

$s_0 s_1 s_2 s_3 \dots s_m$

$t_0 t_1 t_2 t_3 \dots t_n$

$$\text{freq}(t) = \begin{bmatrix} a & b & c & d & e & \dots \\ 0 & 2 & 1 & 0 & & \end{bmatrix}$$

$\underbrace{s_i s_{i+1} s \dots s_j}_1$

$$\text{freq}(s_i \dots s_j) \geq \text{freq}(t)$$

for all
alphabets

(Vector comparison)

A naive solution is

$O(m^2)$: for every (i, j) pair
($i \leq j$)

we check if $\text{freq}(s_i \sim s_j) \geq \text{freq}(t)$

Observe that

if $\text{freq}(s_i \sim s_j) \geq \text{freq}(t)$

there is no need to check

$\text{freq}(s_i \sim s_{j+1})$

because it must $\geq \text{freq}(t)$:

And $\text{len}(s_i \sim s_j) < \text{len}(s_i \sim s_{j+1})$

so it is useless to search

$$S_i \sim S_k \quad \text{where} \quad k \geq j+1 \quad !$$