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Daily Coding Problem #187

Problem

This problem was asked by Google.

You are given a list of rectangles represented by min and max x- and y-coordinates. Compute whether or not a pair of rectangles overlap each other. If one rectangle completely covers another, it is considered overlapping.

For example, given the following rectangles:

```
{
  "top_left": (1, 4),
  "dimensions": (3, 3) # width, height
},
{
  "top_left": (-1, 3),
  "dimensions": (2, 1)
},
{
  "top_left": (0, 5),
  "dimensions": (4, 3)
```

```
}
```

return true as the first and third rectangle overlap each other.

Solution

We can check every pairing of rectangles to see if they overlap, and return true if we find one. If not, then return false.

```
def overlapping(rectangles):
    for i, rec1 in enumerate(rectangles):
        for rec2 in rectangles[i + 1:]:
            if is_overlapping(rec1, rec2):
                return True

    return False
```

How do we calculate whether two rectangles overlap? It's easier to check if they *don't* intersect:

- If rec1's left border is right of rec2's right border
- Or rec1's right border is left of rec2's left border
- Or rec1's top border is below rec2's bottom border
- Or rec1's bottom border is above of rec2's top border

If any of these cases are met, then the rectangles don't overlap, and we can return false:

```
def is_overlapping(rec1, rec2):
    if rec1["top_left"][0] >= rec2["top_left"][0] + rec2["dimensions"][0]:
        return False

    if rec1["top_left"][0] + rec1["dimensions"][0] <= rec2["top_left"][0]:
        return False
```

```
if rec1["top_left"][1] <= rec2["top_left"][1] - rec2["dimensions"][1]:  
    return False  
  
if rec1["top_left"][1] - rec1["dimensions"][1] >= rec2["top_left"][1]:  
    return False  
  
return True
```

Since each `is_overlapping` call is $O(1)$, this whole code takes $O(n^2)$ time.

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