

Selection Sort

Textbook

Selection Sort



Overview

Selection Sort works by searching the list for the smallest value, and placing that at the beginning of the list. As it does this, two lists are created (a sorted and unsorted list). Selection sort repeatedly searches the unsorted list for the smallest value, then adds it to the beginning of the sorted list.

5 3 4 1 2

Selection Sort

Source: <https://algorithms.tutorialhorizon.com/selection-sort-java-implementation/>

Pseudocode

Here is pseudocode for selection sort:

```
1 function SelectionSort(list)
2
3   for all elements (i) in list:
4     minimum = i
5     for remaining elements (j) in list:
6       if list[j] < list[minimum]
7         minimum = j
8       end if
9     end for
10    if the index of minimum != i
11      swap list[minimum] and list[i]
12    end if
13  end for
14  return list
15 end SelectionSort
```

Copy

You'll notice that selection sort is much faster than Bubble Sort. Wait until we get to the final algorithm! You'll be surprised.

Checkpoint

Selection Sort

1. Create a program that will selection sort a list in Python.

Consider the following list:

```
arr = [10, 32, 4, 90, 15, 20, 89, 1, 3, 45, 42, 87, 91, 18, 25, 76, 38, 12]
```

2. The program will then take in a number input from the user.
3. The program will add the number to the list.
4. The program will sort the list using selection sort.
5. Print the resulting list.

For example:

Input: 22

Output: [1, 3, 4, 10, 12, 15, 18, 20, 22, 25, 32, 38, 42, 45, 76, 87, 89, 90, 91]

Another example:

Input: 99

Output: [1, 3, 4, 10, 12, 15, 18, 20, 25, 32, 38, 42, 45, 76, 87, 89, 90, 91, 99]

Hint: To swap values, use the following code for ideas:

```
sort_list[j], sort_list[j+1] = sort_list[j+1], sort_list[j]
```

Questions (3)

1. True or False: Selection sorting is more efficient than bubble sorting.

MULTIPLE CHOICE

Choose the correct answer:

- A. True
- B. False

2. At the end of each iteration, what happens in selection sorting?

MULTIPLE CHOICE

Choose the correct answer:

- A. The next smallest value is added to a new list.
- B. The largest value ends up at the end of the list.
- C. The next largest value is added to a new list.
- D. The smallest value ends up at the end of the list.

3. Each iteration of selection sorting is looking for what value?

Choose the correct answer:

- A. The next smallest value in the list.
- B. The next largest value in the list.
- C. The next index value in the list
- D. The last index value in the list.

Answer Keys & Solutions

Checkpoint Solutions

Selection Sort

```
1 answer = int(input("Enter a number 0 - 100"))
2
3 arr = [10, 32, 4, 90, 15, 20, 89, 1, 3, 45, 42, 87, 91, 18, 25, 76, 38, 12]
4
5 arr.append(answer)
6
7 def selectionSort(sort_list):
8     for i in range(len(sort_list)):
9         smaller_index = i
10        for j in range(i+1, len(sort_list)):
11            if sort_list[smaller_index] > sort_list[j]:
12                smaller_index = j
13        sort_list[i], sort_list[smaller_index] = sort_list[smaller_index],
sort_list[i]
14
15 selectionSort(arr)
16 print(arr)
```

Questions

1. True or False: Selection sorting is more efficient than bubble sorting.

MULTIPLE CHOICE

Correct Answer:

A. True

✓ Correct

B. False

✗ Incorrect

Explanation:

Bubble sorting is the most inefficient of the sorting methods in this course.

2. At the end of each iteration, what happens in selection sorting?

MULTIPLE CHOICE

Correct Answer:

- A. The next smallest value is added to a new list. ✓ Correct
- B. The largest value ends up at the end of the list. ✗ Incorrect
- C. The next largest value is added to a new list. ✗ Incorrect
- D. The smallest value ends up at the end of the list. ✗ Incorrect

Explanation:

Each iteration of the sort is looking for the next smallest value to add to a new list.

3. Each iteration of selection sorting is looking for what value?

MULTIPLE CHOICE

Correct Answer:

- A. The next smallest value in the list. ✓ Correct
- B. The next largest value in the list. ✗ Incorrect
- C. The next index value in the list ✗ Incorrect
- D. The last index value in the list. ✗ Incorrect

Explanation:

Selection repeatedly looks for the next smallest value to add to the next space in the new list, putting the whole list in order