

# LCS

~~RISTORÒ~~  
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RISOTTO

RISTO, RISO O

2 LCS, di lunghezza 5

$$X = x_1 x_2 \dots x_m$$

$$Y = y_1 y_2 \dots y_n$$

$$x_m = y_n$$

ogni LCS(X, Y) termina col carattere comune  $x_m$

$$LCS(X_m, Y_n) \Rightarrow LCS(X_{m-1}, Y_{n-1}) \cdot x_m$$

$$x_i = y_j \Rightarrow c(i, j) = c(i-1, j-1) + 1$$

$x_m \neq y_n$

A B C D E  
 F E L

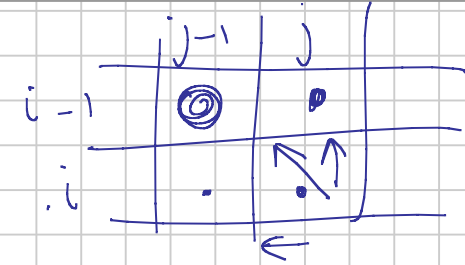
A B C D E  
 F G H

$$\underline{|LCS(X_m, Y_n)|} = \max \left\{ |LCS(X_{m-1}, Y_n)|, |LCS(X_m, Y_{n-1})| \right\}$$

↑
↑

# LCS-LENGTH (X, Y)

$m = X.length$   
 $n = Y.length$



① }  $c =$  nuova matrice  $(m+1) \times (n+1)$  // parte da  $(0,0)$   
 $b =$  nuova matrice  $m \times n$  // parte da  $(1,1)$

② } for  $i = 1$  to  $m$  {  $c[i,0] = 0$  }  $\Theta(m)$   
 for  $j = 0$  to  $n$  {  $c[0,j] = 0$  }  $\Theta(n)$

for  $i = 1$  to  $m$  {  
 for  $j = 1$  to  $n$  {  
 if  $(x_i == y_j)$  {  
 $c[i,j] = c[i-1, j-1] + 1$   $\Theta(m \cdot n)$   
 $b[i,j] = "\uparrow"$   
 }



	Ø	R	I	S	T	Ø	R	Ø
Ø	Ø	0	0	0	0	0	0	0
R	0	1	1	1	1	1	1	1
I	0	1	2	2	2	2	2	2
S	0	1	2	3	3	3	3	3
Ø	0	1	2	3	3	4	4	4
T	0	1	2	3	4	4	4	4
T	0	1	2	3	4	4	4	4
Ø	0	1	2	3	4	5	5	5

R I S Ø Ø

PRINT-LCS(b, X, i, j) // prima chiamata PRINT-LCS(b, X, x.length, y.length)

if (i == 0 or j == 0) return;

if ( b[i, j] == "↖" ) {

PRINT-LCS(b, X, i-1, j-1);

PRINT xi; // i-esimo carattere di X

}

else if ( b[i, j] == "↑" ) PRINT-LCS (b, X, i-1, j);

else // b[i, j] == "←"  
PRINT-LCS(b, X, i, j-1);

$$T(m, n) = O(m+n)$$