Embedded Pushdown Automata

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This talk discussed a class of automata that recognize exactly the class of TALs. The definition of EPDA can be motivated by noting the difference between the structures derived in CFG formalism and TAG.

The EPDA can be considered as a second order PDA whose storage is a pushdown of pushdown of symbols. The aim of the talk was to informally explain the relationship between TAGs and EPDA as well as other weakly equivalent formalisms, Head Grammars and Combinatory Categorial Grammars. Finally the addition of nonlinearity to EPDA move can be shown to be similar to addition of coordination schema to Categorial Grammars.

TAGs by Interpreting Context Free Tree Languages

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By functional multilinear interpretations of context free tree languages, we are able to define infinite hierarchies

$$\mathcal{L}_0 \subsetneq \mathcal{L}_1 \subsetneq \cdots \subsetneq \mathcal{L}_k \subsetneq \cdots$$

of languages. $\mathcal{L}_0$ is identical with the class of context free languages, $\mathcal{L}_1$ with the class of TAGs with constraints. k is the maximal indegree of the nodes of the trees. These classes of languages appear as natural generalizations of the context free languages. Each $\mathcal{L}_k$ satisfies a pumping lemma and for

$$D_k = \{a_1^n a_2^n \cdots a_k^n \mid n \in \mathbf{N}\}$$

it is

$$D_{2k+2} \in \mathcal{L}_k \text{ but } D_{2k+2} \notin \mathcal{L}_{k-1}.$$

Each $L \in \mathcal{L}_k$ is semilinear under the Parikh mapping. Each class $\mathcal{L}_k$ is closed under union, concatenation, and the Kleene $*$-operation.

There is a second form of representations for these classes. $\mathcal{L}_k$ can be generated by semi-Dyck controlled coupled substitutions. These representations allow to reduce the parsing problem to the parsing problem of context free languages.