Interval List Intersections 4.62 (198 votes)

Interval List Intersections

LeetCode Admin Feb 03, 2019

Solution

Approach 1: Merge Intervals

Intuition

In an interval `[a, b]`, call `b` the "endpoint".

Among the given intervals, consider the interval `A[0]` with the smallest endpoint. (Without loss of generality, this interval occurs in array `A`.)

Then, among the intervals in array `B`, `A[0]` can only intersect one such interval in array `B`. (If two intervals in `B` intersect `A[0]`, then they both share the endpoint of `A[0]` -- but intervals in `B` are disjoint, which is a contradiction.)

Algorithm

If `A[0]` has the smallest endpoint, it can only intersect `B[0]`. After, we can discard `A[0]` since it cannot intersect anything else.

Similarly, if `B[0]` has the smallest endpoint, it can only intersect `A[0]`, and we can discard `B[0]` after since it cannot intersect anything else.

We use two pointers, `i` and `j`, to virtually manage "discarding" `A[0]` or `B[0]` repeatedly.

Java Python Copy

```java
class Solution {
  public int[][] intervalIntersection(int[][] A, int[][] B) {
    List<int[]> ans = new ArrayList();
    int i = 0, j = 0;

    while (i < A.length && j < B.length) {
      // Let's check if A[i] intersects B[j].
      // lo - the startpoint of the intersection
      // hi - the endpoint of the intersection
      int lo = Math.max(A[i][0], B[j][0]);
      int hi = Math.min(A[i][1], B[j][1]);
      if (lo <= hi)
        ans.add(new int[]{lo, hi});

      // Remove the interval with the smallest endpoint
      if (A[i][1] < B[j][1])
        i++;
      else
        j++;
    }

    return ans.toArray(new int[ans.size()][]);
  }
}
```

Complexity Analysis

- Time Complexity: $O(M + N)$, where M, N are the lengths of `A` and `B` respectively.
- Space Complexity: $O(M + N)$, the maximum size of the answer.

Share

Comments (80)

Sort by: Best

Type comment here... (Markdown supported)

Preview Comment

Article Commenting Rules

1. This comment section is for questions and comments regarding this **LeetCode article**. All posts must respect our LeetCode Community Rules.

2. Concerns about errors or bugs in the article, problem description, or test cases should be posted on LeetCode Feedback, so that our team can address them.

Abhishek9012 Jun 11, 2020

I am so dumb

1.1K Show 39 Replies Reply

RohanPrakash Jun 22, 2020

Read more

101 Show 5 Replies Reply

haruna_yjc Apr 04, 2019

Shouldn't the space complexity be O(1)?

72 Show 19 Replies Reply

Sithis Feb 17, 2019

@awice It would be better to use `toArray(new T[0])` instead of `toArray(new T[size])` . See this for explanation.

31 Show 1 Replies Reply

wangjian4814 May 27, 2019

So nice solution!!!

31 Show 1 Replies Reply

gauravahlawat81 Apr 02, 2020

`If two intervals in B intersect A[0], then they both share the endpoint of A[0] -- but intervals in B are disjoint, which is a contradiction.)`

Can someone explain this to me ? I didn't understand this part.

12 Show 8 Replies Reply

a_m_a_n Aug 09, 2019

Read more

▲ 12 ▼ Show 1 Replies Reply

maryllia Dec 28, 2020

Interesting "either you know the trick or not" exercise.

▲ 24 ▼ Show 2 Replies Reply

codewithcs Dec 25, 2020

Excellent question for a coding interview. This question shows that drawing diagrams and coming with an algorithm is so important before even writing a single line of code.

▲ 19 ▼ Show 2 Replies Reply

laodasb Sep 02, 2020

The space complexity is O(1), basically, we don't count the space which is used to store the result....

▲ 4 ▼ Reply

‹ 1 2 3 4 5 6 7 8 ›