

Algorithms in Comparative Genomics

Universität Bielefeld, SS 2024

Dr. Marília D. V. Braga · Dr. Roland Wittler · M.Sc. Leonard Bohnenkämper

<https://gi.cebitec.uni-bielefeld.de/teaching/2024summer/cg>

Exercise sheet 6, 17.05.2024

Exercise 1 (SCJ und DCJ Halving)

(6 pts)

Calculate the SCJ and DCJ halving distances for the following duplicated genome:

$$\mathbb{D} = \{[\bar{1} 4], [\bar{5} \bar{3} \bar{2} \bar{4} 1 \bar{2} \bar{6} \bar{6} 3 5 7 \bar{7}]\}$$

Also give a sorting scenario and the perfectly duplicated genome \mathbb{P} as well as the ancestor \mathbb{S} immediately before the duplication (i.e. $\mathbb{P} \in \mathbb{S}$).

Exercise 2 (Size of $2 \times \mathbb{S}$)

(2 pts)

Give a formula for the cardinality of $2 \times \mathbb{S}$ for any singular genome \mathbb{S} ?

Exercise 3 (Halving with the maximum number of telomeres)

(6 pts)

Develop an algorithm that sorts the supernatural diagram with the minimum number of DCJ operations, but that also results in the perfectly duplicated genome having the maximum number of telomeres for a perfect sorting-