Formale Übersetzungsmodelle

Task 24 (BOT^2 *and* TOP^2*)*

Let $\Sigma = \{\sigma^{(2)}, \gamma^{(1)}, \alpha^{(0)}, \beta^{(0)}\}$ be a ranked alphabet. Consider the bu-tt $B = (Q_B, \Sigma, \Sigma, F, R_B)$ and the td-tt $T = (Q_T, \Sigma, \Sigma, I, R_T)$ where $Q_B = \{*, q, q_f\}$, $F = \{q_f\}$, $Q_T = \{*, q\}$, $I = \{*\}$, and

$$
\begin{aligned}
R_B = \{\ & \sigma(*(x_1), *(x_2)) \to *(\sigma(x_1, x_2)), \\
& \sigma(*(x_1), q(x_2)) \to q_f(x_1), \\
& \gamma(*(x_1)) \to *(\gamma(x_1)), \\
& \gamma(q(x_1)) \to q(\gamma(x_1)), \\
& \gamma(q_f(x_1)) \to q_f(\gamma(x_1)), \\
& \alpha \to *(\alpha),\ \ \alpha \to q(\alpha),\ \ \beta \to q(\beta)\ \ \}
\end{aligned}
\qquad
\begin{aligned}
R_T = \{\ & q(\sigma(x_1, x_2)) \to \sigma(q(x_1), q(x_2)), \\
& *(\sigma(x_1, x_2)) \to \sigma(q(x_1), *(x_1)), \\
& *(\sigma(x_1, x_2)) \to \sigma(*(x_1), q(x_1)), \\
& *(\gamma(x_1)) \to \gamma(*(x_1)), \\
& q(\gamma(x_1)) \to \gamma(q(x_1)), \\
& *(\alpha) \to \alpha,\ \ q(\alpha) \to \alpha,\ \ *(\beta) \to \beta\ \ \}
\end{aligned}
$$

(a) Identify the bottom-up and top-down specific properties of $\tau(B)$ and $\tau(T)$.

(b) Give td-tt T_1 and T_2 and bu-tt B_1 and B_2 such that $\tau(B) = \tau(T_1); \tau(T_2)$ and $\tau(T) = \tau(B_1); \tau(B_2)$.

Task 25 (exploring the search space)

Let $\Sigma = \{\sigma^{(2)}, \gamma^{(1)}, \alpha^0\}$ and $\Delta = \{\sigma^{(2)}, \gamma^{(1)}, \gamma'^{(1)}, \alpha^0\}$ be ranked alphabets. Consider the tree $\xi = \sigma(\gamma(\alpha), \sigma(\alpha, \alpha))$.

(a) The tree transformation τ decides at every σ whether to delete one of the subtrees (replacing σ with γ') or none. If a subtree is deleted it then ensures that the remaining subtree contains a γ. Give a td-tt T such that $\tau = \tau(T)$.

(b) Give all derivations of T for ξ.

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