Universität Greifswald Institute für Mathematik and Informatik Marc Hellmuth

9. Übung "Bioinformatik", SS 16

Aufgabe 1: (5+5+5=15 Credits)

Given ordered forests F_1 , F_2 and F_3 . Let M_1 be an ordered edit map from F_1 to F_2 and M_2 be an ordered edit map from F_2 to F_3 . Prove:

- (a) $M_1 \circ M_2$ is an ordered edit map from from F_1 to F_3
- (b) $\gamma(M_1 \circ M_2) \leq \gamma(M_1) + \gamma(M_2)$

Let v_i be the root of the right-most tree in F_i , i = 1, 2. Prove:

(c) If v_1 and v_2 have both "partners" w.r.t. to an optimal map M_1 , i.e., $(v_1, h), (k, v_2) \in M_1$, then $k = v_1, h = v_2$ and hence, $(v_1, v_2) \in M_1$.

Aufgabe 2: (2+8=10 Credits)

Given the secondary structures $S_1 = (\ldots)(\ldots)$ and $S_2 = ((\ldots))(\ldots)$

- (a) Give the tree representation T_1 , resp., T_2 of S_1 , resp., S_2 together with preordered labeled vertices.
- (b) Determine the tree edit distance of these trees (use the edit costs for RNA-trees as given in the lecture). Give the determined optimal ordered edit map and the respective sequence of edit operations that transform T_1 into T_2 .

Deadline: Monday - June 27th, 2016 - 2pm