Formale Übersetzungsmodelle

Task 10 (powerset construction)

Let $\Sigma = \{\alpha^{(0)}, \sigma^{(2)}\}$ be a ranked alphabet. Consider the bottom-up finite state tree automaton $N = (\{q_0, q_1\}, \Sigma, \Sigma, \{q_0\}, R)$ where R is given by

$$\alpha \to q_0(\alpha) \qquad \text{and} \qquad \sigma(q_i(x_1), q_j(x_2)) \to q_{1-k}(\sigma(x_1, x_2))$$

for every $i, j \in \{0, 1\}$ and $k \in \{i, j\}$.

(a) Determine the tree language of N.

(b) Use the powerset construction to give a deterministic bottom-up finite state tree automaton N_{det} such that $\tau(N) = \tau(N_{\text{det}})$.

Task 11 (bounded growth property)

Prove the following statement [cf. Eng75, Lem. 1.1, p. 205]:

Claim. There exists a $c \in \mathbb{N}$ such that for every $(s, t) \in \tau(M)$ holds $\mathsf{height}(t) \leq c \cdot \mathsf{height}(s)$.

References

[Eng75] J. Engelfriet. “Bottom-up and top-down tree transformations—a comparison”. In: *Mathematical systems theory* 9.2 (1975), pp. 198–231. issn: 0025-5661. doi: 10.1007/BF01704020.

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