

Weight Matrix Concept Mode

Information in the table is used to calculate the weight matrix using the formula below.

Calculate weight of A nucleotide at position 1.

“Weight” value of an A at position 1 given the sequences is 0.17.

Greater than Zero means it is more likely than random chance.

Less than Zero means less likely than random chance.

Number of nucleotides at each alignment position

A	3	0	1	0	1
C	1	2	7	10	0
G	6	7	0	0	9
T	0	1	2	0	0

$$\text{Weight} = \ln \frac{(n_{ij} + p_{ij}) / (N + 1)}{p_{ij}}$$

N = total number of sequences used to make weight matrix

$$= \ln \frac{(3 + 0.25)}{(10 + 1)}$$

0.25

P_{ij} = Probability of the base at that position by chance. (4 possible bases,) 1/4 = 0.25

= 0.17

Compute

Weight Matrix

A	0.17	-2.40	-0.79	-2.40	-0.79
C	-0.79	-0.20	0.97	1.32	-2.40
G	0.82	0.97	-2.40	-2.40	1.21
T	-2.40	-0.79	-0.20	-2.40	-2.40

C	T	A	G	A	A	A
		0.17	0.97	-0.79	-2.40	-0.79
		Score: -2.84				

Weight Matrix Concept Mode

Number of nucleotides at each alignment position

A	3	0	1	0	1
C	1	2	7	10	0
G	6	7	0	0	9
T	0	1	2	0	0

$$Weight = Ln \frac{(n_{ij} + p_{ij}) / (N + 1)}{p_{ij}}$$

$$= Ln \frac{(3 + 0.25)}{(10 + 1)}$$

0.25

= 0.17

Compute

Weight Matrix

A	0.17	-2.40	-0.79	-2.40	-0.79
C	-0.79	-0.20	0.97	1.32	-2.40
G	0.82	0.97	-2.40	-2.40	1.21
T	-2.40	-0.79	-0.20	-2.40	-2.40

This calculation is made for all possible nucleotides at every position of the sequence.

The matrix is then used to scan a NEW sequence.

C	T	A	G	A	A	A
		0.17	0.97	-0.79	-2.40	-0.79
		Score: -2.84				

Score = sum of weights.

Weight Matrix Quiz Mode

C C T G C
C C T C T
C T T G C
C T T G C
G A T G C
C G A C C
C C G G C
T C T G C
C C T G C
T C T G C

Number of Columns (5 - 10)

Sequence Length (max = 50 bases)

The first step in quiz mode is to finish FILLING IN the nucleotide count table.

Number of nucleotides at each alignment position

A	0	1	1	0	<input type="text" value="0"/>
C	7	6	0	2	<input type="text" value="9"/>
G	1	1	1	8	<input type="text" value="0"/>
T	2	2	8	0	<input type="text" value="1"/>

Position 5: 9 Cs, 1 T
How easy is that?

Answers | Counts

kelleybioinfo.org/algorithms/weightmatrix/Check

	Solution	Your Answers
A	0	0
C	9	9
G	0	0
T	1	1

Weight Matrix Quiz Mode

Weight Value for T
at position 3 is 1.10

= 1.10

Weight Matrix

A	-2.40	-0.79	-0.79	-2.40	-2.40
C	0.97	0.82	-2.40	-0.20	1.21
G	-0.79	-0.79	-0.79	1.10	-2.40
T	-0.20	0.20	1.10	-2.40	-0.79

Check Answers

The formula can be used to FILL IN THE WEIGHT MATRIX TABLE missing values based on the nucleotide counts.

Answers | Weights

kelleybioinfo.org/algorithms/weightmatrix/Check

	Solution	Your Answers
A	-0.79	-0.79
C	-2.40	-2.40
G	-0.79	-0.79
T	1.10	1.10

The last step is to use the correct Weight Matrix to determine the best match in the sequence at the bottom.

Answers

kelleybioinfo.org/algorithm/weightmatrix/CheckScore.php?window

Sequence	T	A	T	A	C	Score
Weight	-0.20	-0.79	1.10	-2.40	1.21	-1.08
Your Answers	-0.20	-0.79	1.10	-2.40	1.21	-1.18

Weight Matrix

A	-2.40	-0.79	-0.79	-2.40	-2.40
C	0.97	0.82	-2.40	-0.20	1.21
G	-0.79	-0.79	-0.79	1.10	-2.40
T	-0.20	-0.20	1.10	-2.40	-0.79

Check Answers

Use mouse or finger to slide the matrix along the sequence by touching the letters.

Fill in the boxes under each nucleotide, and the Score Box.

A	T	C	T	A	T	A	C	G	A
			-0.20	-0.79	1.10	-2.40	1.21		
			Score: -1.18						
			Check Answers		Reset				