Review for CMSC 452 Final: Grammars

Context Free Languages

Context Free Grammar for $\{a^m b^n : m > n\}$

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$$S \rightarrow AT$$
$$T \rightarrow aTb$$
$$T \rightarrow e$$
$$A \rightarrow Aa$$
$$A \rightarrow a$$

Context Free Grammars

Def A **Context Free Grammar** is a tuple $G = (N, \Sigma, R, S)$

- N is a finite set of **nonterminals**.
- Σ is a finite **alphabet**. Note $\Sigma \cap N = \emptyset$.
- $R \subseteq N \times (N \cup \Sigma)^*$ and are called **Rules**.
- $S \in N$, the **start symbol**.

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Then, if w is string of **non-terminals only**, we define $L(G)$ by:

$$L(G) = \{w \in \Sigma^* \mid S \Rightarrow w\}$$

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One proves theorems NON CFL using the PL for CFL's (we omit)

Closure Properties and REG$\subset$ CFL

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5. CFL's closed under COMPLEMENTATION: FALSE: $\overline{a^n b^n c^n}$ is CFL.

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We omit from this review.

Examples of CFL's and Size of CFG's

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3) $S \to e$ (where S is the start state).

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   Yes: Let w be Kolm. Random.

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Find $\mathrm{GEN}[i, j]$ with Dynamic Programming.