10 October 2022

Let W_1, W_2 be words.

$$\text{edit}(W_1, W_2) = \begin{cases} 0, & \text{if } W_1 = W_2 \\ \text{length}(W_1), & \text{if } W_2 = \emptyset \\ \text{length}(W_2), & \text{if } W_1 = \emptyset \\ \min \begin{cases} \text{edit}(W_1^{n-1}, W_2^{m-1}) + 1 \\ \text{edit}(W_1^{n-1}, W_2^{m}) + 1 \\ \text{edit}(W_1^{n-1}, W_2^{m-1}) + \mathbb{1}_{W_1[n] \neq W_1[n]} \end{cases} \end{cases}$$

Let $n = \text{length}(W_1)$, $m = \text{length}(W_2)$

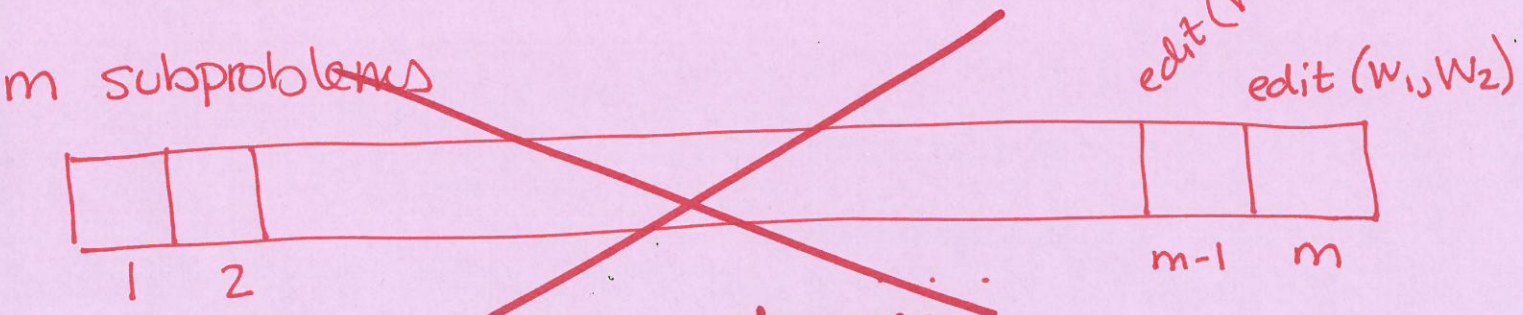
$W_i^j :=$ the substring from 1st through jth elt of W_i

e.g.) $W_1 = \text{FIX}$, $n = 3$

$W_2 = \text{FIND}$, $m = 4$

↓ how does this relate to

$\text{edit}(W_1^3 = \text{FIX}, W_2^3 = \text{FIN})$



not enough storage

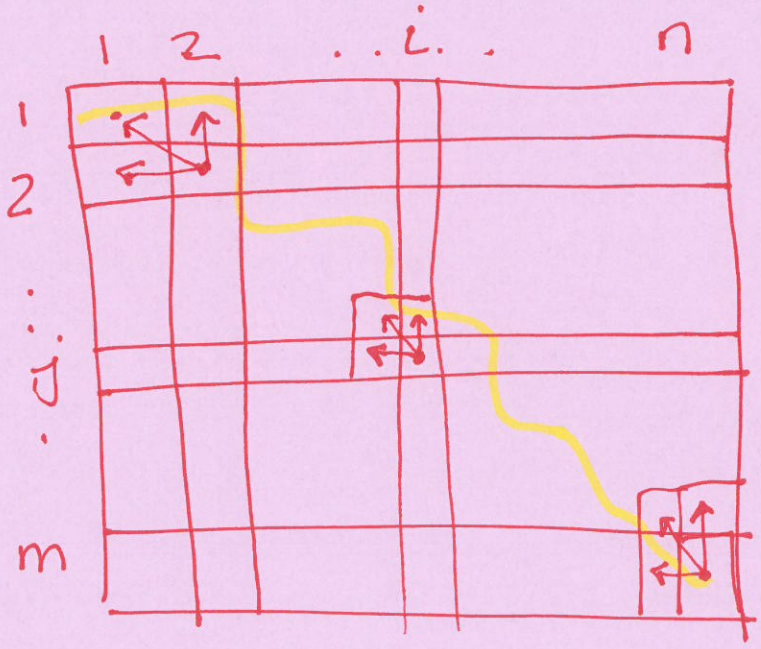
try 2D array next.

example:

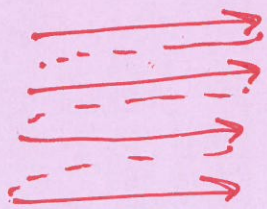
ABC
AAAB

equiv q: What is SP from W_1.. to W_2?

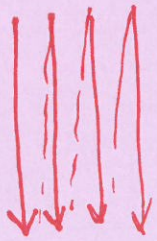
The Data Structure



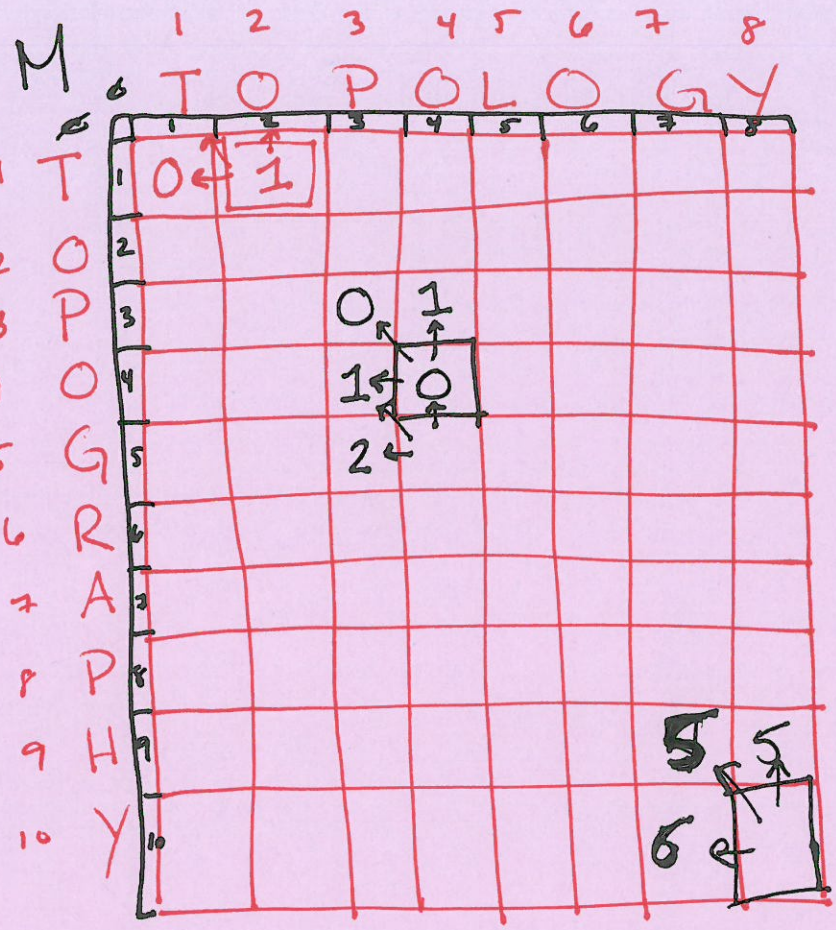
Q1: What order can we evaluate these cells in?



row-by-row



col-by-col



row-by-row eval order

edit (TO, T) = min { edit (TO, ∅) + 1 = 2 + 1
edit (T, T) + 1 = 0 + 1
edit (T, ∅) + 1$_{O=T}$ = 1 + 1

note: we're evaluating w/ the table above, not recursion.

compute 4,4:

edit (TOPO, TOPO) = 0 (base case!)

compute col 4, row 5:

want: TOPO ⇝ TOPOG

edit (TOPO, TOPOG) = { edit (TOPO, TOPO) + 1
edit (TOP, TOPOG) + 1
edit (TOP, TOPO) + 1 = 1 + 1 = 2

sol'n r/c

(4/4) 0+1 = 1
TOPO ⇝ TOPOG

(see r 5, col 3) 2+1 = 3
TOPO ⇝ TOP ⇝ TOPOG

see r 4, col 3.
TOPO ⇝ TOP ⇝ TOPO ⇝ TOPOG 3

row 10, col 8

depends on $M[10,7]=6$

$M[9,8]=5$

$M[9,7]=5$

$$M[10,8] = \min \begin{cases} M[10,7]+1 = 6+1 \\ M[9,8]+1 = 5+1 \\ M[9,7]+\mathbb{1}_{y \neq y} = 5+0 \end{cases}$$