Two pointers - Expressive words

string s can be "stretched" to string t

if s can be made equal to t

by choosing a group of characters c

and replacing each character in c

by 3 or more of same character

in sequence

(eg) hi → hi

→ hiii

→ hiiiii

→ hhhi

→ hhhhi

→ hhhhhi

⋮

Given list of query words and string

s, find number of query words that can

be "stretched" to s

s = heeellooo

words = [hello, hi, helo] output 1

✓ × ×

$|words| \leq 100$, $len(s) \leq 100$, $len(word) \leq 100$ for word in words

Solution write a function

f(S, word)

↙ True if

word ⟶ S

stretches

↘ False if

word ⇸ S

→ call f on query words.

→ So |words| * complexity of f

word = h e l o

new character, pointer i

S = h e e e l l o o

pointer j

↙ if j's character ≠ i's character

False

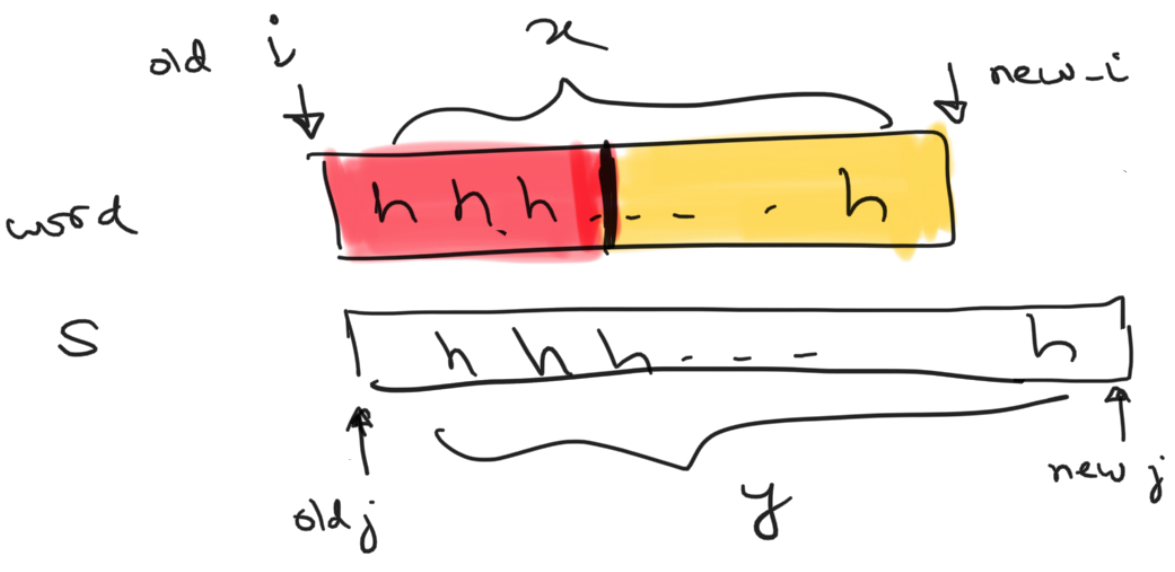
↘ if same,

move pointer i to next new character

x = # of characters in bet in word

move pointer j to next new character

y = # of characters in bet in S



say r of x characters stretched...
Remaining $x-r$ same

$r = 0$ $\quad y = x$

$r = 1$ $\quad y \geq x-1+3$

$r = 2$ $\quad y \geq x-2+6$

$r = r$ $\quad y \geq x-r+3r$

(ie) $y \geq x+2r$

So if able to solve for integer r

$$\begin{cases} 0 \leq r \leq x \\ y = x, & r=0 \\ y \geq x+2r, & r>0 \end{cases}$$

then True, else False

2 ways to think about this

$r = 0 \quad \leftrightarrow \quad y = x$

$r = 1 \quad \leftrightarrow \quad y > x$ if stretched

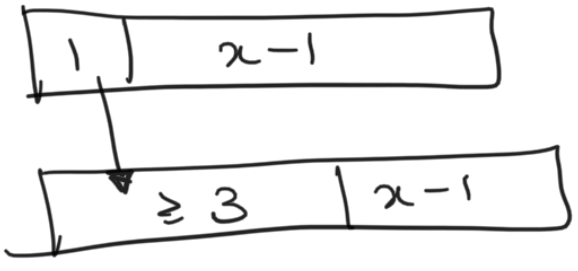
can without loss of generality stretch only 1 character...

$y < x$ False

$y = x$ $r=0$ True

just need $y - x \geq 2$

because



$y \geq x - 1 + 3$

need

$y - x \geq 2$?

yes
True

No
False

$y > x \Rightarrow$ need to solve for

$r > 0$, r int

$y \geq x + 2r$

$\Rightarrow$ need to solve for

$\frac{y-x}{2} \geq r$

r = int > 0

$\Rightarrow$ need

$\frac{y-x}{2} \geq 1$?

If yes
$r = 1$
True

If no
False

Complexity of f $\rightarrow$ $O(|word| + |S|)$

So over all $\rightarrow$ $O(\Sigma|word| + |words||S|)$

$\rightarrow$ $O(100^2) = O(10^4)$