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Associative language descriptions. (English summary)

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The ALD (Associative Language Description) model is a nonterminal-free way of describing languages inspired by local testability and constituent structures. This model has been proposed as an alternative to context-free grammars.

Let Σ be an alphabet and λ denote the empty word. An ALD A over Σ is a finite set of rules; it determines a set $T_L(A)$ of “stencil trees” (i.e., trees with leaves from $\Sigma \cup \{\lambda\}$, whereas internal nodes are labeled with the placeholder Δ) that obey the rules of A . These rules are triples (x, y, z) where y is the “pattern” ($y \in (\Sigma \cup \{\Delta\})^*$) and x and z are the left and the right context, respectively. From $T_L(A)$ we obtain a string language by applying the yield (frontier) operation to the trees in $T_L(A)$.

The authors establish some structural results (swapping lemma, pumping lemma, context-free grammar associated to an ALD) which play a crucial rôle in proving: (i) the ALD languages are a proper subset of the context-free languages; (ii) the ALD languages are not closed under union, concatenation, Kleene \star , (nonerasing) homomorphism, inverse homomorphism, intersection with regular sets, or complementation; and (iii) there exists an infinite hierarchy $\{\text{ALD}_k\}_{k \geq 0}$ where ALD_k are the “ALD languages of degree k ”.

The present paper is an extension of the authors’ conference paper [in *Combinatorics, computation & logic '99 (Auckland)*, 159–174, Springer, Singapore, 1999; MR1717557].

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Note: This list reflects references listed in the original paper as accurately as possible with no attempt to correct errors.