assume $|\Sigma| \leq w$ (since $26 < 32$).
1. we can represent all characters in a string by a word. testing whether two strings share any common letter is $O(1)$. in total $O(n^2)$.
2. first sort all strings in decreasing order. let $C(s)$ denote the set of letters in string s, and let $f[S]$ be a bitset with n bits representing all strings with no letter appear in S, where S is a set of letters. let $d = \Theta(\log n)$, we precompute , this takes $O(2^d n)$ time. we need to find the first 1 in the bitset. $O(\frac{n^2|\Sigma|}{w \log n})$.

References