

Name: Aniket Sarjerao Sable

Roll No: 54

=====

AI Practical 03

Problem Statement:

Write a program to implement various Sorting Algorithms

(such as Bubble Sort, Selection Sort, Merge Sort) using

appropriate Knowledge Representation (like lists, arrays, rules)

and Reasoning Techniques (like if-else logic, decision making).

=====

Sorting Algorithms using Procedural Knowledge Representation

1. Bubble Sort Algorithm

def **bubble_sort**(arr):

 n = len(arr)

 for i in range(n):

 for j in range(0, n - i - 1):

 if arr[j] > arr[j + 1]:

 # Swapping if elements are in the wrong order

 arr[j], arr[j + 1] = arr[j + 1], arr[j]

2. Selection Sort Algorithm

def **selection_sort**(arr):

 n = len(arr)

 for i in range(n):

 min_index = i

 for j in range(i + 1, n):

 if arr[j] < arr[min_index]:

 min_index = j

 # Swap with the smallest element found

 arr[i], arr[min_index] = arr[min_index], arr[i]

3. Merge Sort Algorithm

def **merge_sort**(arr):

 if len(arr) > 1:

 mid = len(arr) // 2 # Finding the middle

 left_half = arr[:mid]

 right_half = arr[mid:]

 # Recursive calls to sort both halves

 merge_sort(left_half)

 merge_sort(right_half)

 # Merge the sorted halves

 i = j = k = 0

 # Compare elements from both halves and merge

 while i < len(left_half) and j < len(right_half):

 if left_half[i] < right_half[j]:

 arr[k] = left_half[i]

 i += 1

 else:

```

        arr[k] = right_half[j]
        j += 1
        k += 1

# Copy any remaining elements
while i < len(left_half):
    arr[k] = left_half[i]
    i += 1
    k += 1

while j < len(right_half):
    arr[k] = right_half[j]
    j += 1
    k += 1

# -----
# Example Usage
# -----
arr = [9, 3, 7, 1, 5]
print("Original Array:", arr)

# User input to choose sorting method
sorting_method = input("Enter sorting method (bubble / selection / merge): ").lower()

# Conditional reasoning to apply correct algorithm
if sorting_method == 'bubble':
    sorted_arr = list(arr)
    bubble_sort(sorted_arr)
    print("Bubble Sorted Array:", sorted_arr)

elif sorting_method == 'selection':
    sorted_arr = list(arr)
    selection_sort(sorted_arr)
    print("Selection Sorted Array:", sorted_arr)

elif sorting_method == 'merge':
    sorted_arr = list(arr)
    merge_sort(sorted_arr)
    print("Merge Sorted Array:", sorted_arr)

else:
    print("Invalid sorting method. Please enter 'bubble', 'selection', or 'merge'.")

# -----
# Sample Output:
# Original Array: [9, 3, 7, 1, 5]
# Enter sorting method (bubble / selection / merge): merge
# Merge Sorted Array: [1, 3, 5, 7, 9]
# -----

```