

1	2	3	$\Sigma$

## Assignment 4

(Abgabe am 9. November 2015)

### Theoretical Assignment - *Optimal multiple alignment*

To calculate our MSA we use the recursion written down on page 50 in the script.

$$F(i_1, i_2, i_3) = \max \begin{cases} F(i_1 - 1, i_2 - 1, i_3 - 1) + s_{SP}(a_{1i_1}, a_{2i_2}, a_{3i_3}) \\ F(i_1 - 1, i_2 - 1, i_3) + s_{SP}(a_{1i_1}, a_{2i_2}, -) \\ F(i_1 - 1, i_2, i_3 - 1) + s_{SP}(a_{1i_1}, -, a_{3i_3}) \\ F(i_1, i_2 - 1, i_3 - 1) + s_{SP}(-, a_{2i_2}, a_{3i_3}) \\ F(i_1 - 1, i_2, i_3) + s_{SP}(a_{1i_1}, -, -) \\ F(i_1, i_2 - 1, i_3) + s_{SP}(-, a_{2i_2}, -) \\ F(i_1, i_2, i_3 - 1) + s_{SP}(-, -, a_{3i_3}) \end{cases}$$

If we fill the DP matrix using this recursion, we get the following MSA:

$$\begin{pmatrix} C & T & T \\ - & T & C \\ C & C & T \end{pmatrix} \quad (1)$$

with score  $\alpha_{SP}(A^*) = S(A, B) + S(A, C) + S(B, C) = -2 + 2 + (-6) = -6$ .

### Theoretical Assignment - *Progressive alignment*

### Practical Assignment - *Comparing multiple alignment*