Merging Overlapping Intervals

Problem Statement

Given a collection of intervals, merge all overlapping intervals.

For example, given the intervals [1, 3], [2, 4], [5, 7], and [6, 8], the output should be [1, 4], [5, 8].

Approaches

1. **Sorting and Merging**:

   - Sort the intervals based on the start time.

   - Iterate through the sorted intervals and merge if they overlap.

   - If no overlap, push the current interval to the result.

2. **Stack-Based Approach**:

   - Use a stack to store intervals as you iterate.

   - If the top of the stack overlaps with the current interval, merge them.

Edge Cases

1. **Intervals that don't overlap**: Ensure the result includes all intervals.

2. **Single interval**: Only one interval, return it as is.

3. **Multiple intervals with exact overlap**: Handle cases where intervals overlap completely.

4. **Intervals with no intersection**: Ensure they are returned separately.

5. **Overlapping interval comes after a larger interval**: For example, [1, 4], [2, 3].

   - This can break naive solutions that only compare start times and forget to update the end correctly.

   - User's first code failed due to not checking this scenario.