

# Algorithms in Comparative Genomics

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

**Exercise sheet 9, 14.06.2024**

## Exercise 1 DCJ-indel Distance

(8 pts)

Consider the following pair of genomes (from the previous exercise sheet):  $\mathbb{A} = \{[1\ 2\ 3], [4\ 5], [6]\}$ ,  $\mathbb{B} = \{[\bar{1}\ 7\ 3][\bar{4}\ 8\ 6][9\ 10]\}$ .

1. Calculate the DCJ-indel distance for this pair of genomes.
2. Apply Algorithm 2 from Bohnenkämper 2024 (Appendix) to sort  $\mathbb{A}$  into  $\mathbb{B}$ .
3. Can you find an alternative scenario that does not follow the steps of the algorithm?
4. Remove all singular markers from  $\mathbb{A}, \mathbb{B}$  and calculate the DCJ-distance between the resulting two genomes  $\mathbb{A}', \mathbb{B}'$ . Which of the two distances is higher?
5. Generalize and prove your finding from the previous exercise.