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Assignment-05.

Problem statement-

Write a python program to store scond year percentage of students in an array. Write function for sorting array of floating point numbers in ascending order using a) Insertion sort b) Shell sort and display top five score

Objective-

1. To understand the concept of sorting and its application.
2. To implement insertion and shell sorting and display the top five score.

Outcomes:

1. To implement insertion and shell sorting algorithms after reading the scores of students and then display the top 5 score.
2. To make the program object oriented with user defined class and function.
3. To write a menu-driven, modular program in Python.

Hardware Requirement-

Operating system-64 bits windows 10, intel core is 9th Generation.

Software Requirements.

Python 3.8, Pycharm IDE.

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Theory:

Sorting is any process of arranging items systematically and has two common & yet distinct meaning -

Ordering - Arranging items in a sequence ordered by some.

Criteria - categorizing group item - with similar properties

1. Insertion Sort.

Insertion Sort is a simple sorting algorithim that works similar to the way you sort playing cards in your hands The array is virtually split into a sorted and an Unsorted part. value from unsorted part are picked & placed at the correct position in sorted part.

2. Shell Sort.

Shell sort is just a variant of insertion sort. In Sertion sort we move elements only one position ahead when an element has to be moved for ahead, many movements are involved, the idea of shell sort is to allow exchange of for item. In shell sort we make.

Algorithm.

Algorithm for Input:

1. Take Empty list as list1.
2. Read the total Number of student and read the percentage of student.
3. if total Number is lecs than five write enter the Number greater than 5.
4. else Read the number of student.
5. ~~Elif~~ if percentage is greater than 100 or less than zero then write invalid percentage
6. else Append all the percentage of student in list1 & write list1.

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Algorithm for Insertion sort:

1. Start.
2. Consider the first element of list1 as sorted and other element as unsorted.
3. intialize i=0
4. for range one to len(list1):
   4.1 Set current_element equal to list1[i] and position equal to i
      4.1.1 Take a while loop from current_element less than list[position-1] and position greater than 0:
         4.1.2 Then we will replace the list[position-1] to list[position]
   4.2 otherwise remain element position as it is
5. Write the insertion sort list1.
6. Stop.

Algorithm for shell sort:

1. Start.
2. intialize gap = len(list1)//2
3. while gap > 0
   j = 0
   for i in range gap to len(list1):
   Intialize current_element is equal to list[i] and position as i
   while current_element is less than list[position-gap] and position is greater than gap do
   Replace list[position] by list[position-gap]
   if not then remain the element as it is
4. Write the shell sort list1
5. Stop.

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Algorithm for main mene:

1. Start.
2. Insertion sort
    2. call the insertion sort function
    2.2 write the list1.
    2.3 write the top 5 percentage from list 1.
3. shell sort
    3.1 call the shell sort function
    3.2 write the list1.
    3.3 write the top 5 percentage from list1.
4. Stop.

Pseudo code:

① Pseudo code for Input.

1. list1 = [ ]
2. Read total no. of student in second year
3. Read the percentage of each student
    if percentage > 100 or percentage < 0
        return -1
    else
        Read the percentage
4. Append each percentage in list1 & write list1.

② Pseudo code for Insertion sort.

1. def Insertion_sort(list):
    for i in range 1 to len(list):
        current_element = list1[i]
        position = i

while (current_element < list[position-1] && position > 0)
list[position] = list[position-1]
position = position - 1.
list[position] = current_element

② Pseudocode For Shell sort:

1. Start.
2. def shell_sort (list):
gap = len(list1)//2
while (gap > 0):
for i in range gap to len(list1):
current_element = list[i]
position = i
while (current_element < list [position-gap] & position > gap)
list[position] = list [position-gap]
position = position-gap
list[position] = curren_elemt
gap = gap//2

③ Pseudocode For Main Menu:

1. Insertion sort
2. Shell sort.
Enter the choice
if [choice == 1)
Shell_sort(list1)
print(list1)
print top 5 percentage of list.
3. Insertion sort
if (choice = 2)
Insertion_sort(list1)
Print top 5 percentage of list.

```
list1=[]  #Empty list
num=int(input("Enter Total Number of Student in Second Year:"))
if(num<5):
    print("Entered Number should be greater than five! Empty list will considered !\n
RUN AGAIN              ")
else:
    print("Enter the Percentage of all student one by one - ")
    print("--------------------------------")
    while(num>0):
        x = float(input("Enter Percentage:"))
        if(x>100 or x<0):
            print("Enter the Percentage in Range!")
            continue
        else:
            list1.append(x)
        num=num-1
    # print("Enter Percentage:",list1)
    print("--------------------------------")
    print(list1)
    # Insertion Sort
    def insertion_sort(list):
        for i in range(1, len(list)):  # zeroth element is consider to be sorted i.e
we stratted with indexing one
            current_element = list[i]  # 20  10   30  96  54   75
            position = i
            while (current_element < list[position - 1] and position > 0):
                 # [position-1] is zeroth position element which is compared with
next element!
                # position>0 because the sorted element will goes on increasing
                list[position] = list[position - 1]
                position = position - 1
            list[position] = current_element
            print(list1)    #one by one
    # Shell Sort
    def shell_sort(list):
        it=0
        gap = len(list) // 2
        while (gap > 0):
            it=it+1
            for i in range(gap, len(list1)):
                current_element = list[i]
                position = i
                while (current_element < list[position - gap] and position >= gap):
                    list[position] = list[position - gap]
                    position = position - gap
                list[position] = current_element
            # print(list1)
            gap = gap // 2  # for reduceing gap
            print(list)
    print("--------------------------------")
    while (True):
        print("MAIN MENU\n1.INSERTION SORT\n2.SHELL SORT")
        choice = int(input("Enter the Choice:"))
        if (choice == 1):
            print("--------------------------------")
            print("***  Insertion Sorted List is  ***")
            insertion_sort(list1)
            print("--------------------------------")
            print("Final Sorted list.............")
            print(list1)
            print("--------------------------------")
            print("TOP 5 Student Percentage - ")
            print(list1[-1])
```

```
            print(list1[-2])
            print(list1[-3])
            print(list1[-4])
            print(list1[-5])
            print("--------------------------------")
        elif (choice == 2):
            print("--------------------------------")
            print("***  Shell Sorted List is  ***")
            shell_sort(list1)
            print("--------------------------------")
            print("Final Sorted list.............")
            print(list1)
            print("--------------------------------")
            print("TOP 5 Student Percentage - ")
            print(list1[-1])
            print(list1[-2])
            print(list1[-3])
            print(list1[-4])
            print(list1[-5])
        else:
            break
        stop = input("Would you like to continue(y/n):")
        print("--------------------------------")
        if (stop == 'n'):
            print("THANK YOU!")
            break
```

OUTPUT:

Enter Total Number of Student in Second Year:6

Enter the Percentage of all student one by one -

Enter Percentage:56

Enter Percentage:23

Enter Percentage:77

Enter Percentage:84

Enter Percentage:98

Enter Percentage:3

[56.0, 23.0, 77.0, 84.0, 98.0, 3.0]

MAIN MENU

1.INSERTION SORT

2.SHELL SORT

Enter the Choice:2

*** Shell Sorted List is ***

[56.0, 23.0, 3.0, 84.0, 98.0, 77.0]

[3.0, 23.0, 56.0, 77.0, 84.0, 98.0]

Final Sorted list.....

[3.0, 23.0, 56.0, 77.0, 84.0, 98.0]

TOP 5 Student Percentage -

98.0

84.0

77.0

56.0

23.0

Would you like to continue(y/n):y

MAIN MENU

1.INSERTION SORT

2.SHELL SORT

Enter the Choice:1

*** Insertion Sorted List is ***

[3.0, 23.0, 56.0, 77.0, 84.0, 98.0]

[3.0, 23.0, 56.0, 77.0, 84.0, 98.0]

[3.0, 23.0, 56.0, 77.0, 84.0, 98.0]

[3.0, 23.0, 56.0, 77.0, 84.0, 98.0]

[3.0, 23.0, 56.0, 77.0, 84.0, 98.0]

Final Sorted list.....

[3.0, 23.0, 56.0, 77.0, 84.0, 98.0]

TOP 5 Student Percentage -

98.0

84.0

77.0

56.0

23.0

Would you like to continue(y/n):n

THANK YOU!