9th tutorial (June 21, 2017)

Formale Baumsprachen

Task 19 (path languages [Com+08, Exercise 2.8])

Definition. Let Σ be a ranked alphabet. For every $\xi = \sigma(\xi_1, ..., \xi_k) \in T_\Sigma$, the *set of paths of* ξ is recursively defined by

$$\mathsf{Paths}(\xi) = \sigma(\mathsf{Paths}(\xi_1), ..., \mathsf{Paths}(\xi_k)).$$

(a) Proof that $\mathsf{Paths}(L) = \bigcup_{\xi \in L} \mathsf{Paths}(\xi)$ is regular for every regular tree language L.

(b) What about the converse?

Task 20 (context-free grammars with latent annotations)

Context-free grammars are frequently used in natural language processing to model tree languages. In order to overcome the restriction to local languages, the community introduced context-free grammars with latent annotations (short: CFG-LA).

(a) Give a formal definition of the syntax and the tree semantics of CFG-LA.

(b) Show that CFG-LA generate exactly the recognizable tree languages.

References

[Com+08] Hubert Comon, Max Dauchet, Rémi Gilleron, Christof Löding, Florent Jacquemard, Denis Lugiez, Sophie Tison, and Marc Tommasi. *Tree Automata Techniques and Applications*. Nov. 18, 2008. url: `http://tata.gforge.inria.fr/`.