Lab Assignment - 7

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Problem Statement -1:

Given: n 2D points and two orthogonal polygons.
Problem: Find the set of points lie inside the overlapping region (rectangular) of the two given orthogonal polygons.
Write a program in Java to solve the above problem applying k-d tree data structure.

DATA STRUCTURES USED:

- Trees
- K-D trees
- Arrays

ALGORITHMS USED:

- Recursive algorithms
- Partition algorithms

```
thefox@thebunker:~/Desktop/CSN261_Assign/csn261_assign7/Q1
$ javac q1.java
thefox@thebunker:~/Desktop/CSN261_Assign/csn261_assign7/Q1
$ java q1
Enter the number of points
10
Enter the x and y coordinates of the points separated by a space
4.3 4.1
5 5.8
5.2 3
4.3 8
6 7.7
7.7 2.2
6.8 4.4
8.1 3.6
7.3 8
7.5 6.6
Enter details for first polygon
Number of sides : 4
Points :
3.5 5.1
6.5 8.4
Enter details for second polygon
Number of sides : 6
Points :
4.1 2.2
6.7 2.2
6.7 4.3
5.4 4.3
5.4 8.7
4.1 8.7
Solution :
4.3 8.0
5.0 5.8
```

Problem Statement -2:

Given n values in an array and two index values, find the result of the following queries
1. minimum value
2. maximum value
3. sum
4. update by adding 4 with each element,

within the given index range using Segment tree. Also implement the brute-force method and compare the execution time of both the methods.

DATA STRUCTURES USED:

- Segment Trees
- Arrays

ALGORITHMS USED:

- Various recursive algorithms for segment tree
- Brute force algorithms to compare against

```
thefox@thebunker:~/Desktop/CSN261_Assign/csn261_assign7/Q2
$ javac q2.java
thefox@thebunker:~/Desktop/CSN261_Assign/csn261_assign7/Q2
$ java q2
Enter the number of elements in the array:
6
Enter the numbers now:
2 5 1 4 9 3
Enter One of These Options to get some results:
        1.Find Minimum value in a range
        2.Find Maximum value in a range
        3.Find The Sum of a given range
        4.Add 4 with each element
        5.Exit
1
Enter the low and high indices
3 5
3
Enter One of These Options to get some results:
        1.Find Minimum value in a range
        2.Find Maximum value in a range
        3.Find The Sum of a given range
        4.Add 4 with each element
        5.Exit
2
Enter the low and high indices
3 5
9
Enter One of These Options to get some results:
        1.Find Minimum value in a range
        2.Find Maximum value in a range
        3.Find The Sum of a given range
        4.Add 4 with each element
        5.Exit
```

```
3
Enter the low and high indices
3 5
16
Enter One of These Options to get some results:
        1.Find Minimum value in a range
        2.Find Maximum value in a range
        3.Find The Sum of a given range
        4.Add 4 with each element
        5.Exit
4
Enter One of These Options to get some results:
        1.Find Minimum value in a range
        2.Find Maximum value in a range
        3.Find The Sum of a given range
        4.Add 4 with each element
        5.Exit
1
Enter the low and high indices
3 5
7
Enter One of These Options to get some results:
        1.Find Minimum value in a range
        2.Find Maximum value in a range
        3.Find The Sum of a given range
        4.Add 4 with each element
        5.Exit
2
Enter the low and high indices
3 5
13
Enter One of These Options to get some results:
        1.Find Minimum value in a range
        2.Find Maximum value in a range
        3.Find The Sum of a given range
        4.Add 4 with each element
```

```
        5.Exit
3
Enter the low and high indices
3 5
28
Enter One of These Options to get some results:
        1.Find Minimum value in a range
        2.Find Maximum value in a range
        3.Find The Sum of a given range
        4.Add 4 with each element
        5.Exit
5
thefox@thebunker:~/Desktop/CSN261_Assign/csn261_assign7/Q2
$
```

```
$ time java q2 < input.txt
Enter the number of elements in the array:
Enter the numbers now:
Enter One of These Options to get some results:
        1.Find Minimum value in a range
        2.Find Maximum value in a range
        3.Find The Sum of a given range
        4.Add 4 with each element
        5.Exit
```

```
real    0m0.084s
user    0m0.117s
sys     0m0.020s
```

```
$ time java q2_brute < input.txt
Enter the number of elements in the array:
Enter the numbers now:
Enter One of These Options to get some results:
        1.Find Minimum value in a range
        2.Find Maximum value in a range
        3.Find The Sum of a given range
        4.Add 4 with each element
        5.Exit
```

```
real    0m0.095s
user    0m0.119s
sys     0m0.032s
```