1 7 9)
- (3 **5 1** 7 9) -> (3 **1 5** 7 9)
- (3 1 **5 7** 9) -> (3 1 **5 7** 9)
- (3 1 5 **7 9**) -> (3 1 5 **7 9**)
- (**3 1** 5 7 9) -> (**1 3** 5 7 9)
- (1 **3 5** 7 9) -> (1 **3 5** 7 9)
- (1 3 **5 7** 9) -> (1 3 **5 7** 9)
- (1 3 5 **7 9**) -> (1 3 5 **7 9**)

6) The algorithm continues the process until a whole pass with no swaps occurs:

- (**1 3** 5 7 9) >> (**1 3** 5 7 9)
- (1 **3 5** 7 9) >> (1 **3 5** 7 9)
- (1 3 **5 7** 9) >> (1 3 **5 7** 9)

- (1 3 5 **7 9**) >> (1 3 5 **7 9**)

7) The result is a sorted list:

- (1 3 5 7 9)

Python program

To create a Python program for the bubble sort algorithm:

1) Define a function to sort an unsorted array:

In [ ]:
```
def bubble_sort(arr):
```

2) Create an outer loop to go through all the elements of the array:

In [ ]:
```
    for i in range(len(arr)):
```

3) Create an inner loop to go through elements in range of the lenght of the array minus 1:

In [ ]:
```
        for j in range(len(arr) -1):
```

4) If the element is greater than the next element, swap them:

In [ ]:
```
            if arr[j] > arr[j +1]:
                arr[j], arr[j +1] = arr[j +1], arr[j]
```

5) Insert the list you want to sort into a new variable:

In [18]:
```
x = ('5, 7, 3, 1, 9')
```

6) Split the list and store the outcome in the *arr* variable:

In [ ]:
```
arr = x.split()
```

7) Call the function:

In [ ]:
```
bubble_sort(arr)
```

8) Print the result:

In [ ]:
```
print (*arr)
```

9) Let's run the programme:

In [21]:
```
def bubble_sort(arr):
    for i in range(len(arr)):
        for j in range(len(arr) -1):
            if arr[j] > arr[j +1]:
                arr[j], arr[j +1] = arr[j +1], arr[j]

x = ('5 9 7 3 1')
arr = x.split()
```

```
bubble_sort(arr)
print(*arr)
```

```
1 3 5 7 9
```