

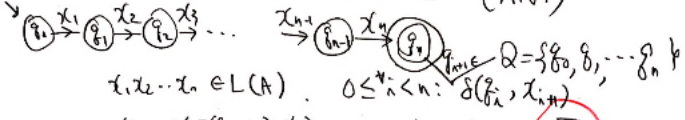
10/24/13 CFG and RG

CFG: FA, RE, RG = m-DFA, CFG eq.

" : CFG = Pushdown Automata, Turing Machine. NP

5-B. Finite State Automata

$A = (Q, T, \delta, q_0, F)$ $\delta: Q \times \Sigma^* \rightarrow 2^Q$ (XFA)



$x_1 x_2 \dots x_n \in L(A)$ $0 \leq i < n: \delta(q_i, x_{i+1})$

$q_n \in \delta(\underbrace{\delta(\delta(\delta(q_0, x_1), x_2), \dots, x_{n-1}), x_n)}_{\text{state transition fn } \delta}) \in F$

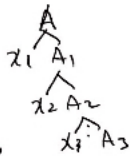
Regular Grammar $G = (N, \Sigma, P, S)$

$N = \{A_0, A_1, \dots, A_n\}$ (Annotated)

$N \leftrightarrow Q$ $N \cong Q$
 $A_0 \Rightarrow x_1 A_1 \Rightarrow x_1 x_2 A_2 \Rightarrow \dots$

$0 \leq i < n: A_i \rightarrow x_{i+1} A_{i+1} \in P$
 $A_0 \Rightarrow x_1 A_1 \Rightarrow x_1 x_2 A_2 \Rightarrow \dots \Rightarrow x_1 x_2 \dots x_n A_n \Rightarrow x_1 x_2 \dots x_n$

Reducing Systems
 Context free Grammar
 RG derivation of $\mathbb{R}^2 \mathbb{R}$



$S \Rightarrow^* x A \Rightarrow^* x y = T^*$

$\Rightarrow^* x y B \Rightarrow^* x y z \in T^*$

RG sentential forms by T^* $S \in T^*$ $A \in T^*$ $x y \in T^*$ $x y z \in T^*$
 terminal string - Nonterminal if any.

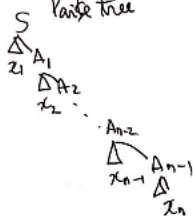


CFG의 표현

(NUT)* - many nonterminals

at most single nonterminal $T^*(N \cup \{ \epsilon \})$

RG 21 Parse tree

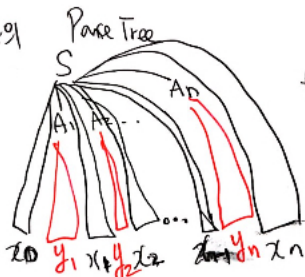


→ skewed tree → list

→ linear structure = F.A.

type 3

FIG 9



tree -

hierarchical structure = F.A + stack

= Pushdown Automata (PDA)

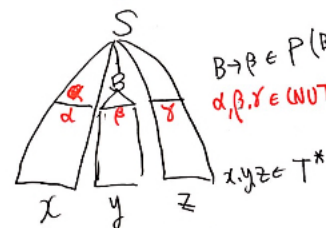
type 2

(memory)

= Turing Machine

type 1 (?)

type 0



$B \rightarrow \beta \in P(B \in N, \beta \in (NUT)^*)$
 $\alpha, \beta, \gamma \in (NUT)^*$

$x, y, z \in T^*$

leftmost/rightmost derivation

lm/rm nonterminal of $\forall P \in P$ (L.H.S. of \rightarrow)
 derivation $\Rightarrow \subseteq (NUT)^* X (NUT)^*$ binary relation on $(NUT)^*$

leftmost derivation \Rightarrow lm

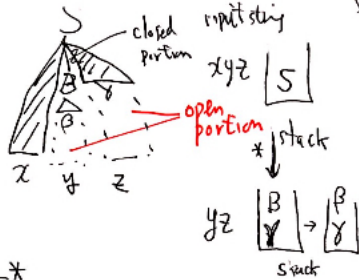
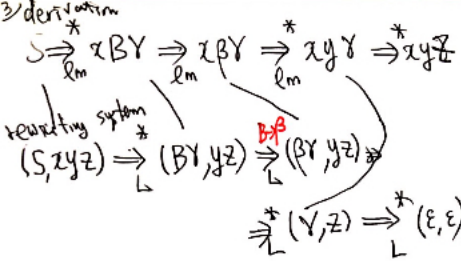
rightmost " \Rightarrow rm

$\Rightarrow = \{(\alpha\beta\gamma, \alpha\beta\gamma) \mid \alpha, \gamma \in (NUT)^*, B \rightarrow \beta \in P\}$

$\Rightarrow_{lm} = \{(\alpha\beta\gamma, \alpha\beta\gamma) \mid \alpha \in T^*, \gamma \in (NUT)^*, B \rightarrow \beta \in P\}$

$\Rightarrow_{rm} \Rightarrow_{lm}$

type 2 language \supseteq type 3 language \Rightarrow class of $\Rightarrow_{rm} = \{(\alpha\beta z, \alpha\beta z) \mid z \in T^*, \alpha \in (NUT)^*, B \rightarrow \beta \in P\}$



$$(stack, remained\ input\ string) \in (\mathbb{N} \cup \mathbb{T})^* \times \mathbb{T}^*$$

$S((\dots \delta(\delta(q_0, x_1), x_2), \dots, x_{n-1}), x_n)$ in P1

$$(q_0, x_1 x_2 \dots x_n) \xRightarrow{A}^* (q_1, x_2 \dots x_n) \xRightarrow{A}^* (q_2, x_3 \dots x_n) \dots \xRightarrow{A}^* (q_{n-2}, x_{n-1} x_n) \xRightarrow{A}^* (q_{n-1}, x_n) \xRightarrow{A}^* (q_n, \epsilon)$$

