

Algorithms in Bioinformatics 2, SoSe2007

Assignment sheet # 1

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1 Phylogeography of dusky dolphins (3 points)

A recent paper (I. Cassens, K. van Waerebeek, P.B. Best, E.A. Crespo, J. Reyes and M.C. Milinkovitch, 2003, available from http://www.ulb.ac.be/sciences/ueg/pdf_files/Cassens&al_03.pdf) uses network methods to study the the phylogeography of dusky dolphins.

- Please describe the question that the paper addresses.
- What type of data is used and why do network methods seem appropriate?
- What do the networks show and what is the conclusion of the paper?

To solve the following problems, please download and install the program **SplitsTree4**, available from <http://www.splitstree.org>.

2 Networks for dusky dolphins (3 points)

Using the data contained in the above mentioned paper, please compute the following trees and networks:

- Neighbor-joining tree
- Split decomposition network
- Median network (first convert the alignment into binary data, how?)

Please discuss and compare the three different results.

3 Split networks and hybridization networks (4 points)

Consider the following four trees given in Newick format:

```
((a,c),(o,((e,b),(f,d))));  
(a,(o,(((e,b),(f,d)),c)));  
(((b,(f,e)),d),(c,a)),o);  
(a,(o,(((f,e),b),d),c)));
```

Using *o* as an outgroup taxon, compute and draw the following:

- all four trees, rooted using *o*.
- the strict consensus of these trees, rooted using *o*.
- the splits network representing all splits present in the set of trees, rooted using *o*.
- a hybridization network that contains all these trees, rooted using *o*.

Please discuss the conceptual difference between the splits network and the hybridization network.

Assignments due: **Monday, July 02, 10h**