Exercises – Phylogenetics

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http://wiki.techfak.uni-bielefeld.de/gi/Teaching/2015winter/Phylogenetik

XMas List – 22.12.2015

The points on this exercise list are no part of the 100%, but they'll be added to your total points.
You don't have to do the exercises, this is completely voluntary Due to 07.01.2015 in your exercise group.

Exercise 1 Perfect Phylogeny: Construction. **(2 Points)**

Use the $\mathcal{O}(mn)$ Algorithm (lecture notes, pages 22–23) to create a PP from the given matrix. Write down the intermediate results after the steps 1 and 2.

	1	2	3	4	5
A	1	1	0	1	0
B	0	0	1	1	0
C	1	0	0	1	0
D	0	0	1	1	1
E	0	0	0	0	0

Exercise 2 Small Parsimony Problem. **(2 Points)**

Compare the algorithms from Fitch and Sankoff. Point out their similarities and differences.
Try to explain the run-time of the algorithms.

Exercise 3 Maximum Parsimony **(2 Points)**

Write a pseudo-code for the *row-wise Branch-and-Bound*.

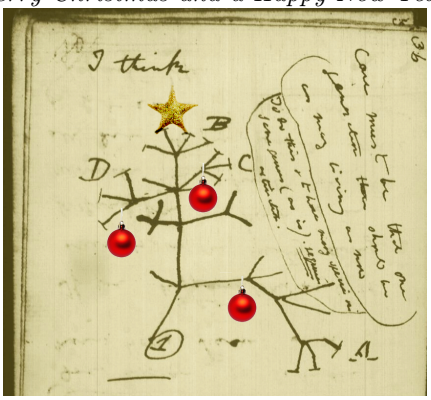
Exercise 4 Programming: Neighbor Joining **(4 Points)**

Implement the *NJ-algorithm*. You can use any language. Send your (documented!) code and an example how to run it to your T.A. Remember the run-time $\mathcal{O}(n^3)$.

Exercise 5 Clustering-Methods for reconstruction of trees. **(3 Points)**

Two methods for agglomerative clustering were used on exercise list 7 to reconstruct one tree from a given matrix. Use the other to methods, *complete linkage clustering* and *UPGMA*, on the same distance matrix.

Merry Christmas and a Happy New Year!



Darwin's (Christmas) tree