Formale Übersetzungsmodelle

Exercise 30 (Baker's Theorem for BOT, I)

Let $\Sigma = \{\alpha^{(0)}, \gamma^{(1)}\}$, $\Delta = \{\alpha^{(0)}, \gamma^{(1)}, \sigma^{(2)}, \tau^{(2)}\}$ be ranked alphabets. Consider the bu-tt $B_1 = (Q, \Sigma, \Delta, F_1, R_1)$ and $B_2 = (P, \Delta, \Delta, F_2, R_2)$, where

- $Q = F_1 = \{*\}$, $P = \{q, p\}$, $F_2 = \{q\}$
- $R_1 = \{\ \alpha \to *(\alpha),\ \gamma(*(x_1)) \to *(\sigma(x_1, x_1)),\ \gamma(*(x_1)) \to *(\tau(x_1, x_1))\ \}$, and
  $R_2 = \{\ \alpha \to q(\alpha),\ \sigma(q(x_1), q(x_2)) \to p(\sigma(x_1, x_2)),\ \tau(p(x_1), p(x_2)) \to q(\tau(\gamma(x_1), \gamma(x_2)))\}$.

(a) Do B_1 and B_2 satisfy the conditions demanded in Baker's theorem for BOT?

(b) Apply Baker's construction to B_1 and B_2!

(c) Denote the result of the above construction by B. Is $\tau(B) = \tau(B_1) \circ \tau(B_2)$?

Exercise 31 (Baker's Theorem for BOT, II)

Let $\Sigma = \{\alpha^{(0)}, \gamma^{(1)}\}$, $\Delta = \{\alpha^{(0)}, \beta^{(0)}\}$, and $\Omega = \{\beta^{(0)}\}$ be ranked alphabets. Consider the bu-tt $B_1 = (Q, \Sigma, \Delta, F_1, R_1)$ and $B_2 = (P, \Delta, \Omega, F_2, R_2)$, where

- $Q = F_1 = \{q\}$, $P = F_2 = \{p\}$,
- $R_1 = \{\ \alpha \to q(\alpha),\ \gamma(q(x_1)) \to q(\beta)\ \}$, and $R_2 = \{\ \beta \to p(\beta)\ \}$.

(a) Do B_1 and B_2 satisfy the conditions demanded in Baker's theorem for BOT?

(b) Apply Baker's construction to B_1 and B_2!

(c) Denote the result of the above construction by B. Is $\tau(B) = \tau(B_1) \circ \tau(B_2)$?

Exercise 32 (Baker's Theorem for BOT, III)

Let $\Sigma = \{\sigma^{(2)}, \tau^{(2)}, \gamma^{(1)}, \alpha^{(0)}\}$ be a ranked alphabet. Consider the bu-tt $B_1 = (Q, \Sigma, \Sigma, F_1, R_1)$ and $B_2 = (P, \Sigma, \Sigma, F_2, R_2)$, where

- $Q = F_1 = \{q\}$, $P = F_2 = \{p\}$,
- $R_1 = \{\ \alpha \to q(\alpha),\ \gamma(q(x_1)) \to q(\sigma(x_1, x_1))\ \}$, and
  $R_2 = \{\ \alpha \to p(\alpha),\ \sigma(p(x_1), p(x_2)) \to p(\sigma(x_1, x_2)),\ \sigma(p(x_1), p(x_2)) \to p(\tau(x_1, x_2))\}$.

(a) Do B_1 and B_2 satisfy the conditions demanded in Baker's theorem for BOT?

(b) Apply Baker's construction to B_1 and B_2!

(c) Denote the result of the above construction by B. Is $\tau(B) = \tau(B_1) \circ \tau(B_2)$?

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