Exercises – Algorithms for Genome Rearrangement

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Exercise List 5 — 11.05.2014

Discussion of exercises on: 18.05.2014
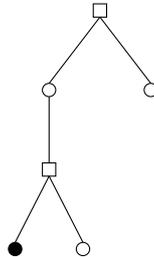
Exercise 1 (3 Points)

Consider the permutation $\pi = (\,0\ 3\ 10\ 9\ 4\ 2\ 1\ 5\ 7\ 6\ 8\ 11\ 13\ 12\ 14\,)$.

(a) Draw the elementary intervals graph.

(b) Find the components of this permutation.

(c) Draw the tree T_P and find a minimal cover of T_P. What is the reversal distance $d(\pi)$?

Exercise 2 (3 Points)

Consider the following tree T_P:

Find a permutation π that has a component tree like T_P above.

Exercise 3 (3 Points)

Write a pseudo-code that receives as input a (signed) permutation of the set $\{0, \ldots, n\}$, where the first element is zero and the last is n, and returns the number of cycles in the breakpoint graph. What is the complexity of your algorithm? Assume that you can perform simple set operations (add/remove element, access element) in constant time.

Exercise 4 (2 Points)

Show that there is always a minimal cover of a tree T_P with 0 or 1 short path.