AMRITA VISHWA VIDYAPEETHAM
DEEMED TO BE UNIVERSITY

22BIO211: Intelligence of Biological Systems - 2

SEQUENCE ALIGNMENT EXAMPLE

Dr. Manjusha Nair M
Amrita School of Computing, Amritapuri

Email : manjushanair@am.amrita.edu
Contact No: 9447745519

Sequence alignment Example

- Find the best alignment of the following two sequences. Also, write the alignment score

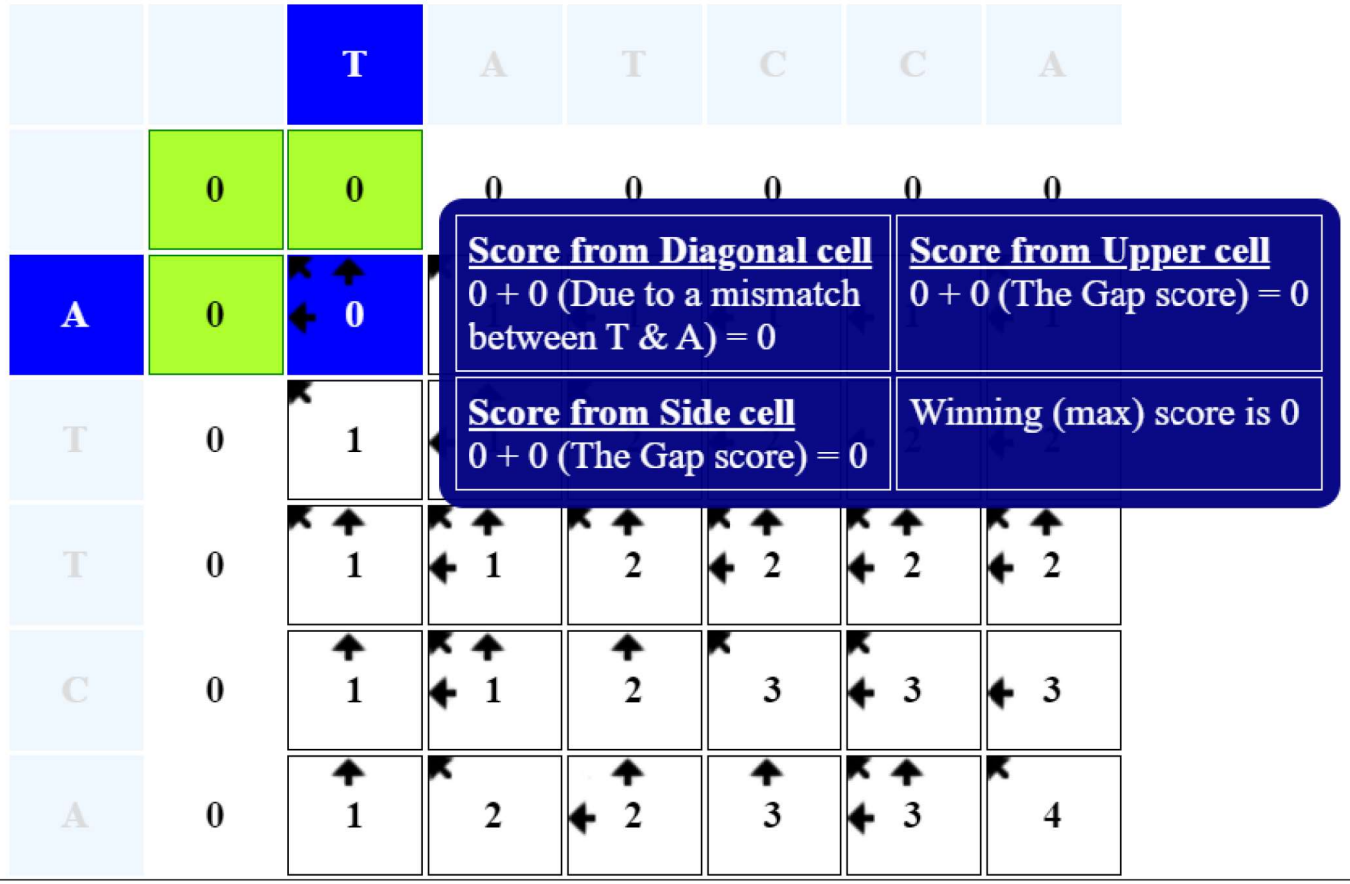
TATCCA

ATTCA

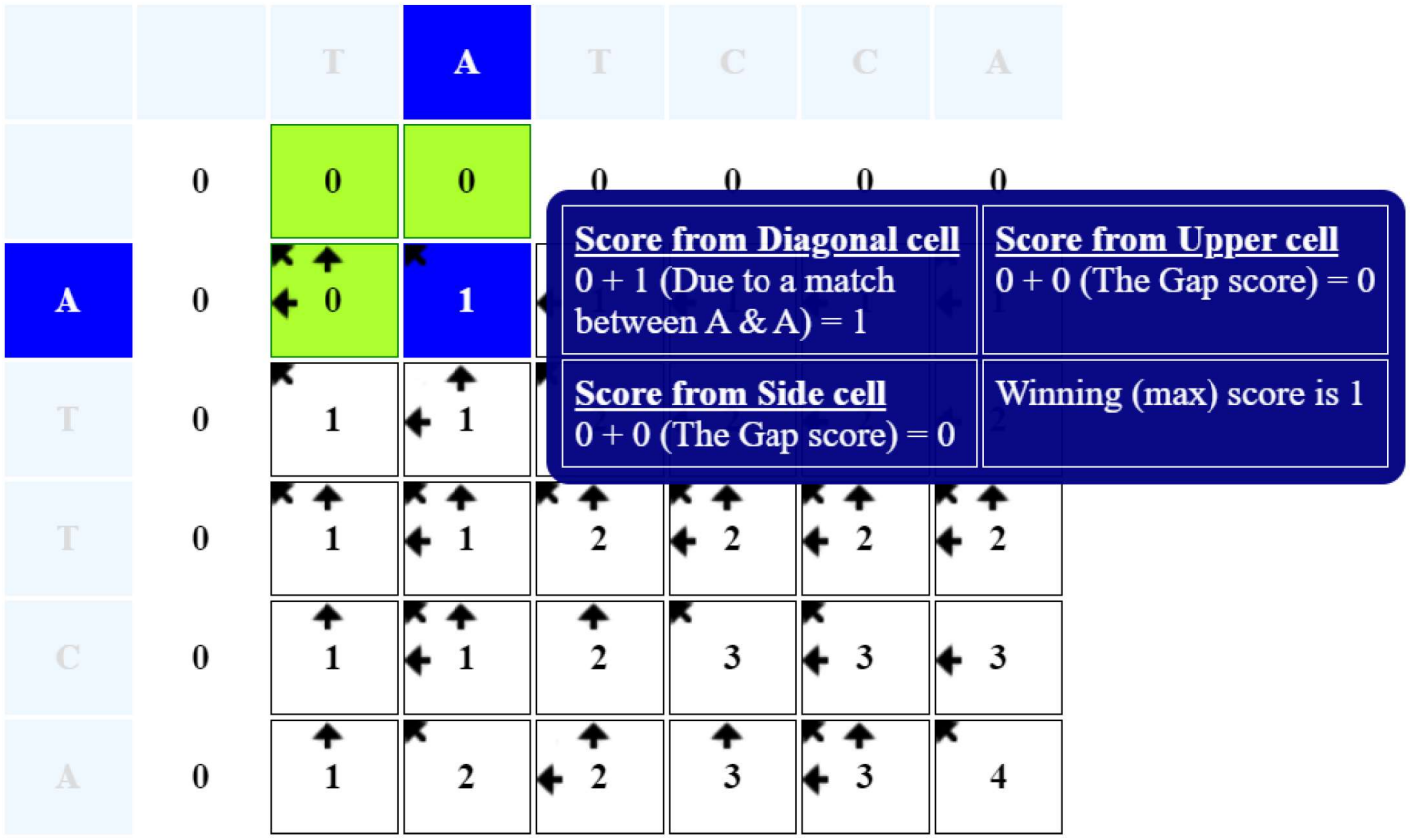
- Given Score(match)= 1
- Score(mismatch) = Score(gap) = 0

Reference:
https://bioboot.github.io/bimm143_W20/class-material/nw/

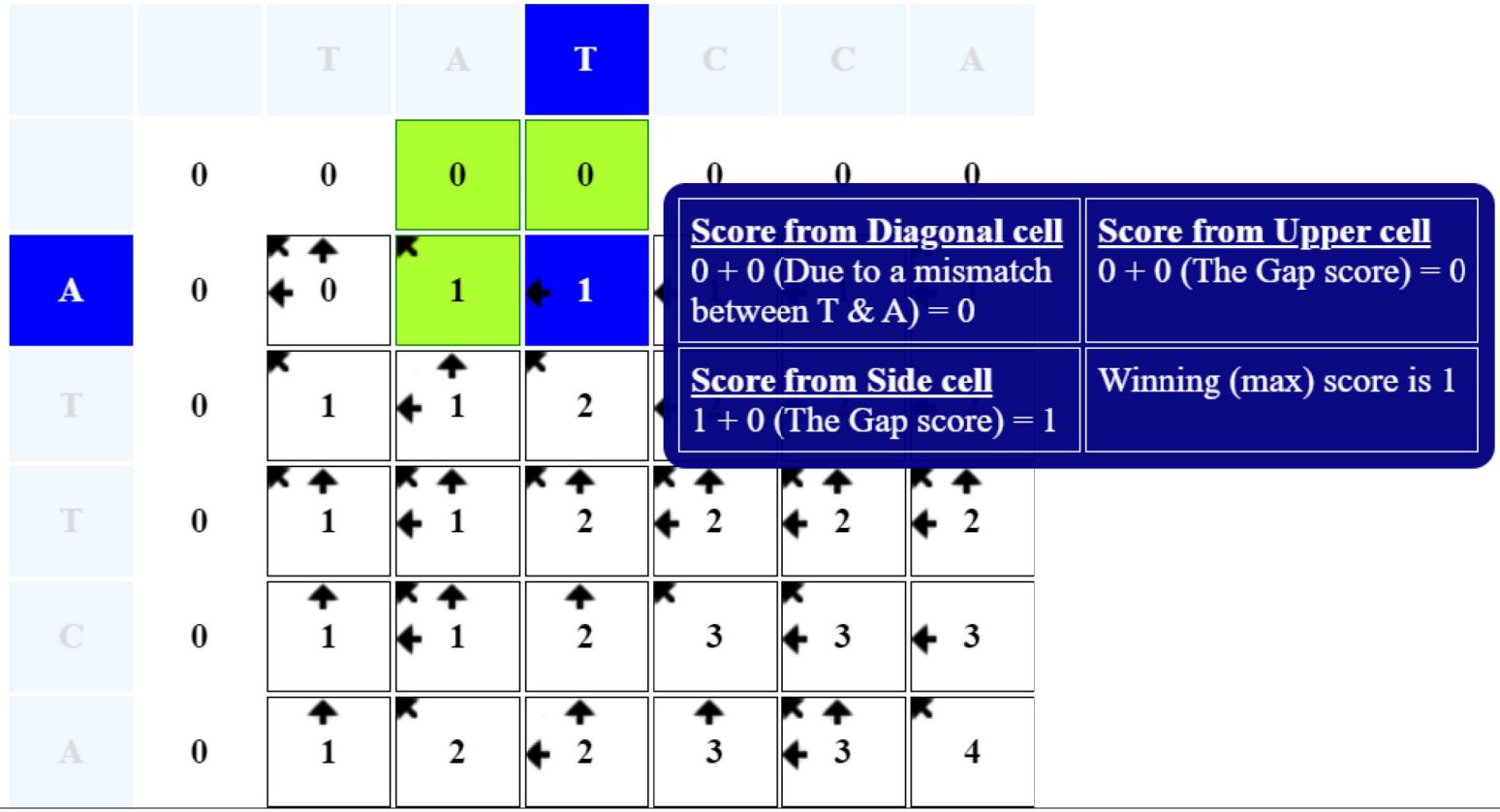
Sequence alignment Example



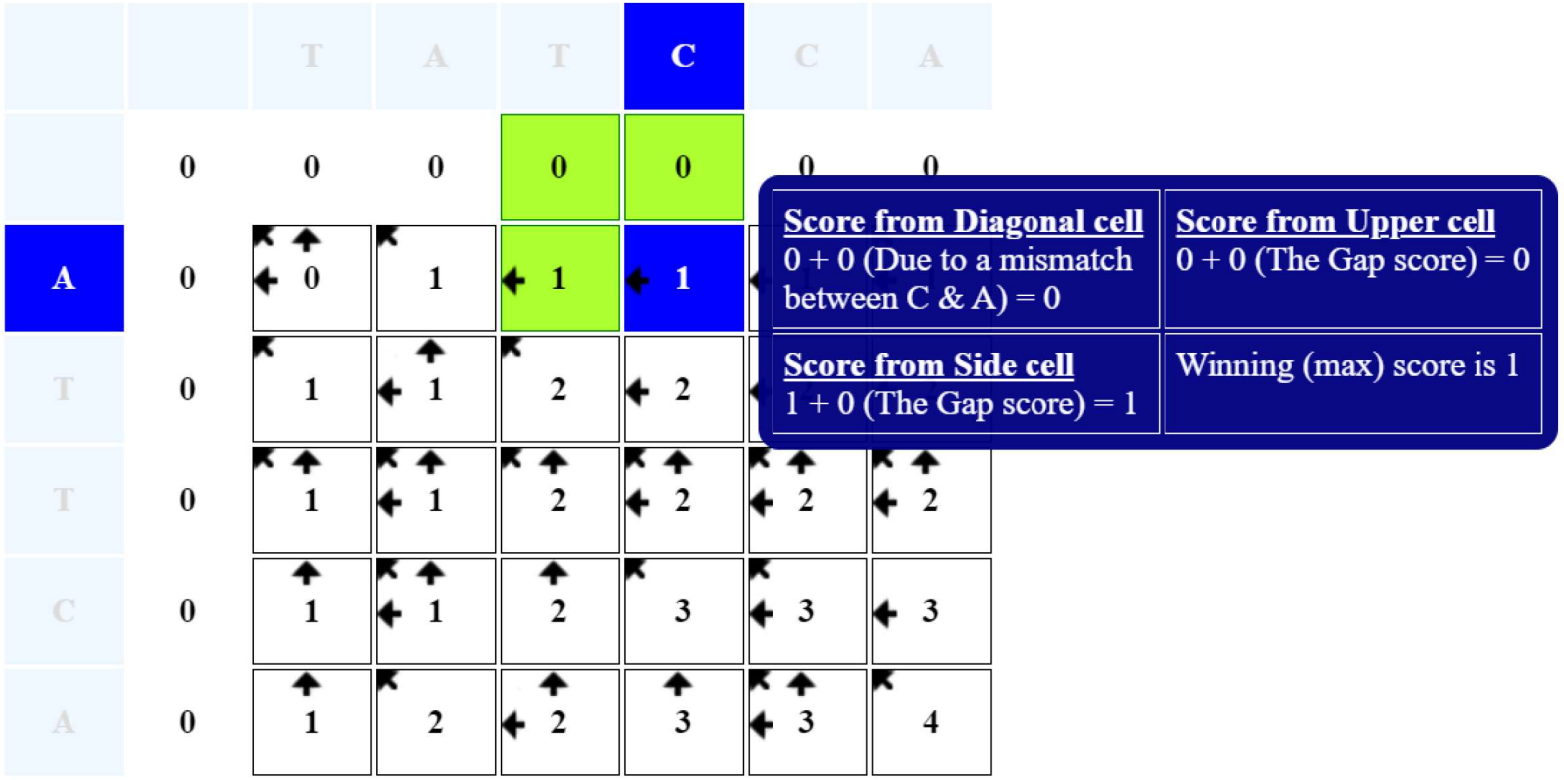
Sequence alignment Example



Sequence alignment Example



Sequence alignment Example



Sequence alignment Example

		T	A	T	C	C	A
	0	0	0	0	0	0	0
A	0	0	1	1	1	1	
T	0	1	1	2	2	2	
T	0	1	1	2	2	2	2
C	0	1	1	2	3	3	3
A	0	1	2	2	3	3	4

Score from Diagonal cell 0 + 0 (Due to a mismatch between C & A) = 0	**Score from Upper cell** 0 + 0 (The Gap score) = 0
Score from Side cell 1 + 0 (The Gap score) = 1	Winning (max) score is 1

Sequence alignment Example

		T	A	T	C	C	A
	0	0	0	0	0	0	0
A	0	0	1	1	1	1	1
T	0	1	1	2	2	2	2
T	0	1	1	2	2	2	2
C	0	1	1	2	3	3	3
A	0	1	2	2	3	3	4

Score from Diagonal cell 0 + 1 (Due to a match between A & A) = 1	**Score from Upper cell** 0 + 0 (The Gap score) = 0
Score from Side cell 1 + 0 (The Gap score) = 1	Winning (max) score is 1

Sequence Alignment Example

Scoring Matrix

Final Score=4

		T	A	T	C	C	A
	0	0	0	0	0	0	0
A	0	0	1	1	1	1	1
T	0	1	1	2	2	2	2
T	0	1	1	2	2	2	2
C	0	1	1	2	3	3	3
A	0	1	2	2	3	3	4

Sequence alignment Example - Backtracking

		T	A	T	C	C	A
	0	0	0	0	0	0	0
A	0	0	1	1	1	1	1
T	0	1	1	2	2	2	2
T	0	1	1	2	2	2	2
C	0	1	1	2	3	3	3
A	0	1	2	2	3	3	4

Alignment Path

T A T - C C A
- A T T C - A

Score = 4

Sequence alignment - Another Example

Find the best alignment of the following two sequences. Also, write the alignment score

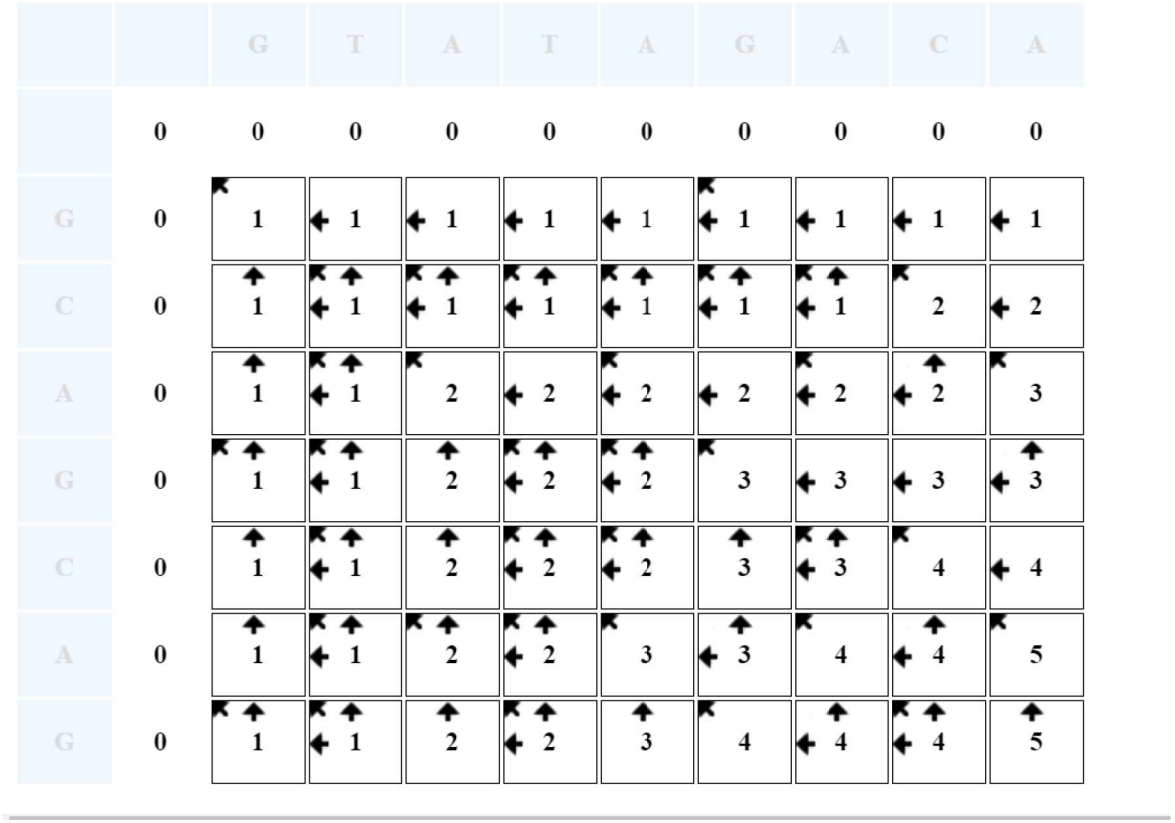
GTATAGACA
GCAGCAG

Given Score(match)= 1
Score(mismatch) = Score(gap) = 0

Sequence alignment - Another Example

Scoring Matrix

Final Score=5



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

Sequence alignment Example - Backtracking

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

Alignment Path

G - T A T A G A C A -

G C - A - - G - C A G