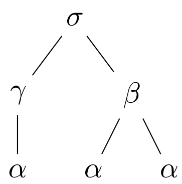
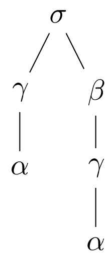
Formale Übersetzungsmodelle

Task 1 (ranked alphabets and trees)

Consider the following trees:

$\xi_1 =$  $\xi_2 =$ 

(a) Give $\mathsf{height}(\xi_i)$, $\mathsf{size}(\xi_i)$, $\mathsf{pos}(\xi_i)$, $\mathsf{sub}(\xi_i)$ for $i \in \{1, 2\}$.

(b) Extend the intersection, union, and subset relation to ranked alphabets.

(c) Define minimal ranked alphabets Δ_1 and Δ_2 such that $\xi_1 \in \mathrm{T}_{\Delta_1}$ and $\xi_2 \in \mathrm{T}_{\Delta_2}$.

(d) Prove or refute: There is a ranked alphabet Γ such that $\xi_1, \xi_2 \in \mathrm{T}_\Gamma$.

Task 2 (definition by structural induction)

Let Σ be a ranked alphabet, A a set, $\xi \in \mathrm{T}_\Sigma(A)$, $w \in \mathsf{pos}(\xi)$, $\zeta \in \mathrm{T}_\Sigma(X_k)$, and $\zeta'_1, ..., \zeta'_k \in \mathrm{T}_\Sigma(A)$. Define the following characteristics of ξ and ζ by structural induction:

(a) $\xi(w)$, the label of ξ at position w,

(b) $\xi|_w$, the subtree of ξ at position w,

(c) $\xi[\zeta]_w$, the tree obtained by substituting the subtree of ξ at position w with ζ,

(d) $\mathsf{yield}(\xi)$, the sequence of leaves of ξ from left to right, and

(e) $\max\mathsf{rank}(\zeta)$, the maximum number of successors in ζ,

(f) $\zeta[\zeta'_1, ..., \zeta'_k]$, the tree obtained from ζ by substituting x_i by ζ'_i for every $i \in \{1, ..., k\}$.

Note The tutorial's time might not suffice to present all solutions. Please prepare to ask for the solutions you are most interested in.

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