1)

제13강 10/12(火) Chap5 Context-free Grammars

quadruple-(4순서쌍)

Def. A CFG $G=(N,T,P,S)$ where

(1) N … is a set of nonterminals (variables, syntactic categories)
(V in text) symbols

(2) T … is a 〃 terminal symbols.
(input)

$N \cap T = \emptyset$. $V = N \cup T$ … general symbols

(3) P … a set of production rules (문법규칙)

$(A,\alpha) \in P \quad A \to \alpha \in P \quad (A,\alpha) \in N \times V^* = N \cup (N \cup T)^*$

$A \in N, \ \alpha \in V^* = (N \cup T)^*$

(4) $S \in N$, a distinguish nonterminal call start symbol.
axiom

Context-Free $G=(N,T,P,S)$
문맥 자유

$(B \in N, \beta \in (N \cup T)^*)$

derive
$\Rightarrow$: $\alpha, \gamma \in V^*$, ~~$B \in N$~~ $B \to \beta \in P$.
derivation

$\alpha B \gamma \underset{G}{\overset{1}{\Rightarrow}} \alpha \beta \gamma \quad (B \to \beta \in P)$

We define $\Rightarrow^n$ $(n \geq 0)$

$\alpha \overset{0}{\Rightarrow} \alpha$ (basis) $\alpha \in V^*$ B

If $\alpha \Rightarrow^{n-1} \beta$, $\beta \overset{1}{\Rightarrow} \gamma$. Then $\alpha \overset{n}{\Rightarrow} \gamma$ $n \geq 0$) (recursion) R

We define $\Rightarrow^*$ (star) and $\Rightarrow^+$ (dagger)

$\Rightarrow^* \overset{\text{def}}{=} \bigcup_{i \in \mathbb{N}_0} \Rightarrow^i$ where $\mathbb{N}_0 = \{0,1,2,\ldots\}$ … (ref. & tran.) closure of $\Rightarrow$

$\Rightarrow^+ \overset{\text{def}}{=} \bigcup_{i \in \mathbb{N}_1} \Rightarrow^i$ 〃 $\mathbb{N}_1 = \{1,2,3,\ldots\}$ … (tran.) closure of $\Rightarrow$ positive

무한번

0번 이상 closure

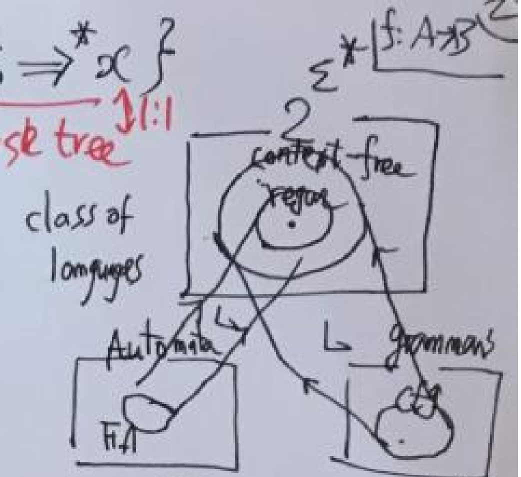
1번 이상 positive closure

2)

Def. $G=(N,T,P,S)$ $\quad L(G)=\{x \in T^* \mid S \Rightarrow^* x\}$

languages of G
defined by G
generated by G

parse tree 1:1



sentential form, sentence

$S \Rightarrow \alpha \in V^*$ $\qquad S \Rightarrow x \in T^*$.

Set of
L: Grammars → Set of Languages
L: Set of Automata → //

~~Notational~~ ~~Convent~~ 습관
쓰는

$a, b, c .. \in T$

$x, y, z, u, v, w .. \in T^*$

$A, B, C, .. \in N$

$X, Y, Z, .. \in V = N \cup T$

$\alpha, \beta, \gamma \in V^*$

if $\exists x \in L(G)$
ㅋ. ∃₂ Parse tree for x in G.

(모호한)
G_2: Abmiguous grammar

G_1:
Ex) $E \to E+T \mid T*F \mid a \mid (E)$ vs $E \to E+E \mid E*E \mid a \mid (E)$

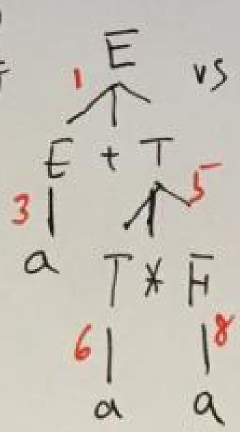
$T \to T*F \mid a \mid (E)$ precedence

$F \to a \mid (E)$ $+ < *$

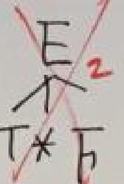
associativity
+ : left
* : "

만일 $T \to F*T$

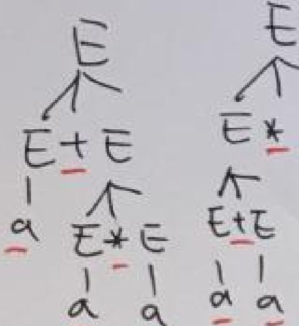
(?) 인수



vs



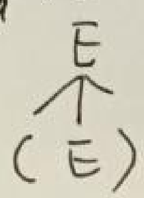
T나 F같은 +를 못받는다
except (E)



$a+a*a \in L(G_2)$

$E \Rightarrow E+E \Rightarrow a+E \Rightarrow a+E*E$
$\Rightarrow a+a*E \Rightarrow a+a*a \in T^*$

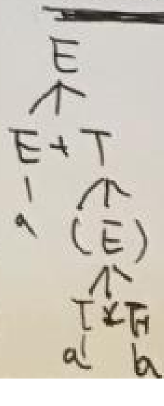
학생생각
열전



$a+(a*a) \Rightarrow$

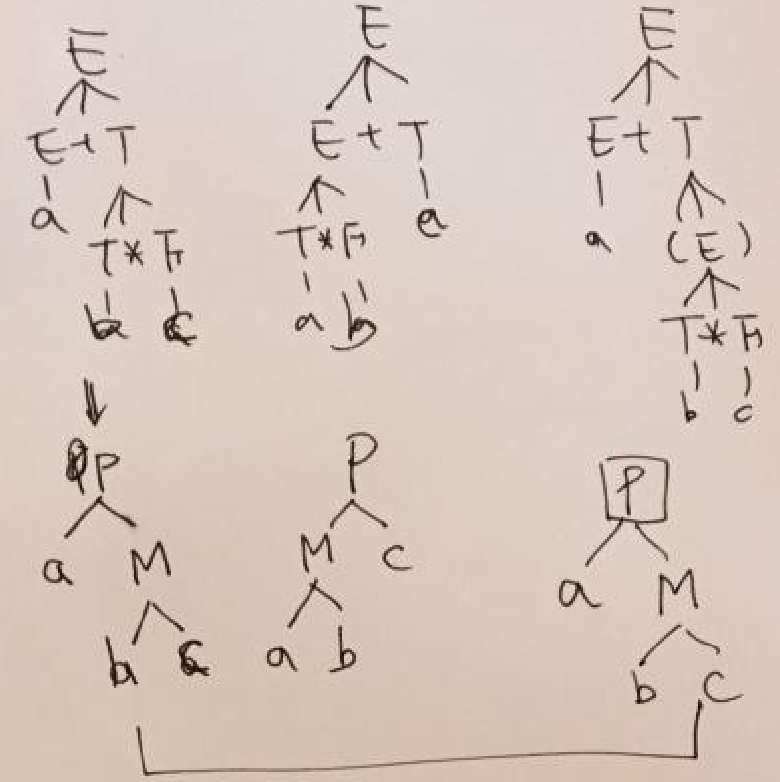
$(a+a)*a$

$(a+a*a)$ X



3) Abstract syntax Tree (AST) vs Parse Tree ($G = (N, T, P, S)$)

P.T



AST

AST

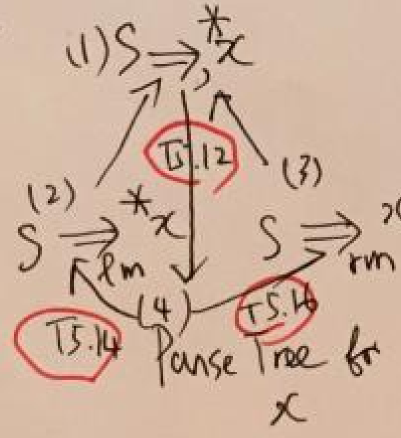
$P' \subseteq P$ ... subtree

$T' \subseteq T$ ... leaf

$P' = \{E \to E + T \mid T * F$, $T \to T * F\}$ (P, M)

$T' = \{a\}$ ~~+, *, (,)~~ (M)

5.2



$(1) \equiv (2) \equiv (3) \equiv (4)$

$S \xRightarrow[lm]{\pi_L} x \in T^*$ $\qquad \pi_L \in P^*$ ... left parse of $x \in T^*$???

$S \xRightarrow[rm]{\pi_R} x \in T^*$ $\qquad \pi_R \in P^*$ ... $\boxed{\text{Reversal}}$ of right parse of $x \in T$

P.T. for x

~~Dign~~ Ding & Ko's Book

Examples of CFG's.

→ 중간고사 위치 10/25(화) 오후1:00~

전산학동(E3-1)

1층 공동강의실(1501)