Exercises – Algorithms for Genome Research

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http://wiki.techfak.uni-bielefeld.de/gi/Teaching/2014winter/AlgoGR

Exercise List 4 — 21.11.2014

Discussion of exercises on: 28.11.2014

Exercise 1 Given the following genomes:

$$A = \{1_t, 1_h6_h, 6_t2_h, 2_t5_t, 5_h4_h, 4_t, 3_h, 3_t7_t, 7_h, 9_h8_t, 8_h9_t, 12_t10_h, 10_t11_t, 11_h12_h\}$$

$$B = \{3_h1_t, 1_h2_t, 2_h3_t, 4_t, 4_h5_t, 5_h6_t, 6_h7_t, 7_h8_t, 8_h9_t, 9_h, 12_h10_t, 10_h11_t, 11_h12_t\}$$

(a) Draw the chromosomes of A and B.

(b) Draw the adjacency graph of A and B.

(c) Compute the DCJ distance between A and B.

(d) Find 3 different DCJ operations applied in A that decrease its distance to B, and redraw the adjacency graph for each operation.

(e) What is type of the operations that you applied in (c)? (Reversal, translocation, fission...)

Exercise 2 Given a genome A with l_1 linear chromosomes, and B with l_2 linear chromosomes, how many paths does the adjacency graph $AG(A, B)$ have?

Exercise 3 The reversal distance between the permutation $\pi = (1\ 3\ 2\ 4)$ and the identity $(1\ 2\ 3\ 4)$ is 3. But the DCJ distance between these two genomes is 2. Why?