Normal Forms of One-Sided Random Context Grammars

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Introduction and Motivation

Area

- Theoretical computer science, formal language theory

Topic

- Normal forms of one-sided random context grammars

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- Theoretical computer science, formal language theory

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- Normal forms of one-sided random context grammars

What are normal forms?

Motivation?

- theoretical: simplification of proofs
- practical: more efficient construction of parsers

Area

- Theoretical computer science, formal language theory

Topic

- Normal forms of one-sided random context grammars

What are one-sided random context grammars?

Motivation?

- vivid topic in today's formal language theory
- only one existing normal form

One-Sided Random Context Grammars

- variant of a random context grammar
- $P = P_L \cup P_R$
- $(A \rightarrow x, U, W) \in P$

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Example

$(A \rightarrow x, \{B, C\}, \{D\}) \in P_L$

$$bBcECbAcD$$

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Example

$(A \rightarrow x, \{B, C\}, \{D\}) \in P_L$

$$\overleftarrow{bBcECb}\boxed{A}\, cD \Rightarrow bBcECb\, x\, cD$$

Form of all results

For any one-sided random context grammar, there is an equivalent one-sided random context grammar satisfying

$<$ normal form $>$

Normal Form I

$P_L = P_R$

Results

Normal Form I

$P_L = P_R$

Normal Form II

$P_L \cap P_R = \emptyset$

Normal Form I

$P_L = P_R$

Normal Form II

$P_L \cap P_R = \emptyset$

Normal Form III

$(A \rightarrow x, U, W) \in P_L \cup P_R$ implies that

$$x \in NN \cup T \cup \{\varepsilon\}$$

Results

Normal Form I

$P_L = P_R$

Normal Form II

$P_L \cap P_R = \emptyset$

Normal Form III

$(A \to x, U, W) \in P_L \cup P_R$ implies that

$$x \in NN \cup T \cup \{\varepsilon\}$$

Normal Form IV

$(A \to x, U, W) \in P_L \cup P_R$ implies that

$$U = \emptyset \text{ or } W = \emptyset$$

Discussion