

ECS129

Examples of Sequence Alignments Using Dynamic Programming

In all the example below:

- Fill in the matrix
- Write one of the alignments with optimal score

Example 1:

Match: +2; Mismatch 0; Gap 0

	G	A	T	T	A	G	C
A	0	2	0	0	2	0	0
T	0	0	4	4	2	2	2
T	0	0	4	6	4	4	4
A	0	2	2	4	8	6	6
C	0	0	2	4	6	8	10

Only one alignment:

```
G A T T A G C
  A T T A - C
```

Example 2:

Match: +2; Mismatch 0; Gap -2 (no gap cost at the beginning)

	G	A	T	T	A	G	C
A	0	2	0	0	2	0	0
T	0	0	4	2	0	2	0
T	0	0	2	6	2	2	2
A	0	2	0	2	8	4	4
C	0	0	2	2	4	8	8

2 possible alignments:

```
G A T T A G C
  A T T A - C

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

Example 3

Match: +1; Mismatch: 0; Gap: -1 (no gap cost at the beginning)

	I	N	D	U	S	T	R	Y
I	1	0	0	0	0	0	0	0
N	0	2	0	0	0	0	0	0
T	0	0	2	1	1	2	1	1
E	0	0	1	2	1	1	2	1
R	0	0	1	1	2	1	2	2
E	0	0	1	1	1	2	1	2
S	0	0	1	1	2	1	2	1
T	0	0	1	1	1	3	1	2

I N D U - - S T R Y ; I N D - - U S T R Y ; I N - - D U S T R Y
 I N T E R E S T ; I N T E R E S T ; I N T E R E S T

Example 4

Match: +10; Mismatch: -5; Gap: -5 (no gap cost at the beginning)

	I	N	D	U	S	T	R	Y
I	10	-5	-5	-5	-5	-5	-5	-5
N	-5	20	0	0	0	0	0	0
T	-5	0	15	10	10	25	10	10
E	-5	0	10	10	5	5	20	15
R	-5	0	10	5	5	0	30	15
E	-5	0	10	5	0	0	15	25
S	-5	0	10	5	15	0	15	20
T	-5	0	10	5	0	25	15	20

Many more alignments, including the three before:

I N D U - S T R Y ; I N D - U S T R Y ; I N - - D U S T R Y
 I N T E R E S T ; I N T E R E S T ; I N T E R E S T

Example 5:

Match: +10; Mismatch: +3; Gap: -8 (no gap cost at the beginning)

	G	S	A	Q	V	K	G	H	H	K	K	V
G	10	3	3	3	3	3	10	3	3	3	3	3
N	3	13	6	6	6	6	6	13	6	6	6	6
P	3	6	16	9	9	9	9	9	16	9	9	9
K	3	6	9	19	12	19	12	12	12	26	19	12
V	3	6	9	12	29	15	22	15	15	15	29	29
K	3	6	9	12	15	39	24	25	24	31	31	32
A	3	6	16	12	15	24	42	34	34	34	34	34
H	3	6	9	19	15	24	34	52	44	37	37	37
G	10	6	9	12	22	24	41	37	55	47	47	47
K	3	13	9	12	15	32	34	44	47	65	57	50
K	3	6	16	12	15	31	35	37	47	57	75	60
V	3	6	9	19	22	18	34	38	47	50	60	85

G S A Q V K G H H K K V
 G N P K V K A H G K K V