

CHARACTERIZING IMPORTANT SUBCLASSES OF ATTRIBUTED TREE TRANSFORMATIONS BY MACRO TREE TRANSDUCERS¹

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ABSTRACT

We consider attributed tree transducers of type simple multi-visit, multi-sweep, multi-alternating pass, and multi-pass following the definition of the same subclasses of attribute grammars. We characterize the tree transformation classes induced by the considered four subclasses of attributed tree transducers in terms of macro tree transducers. Namely, we define simple multi-visit, multi-sweep, multi-alternating pass and multi-pass macro tree transducers and prove formally that the attributed tree transducers and the macro tree transducers of the same type induce the same tree transformation class. Also we give an inclusion diagram of the tree transformation classes induced by the above and some further fundamental types of attributed and of macro tree transducers.

Keywords: attribute grammars, tree transducers.

1. Introduction

The concept of the macro tree transducer was introduced in [6] as a combination of the top-down tree transducer [5, 22] and the context-free tree grammar [12, 14]. (A comprehensive discussion on macro tree transducers was made in [6, 7] and [13].) On the other hand, attributed tree transducers, as an abstraction of KNUTH's attribute grammars [26], were defined in order to study formal properties of attribute grammars in [6, 7, 17]. It turned out soon that the attributed tree transducers and the macro tree transducers are very close to each other. In fact, it was stated already in [6], cf. also [7] that the tree transformations induced by absolutely noncircular attributed tree transducers can also be induced by macro tree transducers.

A very similar approach was initiated in [4]. They introduced the concept of the primitive recursive program scheme, which can be considered as the many sorted version of the macro tree transducers. Also, the concept of the attribute system was

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