

# Medical informatics

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## ① Needleman Algorithm

Sequence Alignment

Global alignment

- ① initialization
- ② main iteration
- ③ termination

EX X = ACGCTG  
y = CATGT

Match : 2  
GAP : -1

Mismatch : -1

$-(1 \times -1) = 1$

Matrix  $m+1 \times n+1$   
7 x 6

		1	2	3	4	5	6
		A	C	G	C	T	G
1	C	-1	-1	0	-1	-2	-3
2	A	-2	1	0	-1	-2	-3
3	T	-3	0	-1	-1	1	0
4	G	-4	-1	2	1	0	3
5	T	-5	-2	-2	1	3	2

AC  $\Rightarrow$  up =  $-1 + -1 = -2$

diag = mismatch  $\rightarrow -1 + 0 (A, C)$

left =  $-1 + -1 = -2$

up | diag | left  
↓ | ↓ | ↓  
+gap | +score | +gap  
match | mismatch

CC  $\Rightarrow$  up =  $-2 + -1 = -3$

diag =  $2 + -1 = 1$

left =  $-1 + -1 = -2$

diag

Termination

Most Greedy

$F(5, 6) \rightarrow F(0, 0)$

## Termination

2, 3, 1, 1, -1, 0, 1, 1, -1, 0

قاعدة

① من فوقه احط جانب الأول والحرف المقابل في التالي  
 ② diagonal ← حرفيه  
 ③ سيار ← sequence و الثاني جانب حرف

2, 3, 1, 1, -1, 0, 1, 1, -1, 0

ACGCTG-  
 -CATGT

2, 3, 1, 2, 0, 1, 1, -1, 0

-ACGCTG  
 CATGT- ✓