5/23 (水) # Chap. LR(k) Parsing

Right parser : $\Gamma = N \cup \Sigma$ .. vocabulary symbol $X \in N \cup \Sigma$

$|a \to a|$ $a \in \Sigma$ push $a \in \Sigma$ onto stack

$\omega |\ \to A|$ $A \to \omega \in P$ pop ω (RHS of rule $A \to \omega$) and push A (LHS of rule $A \to \omega$)

↓ LR(k) parser

$\Gamma = [\gamma X]_k$ where $\gamma \in (V \cup \Sigma)^*$, $X \in N \cup \Sigma$.

LR(k) state — viable prefixes

valid stack strings $= [\gamma]_k : V^* \to V^*$

$\gamma_1 X, \gamma_2 X \in [\gamma X]$ refinement of X

= valid LR(k) items → $Valid_k(\gamma) : V^* \to 2^{R_k}$

where R_k : LR(k) items

$[A \to \alpha . \beta, x]$, $A \to \alpha\beta \in P$

core, lookahead $x \in \Sigma^{*k}$

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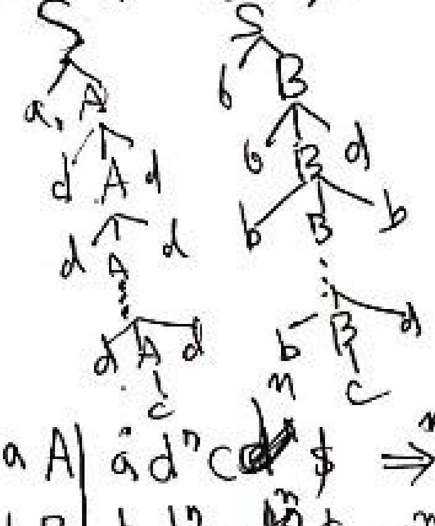
ex) G_{a6} $S \to aA \mid bB$ $L(G_{a6}) = \{a, b\}\{d^n c d^n \mid n \geq 0\}$

$A \to c \mid dAd$

$B \to c \mid dBd$



$\$ S | ad^n c d^n \$ \Rightarrow^{Start} \$ aA | ad^n c d^n \$ \Rightarrow^n \$ ad^n (c) | ad^n c d^n \$ \Rightarrow^{B \to c}$

$\$ S | bd^n c d^n \$ \Rightarrow \$ bB | bd^n c d^n \$ \Rightarrow^n \$ bd^n (c) | bd^n c d^n \Rightarrow^{B \to c}$

$\Rightarrow^{A \to c} \$ ad^n (A) | ad^n c$

$\Rightarrow^{B \to c} \$ ad^n (B) | ad^n c$

reduce-reduce conflict for any k for $A \to c$ and $B \to c$

$\Rightarrow^r \$ \gamma' | y \$$

$\$ \gamma_s | xy \$ \Rightarrow^* \$ \gamma | y \$ \Rightarrow \$ \gamma_f | \$$

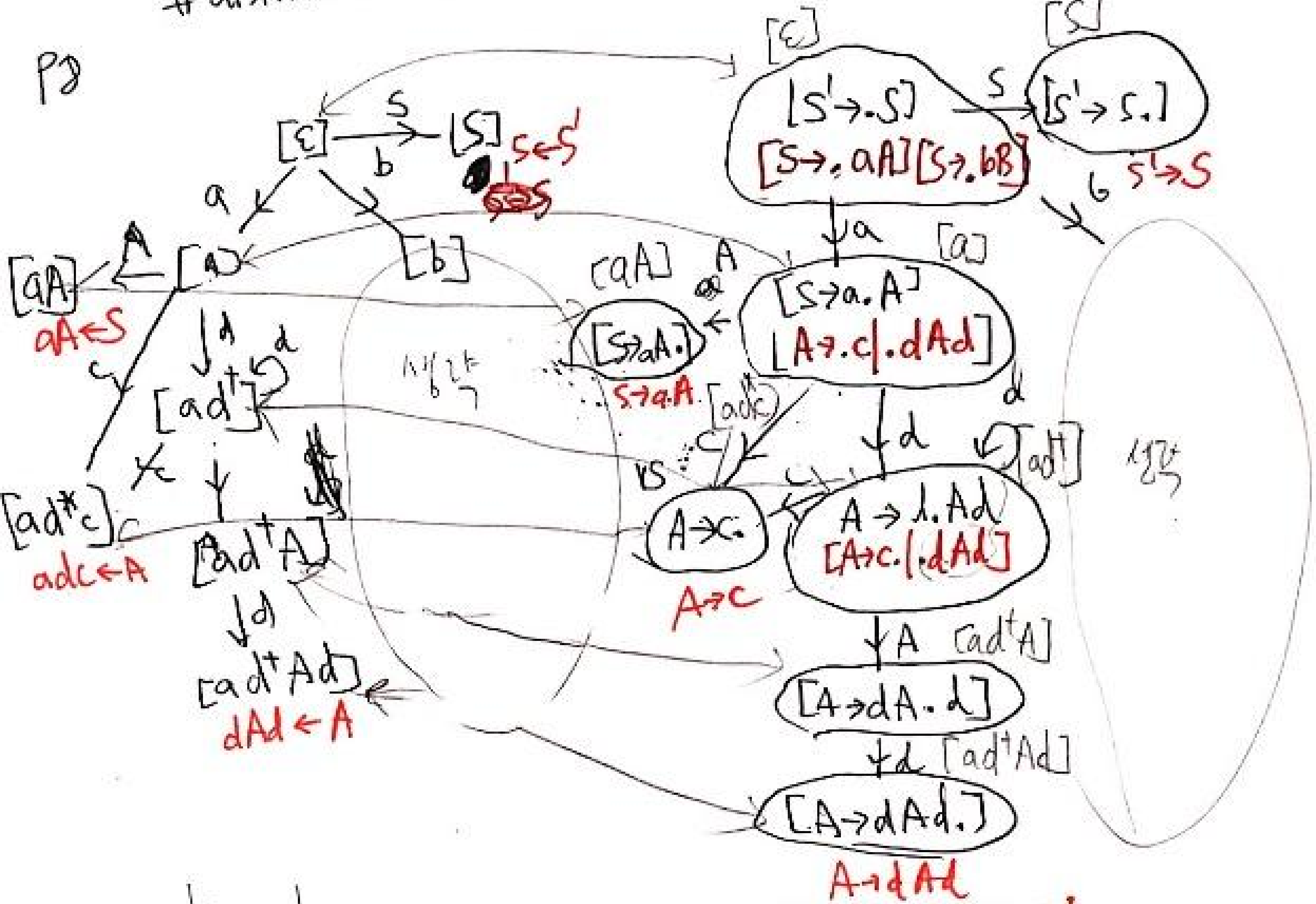
$r \in P$ r is a valid action for viable stack string γ

valid stack string = viable stack string γ

3 # of distinct action ≤ |Σ| + |P|
shift redna

#set (= equivalent classes) ≤ $2^{|\Sigma|+|P|}$
= # distinct states

p8



[δ] | a → [δ] [δa] |

$X_1 X_2 \cdots X_d \rightarrow A$ |

[δ][δX₁][δX₁X₂]…[δX₁X₂…Xₙ] | ε → [δ] [δA] | ε

LR(0) parser.

$S \overset{*}{\underset{rm}{\Rightarrow}} \delta A y \overset{A\to\alpha\beta}{\Rightarrow} \delta\alpha\beta y \;(\Rightarrow^* xzy)$

γ (= δα) is a viable prefix of G.
(= stack string) of M.

$\$ | \cdots y\$ \Rightarrow^* \$\delta A | y\$ \Rightarrow \delta\alpha | y\$$

Lemma 6.4 Prefix of V.P is a V.P.