Characterizing Families of Tree Languages by Syntactic Monoids

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Abstract

When trees are defined as terms over a ranked alphabet, syntactic algebras become the most natural structures for characterizing families of tree languages. However, several other syntactic structures have been introduced by some authors, and in most cases an á la Eilenberg variety theorem has been provided for them. One of these structures, which resisted any variety theorem for more than a decade, was syntactic semigroups/monoids introduced by W. Thomas (1983) and further studied by M. Nivat and A. Podelski (1989).

In this talk we sketch a variety theorem for these structures, which solved a long-standing open problem in 2005. We also show that definite tree languages are not definable by syntactic monoids (neither by semigroups), which refutes a result of M. Nivat & A. Podelski for the first time after its publication in 1989 (*Bull. EATCS* **38**, pp. 186–190).