

ex $S = abab \rightarrow abababab$
 $S = aaa \rightarrow aaaaaa$
 $S = \text{|||} \rightarrow \text{|||||}$

①

a a c

a a x x

a x x x x

x x x x x x

a a a a a a

—

a b a

d b a x a

②

a a a

x x x

a x x a

a a x a a

a a a a a a

$$\begin{aligned} & (g_0, a, a, h, g_0) & (g_0, x, x, h, g_0) \\ & (g_0, \#, \#, R, g_s) \\ & (g_s, a, \#, R, g_a) \end{aligned}$$
$$(g_a, a, a, R, g_a)$$

a a #
a a x x #
 ↑

$$(g_{aa}, \#, x, L, g_0)$$
$$(g_a, x, x, \mathbb{R}, g_a)$$
$$(q_s, x, a, R, q_s)$$
$$(q_s, \#, \#, L, q_f)$$

1. double check!
2. other algo. (2)

$M_{TM}(s) \leftarrow$
 $M_{UTM}(\underbrace{M_{TM}(s)}_{s'})$

Input string (s_i) - example $s_i = aabb$

$$a = 1$$

$$S_i = \begin{matrix} 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 \end{matrix}$$

$s_i = 101011011$

$S_i = b a a a b$

$$s_{i_9} = 11010101011$$

$$S_{\mathcal{F}} = (q_1, a, b, R, q_2)$$

$$q_1 = 1 \quad q_2 = 11 \quad \vdots \quad q_i = 1 \times i$$

$$a = 1 \quad b = 11$$

$$R = 1 \quad L = 11$$

$$s_f = (1, 1, 11, 1, 11)$$

$$= \underline{89} = 10101101011$$

$$S_{f_2} = (q_2, b, b, L, q_2)$$

$$\equiv 11011011011$$

$S_{f_1} S_{f_2} = 10101101011011011011$

$$\Rightarrow S_{f_1} S_{f_2} S_{i_1} = \underbrace{10101101011011011011011010101011011}_{S_{f_1} S_{f_2}} \underbrace{101011011}_{S_{i_1}}$$

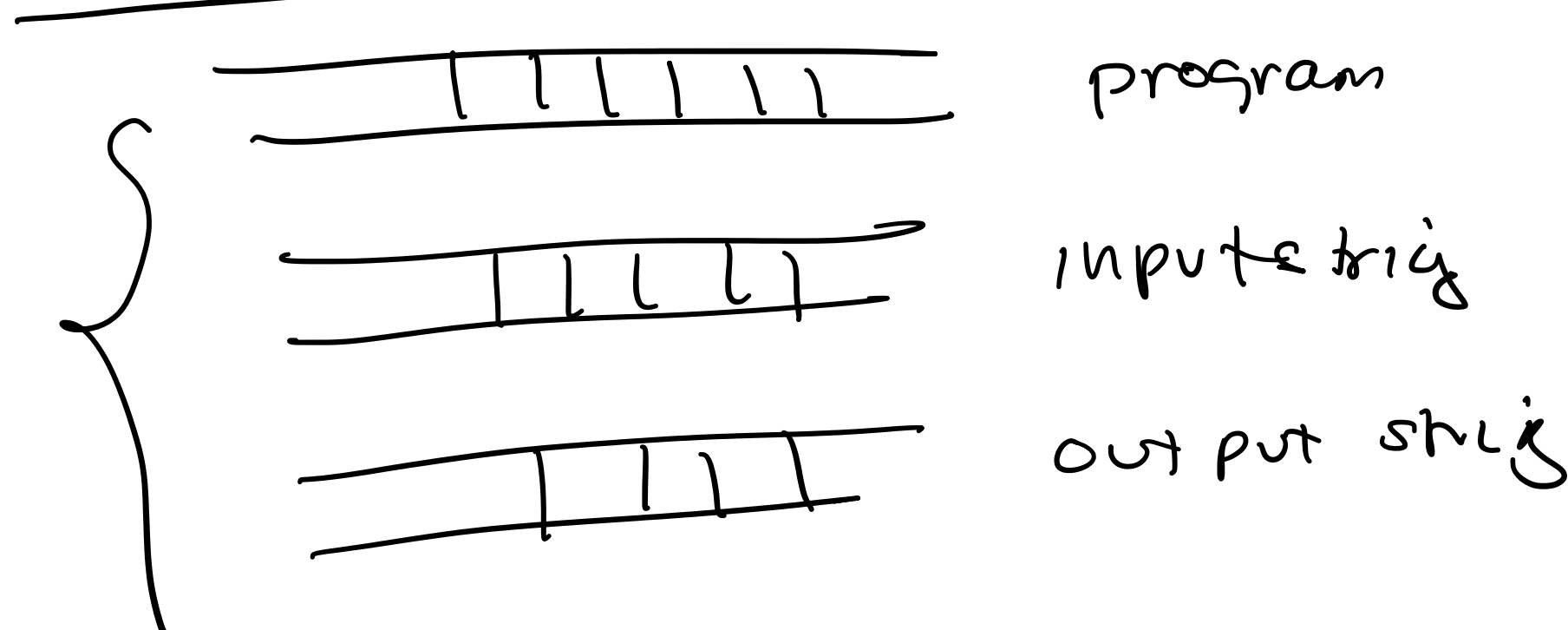
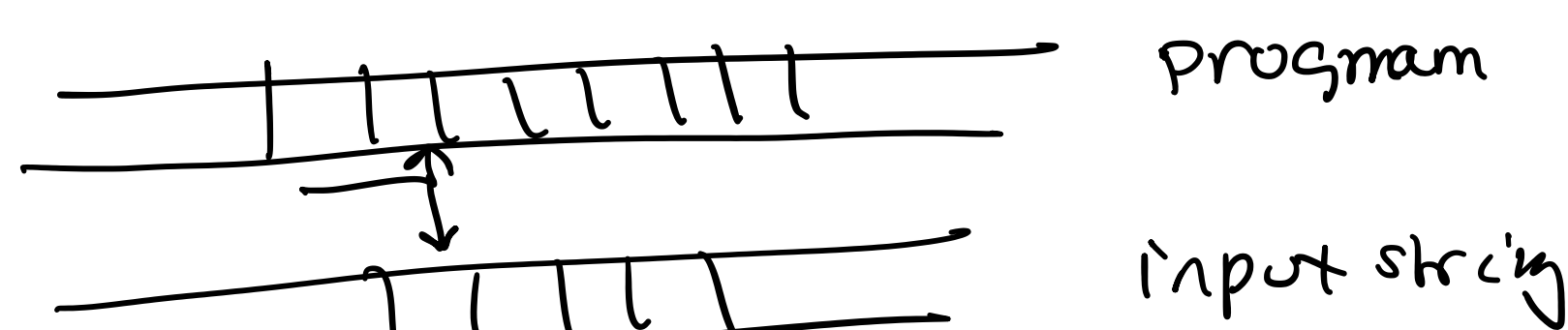
$S_{f_1} S_{f_2} S_{i_2} =$

1	0	1	0	1	0	1	1	0	1	1	0	1	1	0	1	1	0	0	1	0	1	0	1	0	1
transitions																	input string								

UTM

$$tm - (R, L, S)$$

$$tm = (R, L, U, D)$$



next time count + ms.
+ count languages.