For all i from 1 to n, put L_i, U_i in new arrays B, C. Sort array B, C and find the largest L_i and smallest U_i, named them L, U. Elements in A satisfied $L \leq A_i \leq U$ are elements we want to count. $O(nlogn)$

Sort array A. Use binary search to find two elements in A, A_1 and A_2. A_1 is equal to or bigger than L. A_2 is equal to or smaller than U. Then count the number of elements that is between A_1 and A_2. $O(nlogn)$