RECTANGLE INTERSECTION

Given a number of rectangles, determine which of them intersect.

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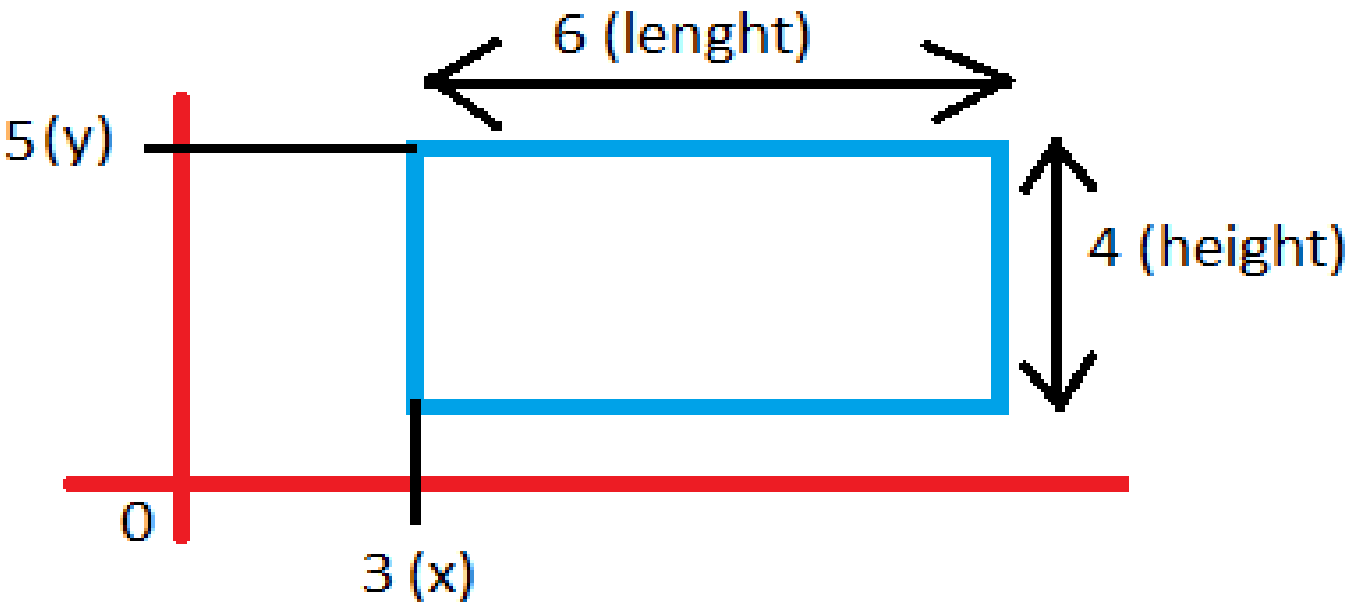
DCTI – IT Companies Seminary

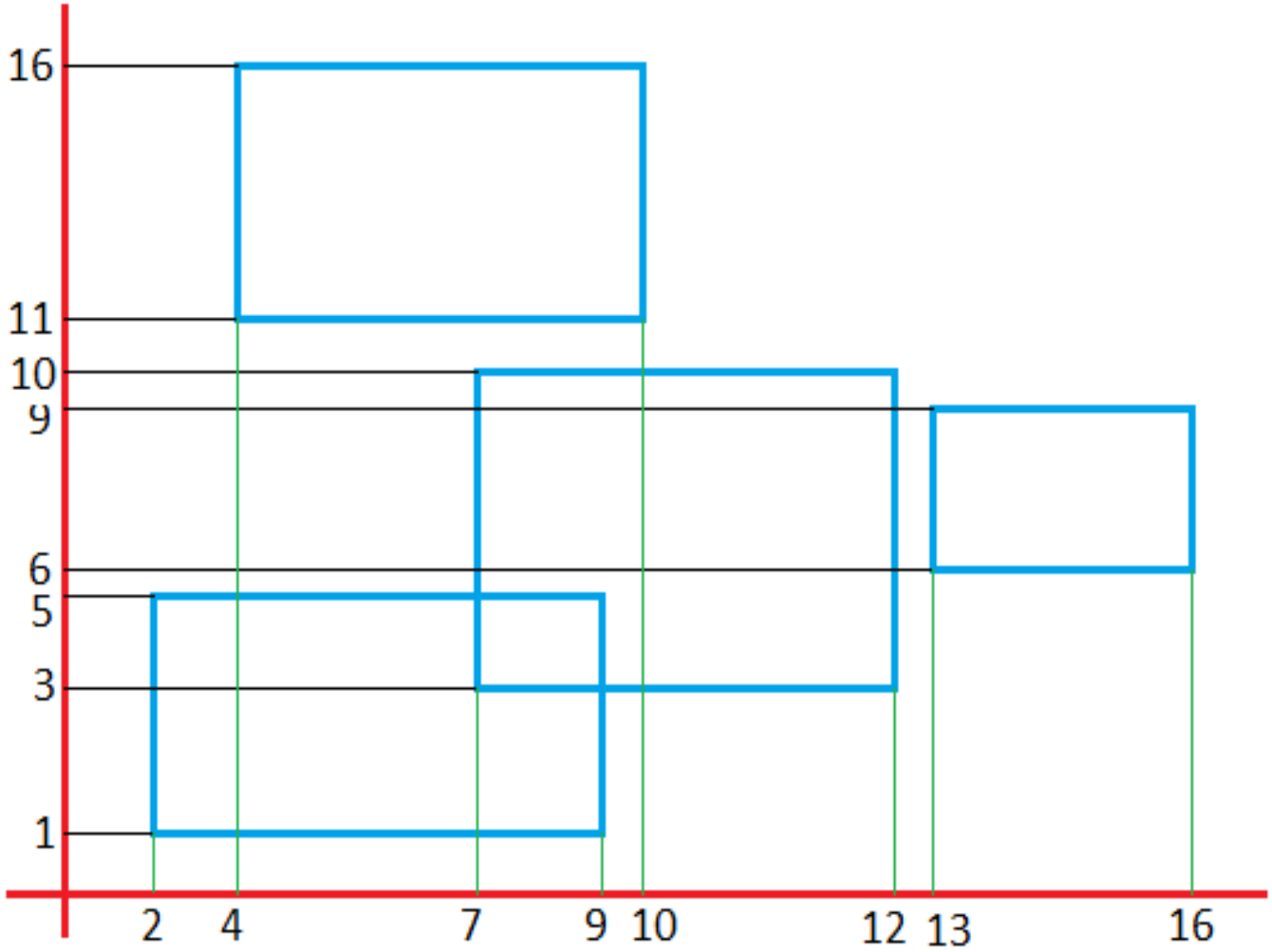
INPUT

- An input file which defines on each line a rectangle
  - X - top left corner's position on x axis
  - Y – top left corner's position on y axis
  - Length
  - Height



Rectangle:
3,5,6,4

Brute Force



Input:

1) 2 , 5 , 7 , 4
2) 4 , 16 , 6 , 5
3) 7 , 10 , 5 , 7
4) 13 , 9 , 3, 3

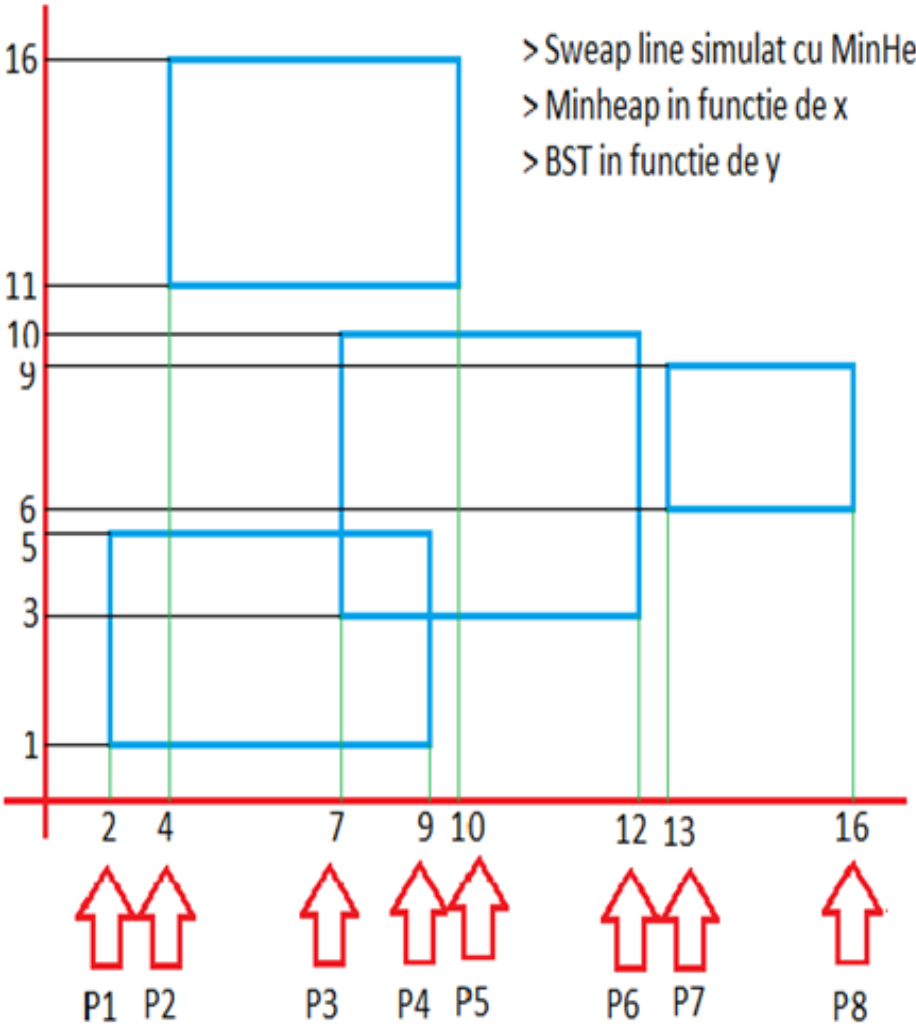
Output:

<2,5,7,4> ∩ <7,10,5,6>

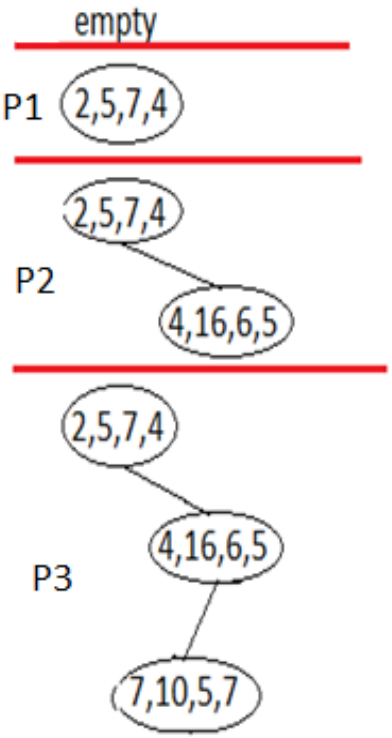
Nr. comparari = 6

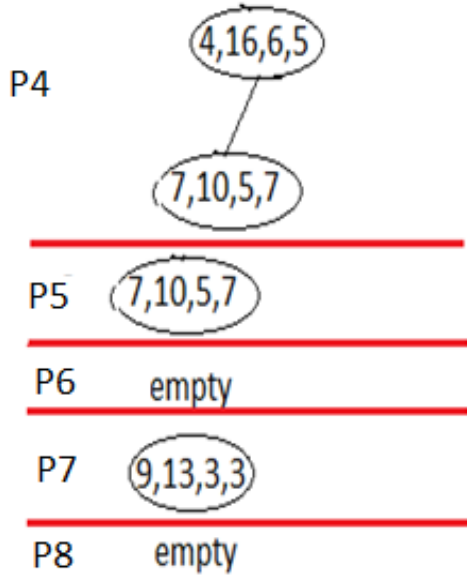
1 -> 2
1 -> 3
1 -> 4
2 -> 3
2 -> 4
3 -> 4

Sweep Line + BST



> Sweap line simulat cu MinHeap
> Minheap in functie de x
> BST in functie de y

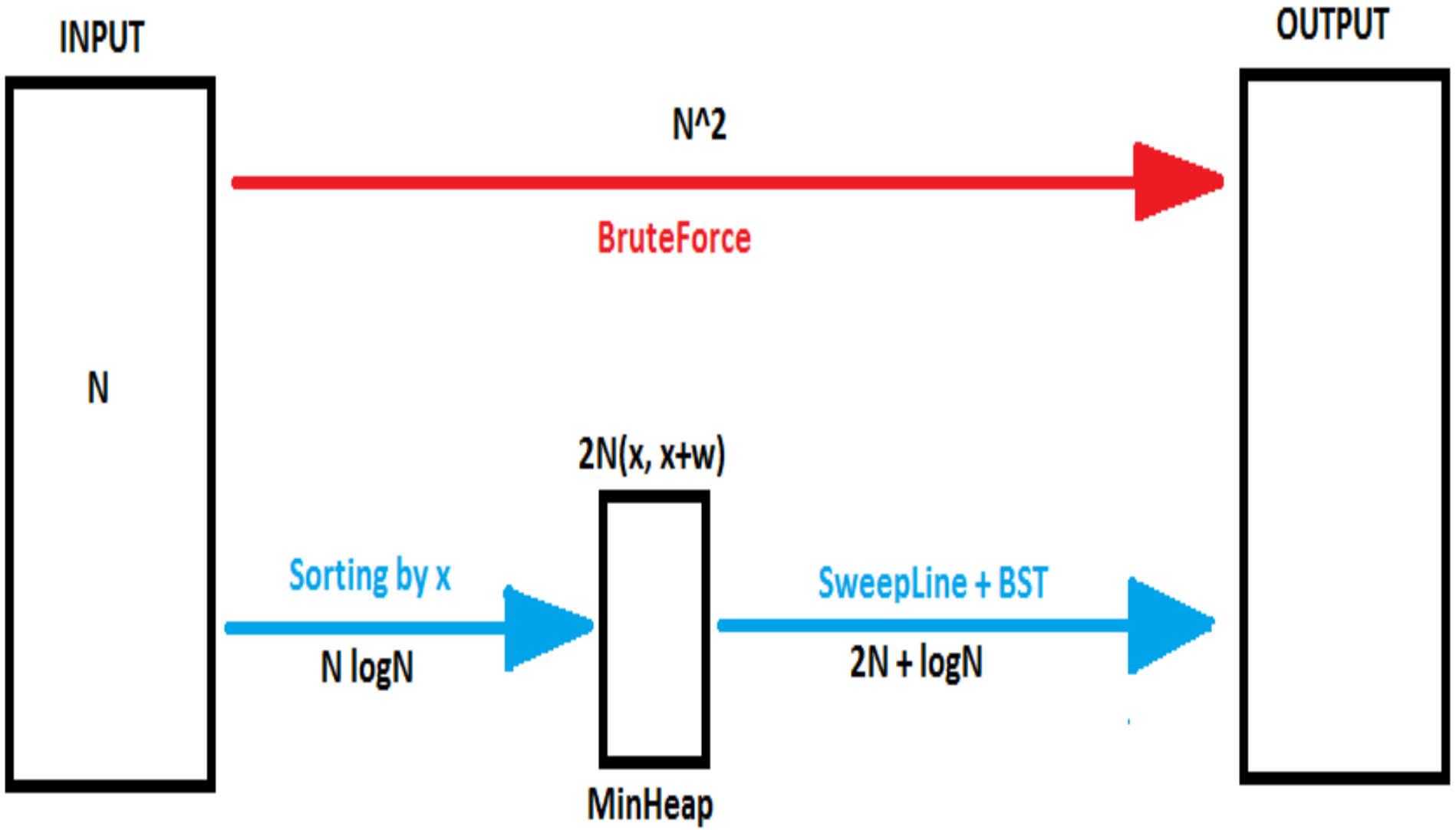




Output:

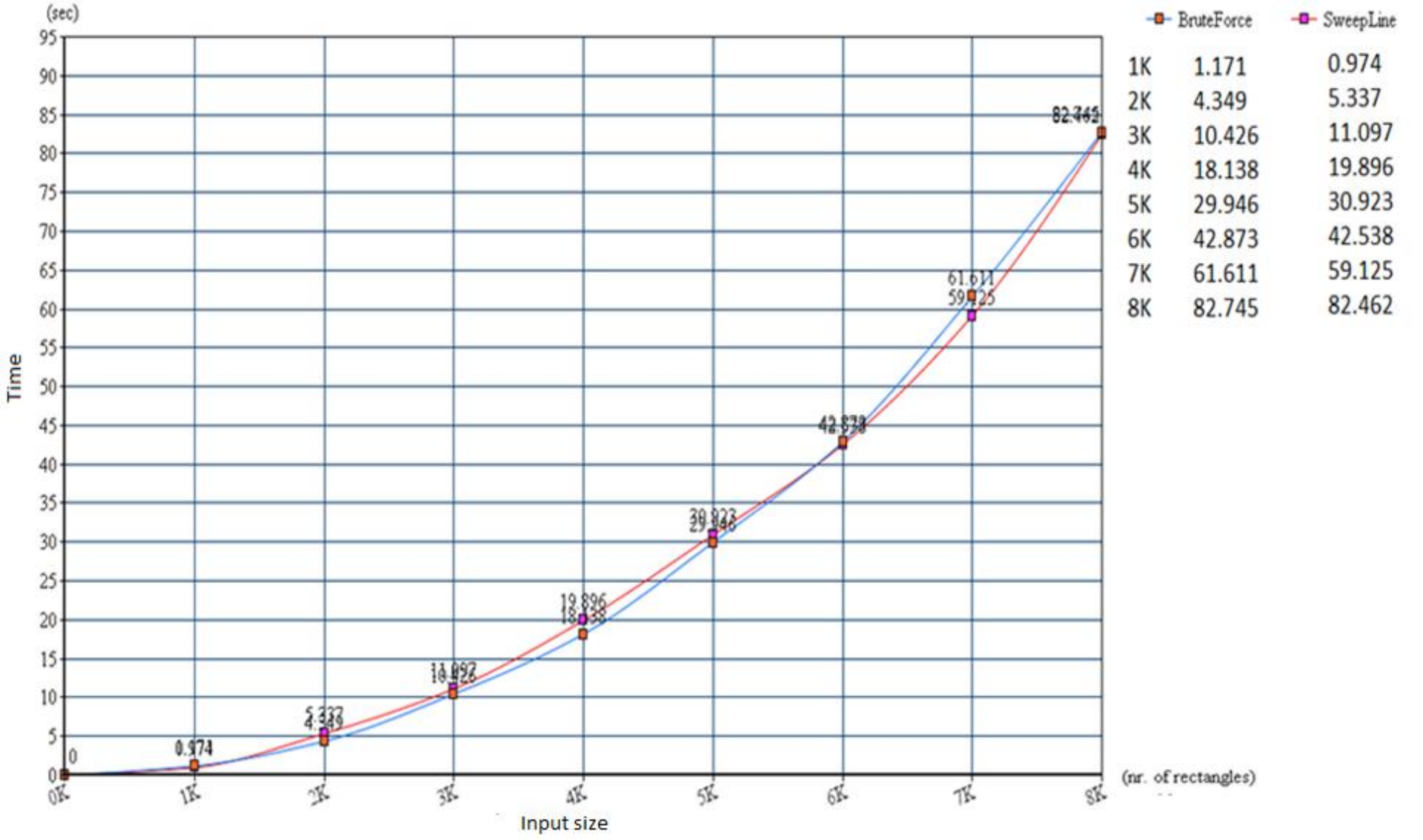
P5 <2,5,7,4> ∩ <7,10,5,6>

Nr de comparari - 3
P4 - o comparare
P5 - doua comparari

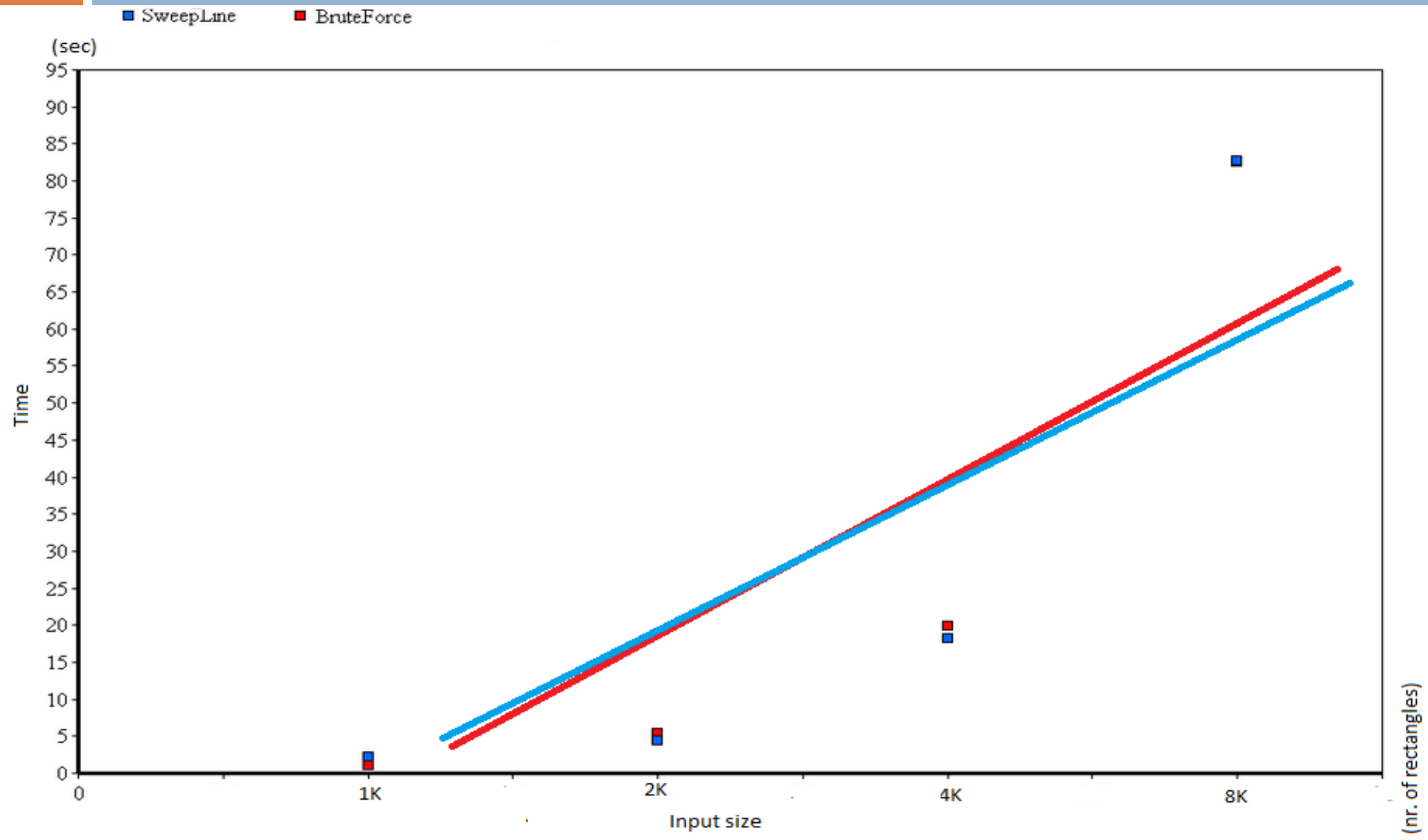

INPUT
OUTPUT
N^2
BruteForce
N
2N(x, x+w)
Sorting by x
N logN
SweepLine + BST
2N + logN
MinHeap

Order of growth	Algorithm Example	Input size solvable in minutes
2N+logN	Sweep Line + BST	Billions
N logN	Sorting	Hundreds of millions
N^2	Brute Force (2 for loops)	Tens of thausands

Standard Plot



Log-Log Plot


SweepLine
BruteForce
(sec)
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
Time
0
1K
2K
4K
8K
Input size
(nr. of rectangles)

Questions

For code, visit:

https://github.com/mihaescu/ADS/tree/master/BST/Geometric%20Applications/Rectangle%20Intersection%20by%20Georgoiu%20Dragos