Bielefeld University
Faculty of Technology

AG Genominformatik
Prof. Dr. Jens Stoye

Algorithms in Genome Research
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Exercises

Exercise 12, 26.01.2018

1. Develop a test that allows to check if an interval $(i..j)$, $1 \leq i \leq j \leq n$ is a common interval of a permutation π of size n *without* using generators. Can this test be achieved in constant time?

2. Develop an $O(n)$ algorithm for finding all left bounds of intervals of IMin of a permutation of size n.

3. Given permutation $\pi = (5\ 4\ 3\ 1\ 6\ 7\ 8)$,

   (a) compute generators (Sup, Inf),

   (b) visualize their intervals $(i..R[i])$ and $(L[i]..i)$, and

   (c) find the canonical generator

4. Prove that the following algorithm for building an inclusion tree from a commuting set of intervals runs F in $O(|F|)$ time:

Algorithm 7. Building the inclusion tree of a proper commuting family $\mathcal{F}$.

```
Bucket-sort in decreasing order the intervals of F according to their right bound
Bucket-sort in increasing order the intervals of F according to their left bound
Let I_1..I_m be the list of sorted intervals
F ← I_1 (* I_1 = V is the root *)
k ← 2
While k ≤ m
    If I_k ⊂ F
        Parent(I_k) ← F
        F ← I_k
        k ← k + 1
    else
        F ← Parent(F)
```