Grammar Trees

Ian Ludden

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Example 1: Binary Strings

Start symbol is S, terminals are 0, 1, and ε, rules are:

$$S \to 0S$$
$$S \to 1S$$
$$S \to \varepsilon$$

Example 2: Simple Arithmetic Expressions

Start symbols are E and V (also non-terminals), terminals are a, b, $+$, and $\times$, rules are:

$$E \rightarrow E + V \mid E \times V \mid V + V \mid V \times V$$
$$V \rightarrow a \mid b$$

Ambiguity

Example 3: Where are the implicit parentheses?

$$E \rightarrow E + V \mid E \times V \mid \mathbf{V} \times \mathbf{E} \mid V + V \mid V \times V$$
$$V \rightarrow a \mid b$$

Designing Parse Trees, and Impossible Strings

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$$A \rightarrow Aa \mid a$$
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- b

Recap: Learning Objectives

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