3 Exercises – Extension of global alignment

1. DP with score matrix

Use the score matrix below with gap penalty g = 1 and answer the following questions.

| | С | G | Α | Τ |
|---|---|---|---|---|
| С | 1 | 0 | 0 | 0 |
| G | | 1 | 1 | 0 |
| Α | | | 1 | 0 |
| Т | | | | 1 |

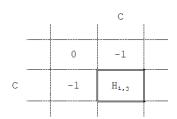
- (a) Calculate the alignment score.
 - Alignment 1

q: ATGCT d: CA--T

• Alignment 2

q: CAGCT d: C-A-T

- (b) Use the simple scorning scheme and fill the empty cells with appropriate scores.
 - Table A



• Table B

| | C | A | |
|---|----|------------------|--|
| | | | |
| A | 0 | 2 | |
| G | -1 | H _{i,j} | |
| | | | |

(c) Fill the empty cells with appropriate scores in the DP table. What is the optimal alignment score?

| q\d | | С | A | Т |
|-----|----|----|----|----|
| | 0 | -1 | -2 | -3 |
| С | -1 | | 0 | -1 |
| A | -2 | 0 | 2 | 1 |
| G | -3 | -1 | | 2 |
| С | -4 | -2 | | 1 |
| Т | -5 | -3 | -1 | |

(d) There are two different alignments that give the same optimal score in the solution above. Specify both of them.