

It suffices to count the number of pairs  $(i, j)$  that satisfies  $a[i] \text{ xor } a[j] \leq x$ .

1. Use trie.  $O(nW)$ .

2. First sort the integers, then build the compressed trie in  $O(n)$  time, which has  $O(n)$  nodes and edges. Perform a dfs on the trie to enumerate all possible  $a[i]$ 's, and the value  $a[i] \text{ xor } x$  will also traverse the trie once (we can simulate the traversal using bit operations), in the meantime we maintain the number of possible  $j$ 's, so the running time is  $O(n)$ .  $O(\text{sort}(n))$ .

## References