

1/16 (木) Chap. 7 Properties of Context-free Languages

7.1 Normal Form for Context-free Grammars. (Regular Grammar)

$$A \rightarrow \alpha \in P \quad A \in N, \alpha \in (N \cup T)^*$$

$$A \rightarrow xB \text{ or } y \quad A, B \in N, x, y \in T^*$$

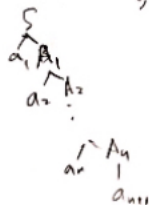
Chomsky Normal Form (CNF) for CFG

Normal Form

$$A \rightarrow aB \text{ or } b \quad A, B \in N, a, b \in T$$

$$A \rightarrow BC \in P \text{ or } A \rightarrow a \in P \text{ except } S \rightarrow \epsilon$$

where $A, B, C \in N, a \in T$.



CNF 만드는 법

1. useless X
2. ϵ -rule X
3. unit. prod. X
4. $\forall a \in T: Aa \rightarrow a \in P$
- 5: $\forall A \in N: A \rightarrow BC \text{ or } a \in T \text{ or } BC \text{ when } B, C \in N$

regular lang.

Pumping Lemma for CFL (Thm 7.18)

Let L be a CFL $|z| \geq n, z = uvwx^i y$

ii) ~~uvwx~~ $\forall x \neq \epsilon \rightarrow v \neq \epsilon, x \neq \epsilon$

ii) ~~uvwx~~ $|vwx| \leq n$

iii) $\forall i \geq 0: uv^i wx^i y \in L$

! $\forall i \geq 0$ \Rightarrow pumping 한다.

Pumping Lemma for RL

Let L be a RL.

$|z| \geq n, z = uv^i wx^i y \in L$

i) $v \neq \epsilon$

ii) $|vwx| \leq n$

iii) $\forall i \geq 0: uv^i wx^i y \in L$

꼭 pumping 한다

7.1.1 Eliminating useless symbol.

$x \in N \cup T$ is useful, if $S \xRightarrow{*} \alpha x \beta \xRightarrow{*} w, w \in T^*$