Algorithms in Genome Research
Winter 2019/2020

Exercises

Number 9, Discussion: 2020 January 24

1. Given the following two genomes:

$$A = (\circ\ 11\ -12\ \circ)\quad (\circ\ 2\ 3\ -4\ 5\ 6\ 7\circ)\quad (-9\ -10\ 1\ 8)$$
$$B = (1\ 2\ 5\ 3\ -4\ 6\ 7)\quad (\circ\ 8\ -9\ -10\ 11\ -12\ \circ)$$

   (a) draw the genome graph of A and B,

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

   (c) What is the DCJ distance between A and B?

   (d) Give an optimal DCJ sorting scenario from A to B and name the operations in your sorting scenario.

   (e) If any of your intermediate genomes contains a circular intermediate chromosome, try to find an alternative optimal scenario that does not contain such a chromosome.

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

3. How many different optimal DCJ sorting scenarios exist for the following two genomes?

$$A = (\circ\ 1\ \circ)\quad (\circ\ 4\ 3\ 2\ 5\ \circ)$$
$$B = (\circ\ 1\ 2\ 3\ 4\ 5\ \circ)$$