

Formale Übersetzungsmodelle

Task 16 (Symbolic derivation)

Let $k \in \mathbb{N}$ and $\Sigma = \{+^{(2)}, \cdot^{(2)}, -^{(1)}, \sin^{(1)}, \cos^{(1)}, X^{(0)}\} \cup \{0^{(0)}, \dots, k^{(0)}\}$ a ranked alphabet. The trees over Σ represent a subset of polynomials with natural number coefficients.

- (a) Give a td-tt T that computes the symbolic derivation of a given tree.
- (b) Give a derivation for $\xi = \cdot(+(\sin(\cdot(X, X)), 5), X)$ in T .
- (c) Why is there no bu-tt B' such that $\tau(T) = \tau(B')$?
- (d) Give a bu-tt B that simplifies a given tree according to the units with respect to \cdot and $+$ and the absorbing nature of 0 with respect to \cdot , in particular, B should collapse $\cdot(\xi, 1)$, $\cdot(1, \xi)$, $+(\xi, 0)$, or $+(0, \xi)$ to ξ and $\cdot(\xi, 0)$ or $\cdot(0, \xi)$ to 0 for every $\xi \in T_\Sigma$.
- (e) Why is there no td-tt T' such that $\tau(B) = \tau(T')$?