## **BIOINFORMATICS**

How do we compare biological sequences?

### Marco Beccuti

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April 2019



### Try to align globally/locally the following sequences:

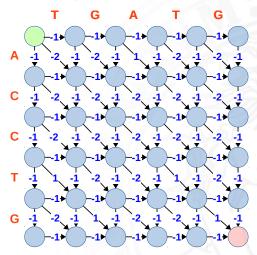
- ACCTG and TGATG;
- ACTCA and CACTC.

$$score\ matrix = \begin{bmatrix} 1 & -2 & -2 & -2 & -1 \\ -2 & 1 & -2 & -2 & -1 \\ -2 & -2 & 1 & -2 & -1 \\ -2 & -2 & -2 & 1 & -1 \\ -1 & -1 & -1 & -1 & - \end{bmatrix}$$

### Try to align globally the following sequences:

ACCTG and TGATG;

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#### Try to align globally the following sequences:

		Т		G		A		Т		G	
	0	-1	-1)	<b>1</b>	-2	) <b>1</b>	-3	<b>1</b> ►(	-4)	<b>1</b>	-5
A	-1 -1	-2	-1 ¥	-2	- <b>1</b>	1	-1 ×	-2	-1 X	-2	- <u>1</u>
	-1	-1	-2	<b>1</b> ▶(	-3	<b>)</b> – <b>-1</b> ►	-1	<b>1</b> ▶	-2	<b>1</b>	-3
С	-1	-2	-1	-2	-1	-2	-1	-2	-1	-2	-1
	(-2)	-1+(	-3	<b>1</b> ▶(	-4	<b> 1</b> →	(-2)	<b>1</b> ▶(	-3	- <b>-1</b> -(	-4
С	-1	-2	-1	-2	-1	-2	-1	-2	-1	-2	-1
	(-3)	-1•(	-4	<b>1</b>	-5	<b>)1</b> →	(-3)	<b>1≻</b> (	-4)	-1-(	-5
Т	-1	1	-1 -	-2	- <u>1</u>	-2	-1	1	-1 -	-2	-1 ×
	(-4)-	<b>-1</b> ►(	-2	<b>1</b> ▶(	-3	<b>-1</b>	(-4)	<b>1</b> ▶(	-2	<b>1</b> •(	-3
G	-1	`-2	-1	1	-1	-2	-1	-2	-1	1	-1
	(-5)-	<b>-1</b> • (	-3	<b>1</b> ▶	-1	<b>-1</b> ▶	(-2)	<b>1</b> ►(	-3	<b>1</b> ≯(	-1

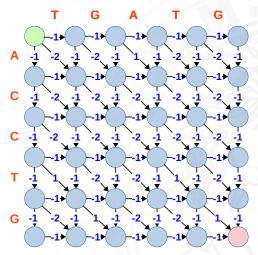
### Try to align globally the following sequences:

		Т	G	A	T	G
	0	-1>(-	1)1>(-	2)1>(-	3 -1 (-4	-1-(-5)
A	- <u>1</u>	-2	1 -2 -	1 1	1 -2 -1 V	-2 -1
	-1	-1-(	-2)1-(-	3)1+	1 -1 -2	-1 -3
С	-1	-2	1 -2 -	1 -2	1 -2 -1	-2 -1
	-2	-1	-3)1 (-	4)1>	2 -1 -3	-1 -4
С	-1	-2	1 -2 -	1 -2	1 -2 -1	-2 -1
	-3	-1	-4)1 (-	5)1>	31▶ -4	-1-(-5)
T	-1	1 .	1 -2 -	1 -2	1 1 -1	-2 - <u>1</u>
	-4	<b>1</b> ▶	2 -1 (-	3)1-(-	-41▶ -2	-1 -3
G	-1	-2	1 1 -	1 -2	1 -2 -1	1 -1
	(-5)	<b>1</b> ≯(	-3)- <b>-1&gt;</b> (-	1)1-(-	2 -1 -3	-1>(-1)
	ΤG	Α -	-TG			
		A C	CTG			

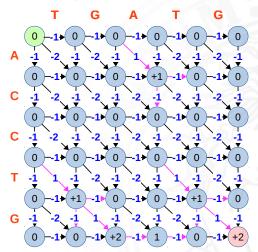
### Try to align locally the following sequences:

ACCTG and TGATG;

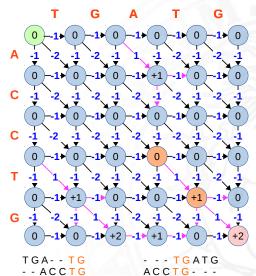
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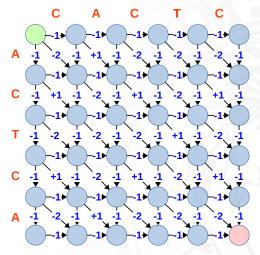
#### Try to align locally the following sequences:



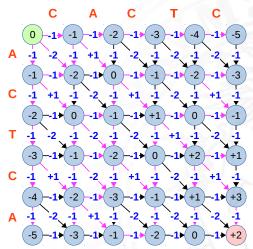
## Try to align globally the following sequences:

ACTCA and CACTC.

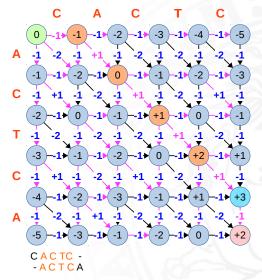
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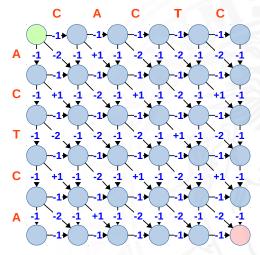
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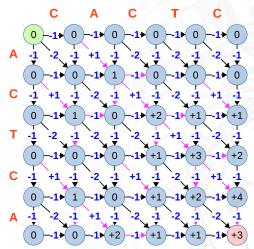
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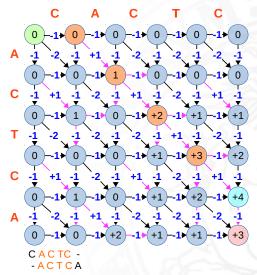
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Try to align globally the following sequences using the Divide and Conquer approach:

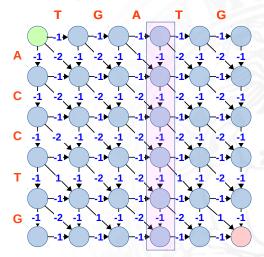
- ACCTG and TGATG;
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$$score\ matrix = \begin{bmatrix} 1 & -2 & -2 & -2 & -1 \\ -2 & 1 & -2 & -2 & -1 \\ -2 & -2 & 1 & -2 & -1 \\ -2 & -2 & -2 & 1 & -1 \\ -1 & -1 & -1 & -1 & - \end{bmatrix}$$

Try to align globally the following sequences using the Divide and Conquer approach:

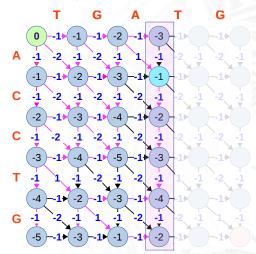
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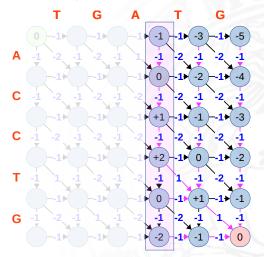
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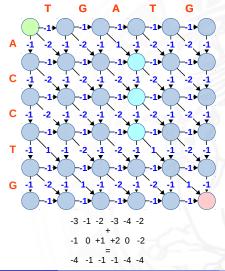


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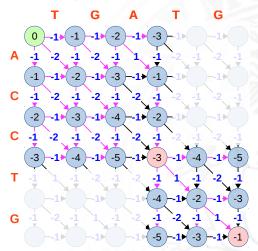
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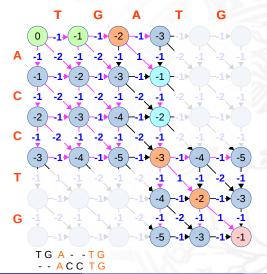
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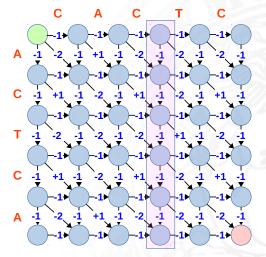
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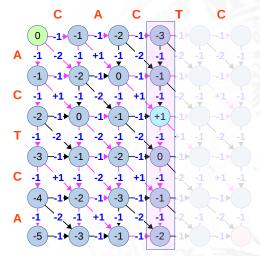
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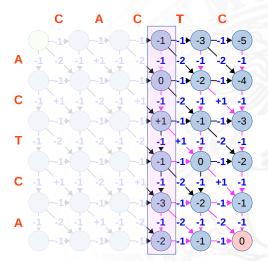
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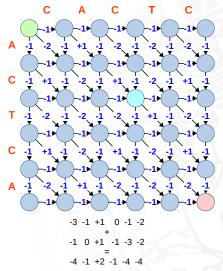


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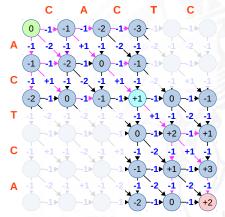


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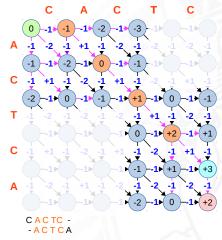
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