Algorithms in Comparative Genomics

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https://gi.cebitec.uni-bielefeld.de/teaching/2019winter/cg

Exercise sheet 9, 12.12.2019

Exercise 1 (Computing IMin)

Develop an $O(n)$ algorithm for finding the bounds of intervals $IMin[p_i]$ for all p_i in a permutation p of size n. (Suggestion: Find the left and right bounds separately.)

Exercise 2 (Generators for common intervals)

For the permutation (4 3 2 1 5 6 7),

1. compute generator (Sup, Inf),
2. visualize the intervals $(i..R[i])$ and $(L[i]..i)$, and
3. calculate *Support* for R.

Exercise 3 (Combining generators)

Prove (in your own words) the following lemma:

Lemma. *Let (R_1, L_1) and (R_2, L_2) be generators for common intervals of two sets $\mathcal{P}_1$ and $\mathcal{P}_2$. The pair $(\min(R_1, R_2), \max(L_1, L_2))$ is a generator for the common intervals of $\mathcal{P}_1 \cup \mathcal{P}_2$.*

Note that $\min(R_1, R_2)$ at position i is defined as $\min(R_1[i], R_2[i])$ and $\max(L_1, L_2)$ is defined analogously.