제18강 3/27(水) Finite-state Automata

R.E.

syntax

$E \to \phi \mid \varepsilon \mid a \in V$

$\mid (E) \mid E^* \mid E_1 \cdot E_2 \mid E_1 \cup E_2$

(예) 식 → 숫자 | 문자 | (식) | 식+식 | 식*식 | (식)

Semantics: $RE's \longrightarrow 2^{V^*}$

$L(\phi) = \{\}$, $L(\varepsilon) = \{\varepsilon\}$, $L(a) = \{a\}$

$L((E)) = L(E)$, $L(E^*) = (L(E))^*$, ...

Semantic: 식's → 수 (→ not defied yet!)

값(숫자) = 수, 값(문자) = ?

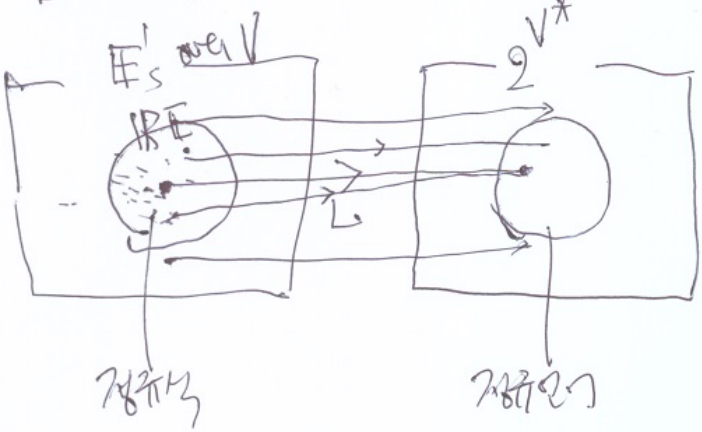
값(식 + 식) = 값(식) + 값(식) = 값(식)

값(식 * 식) = 값(식) * 값(식), 값((식))

$E \cup E \cup E$

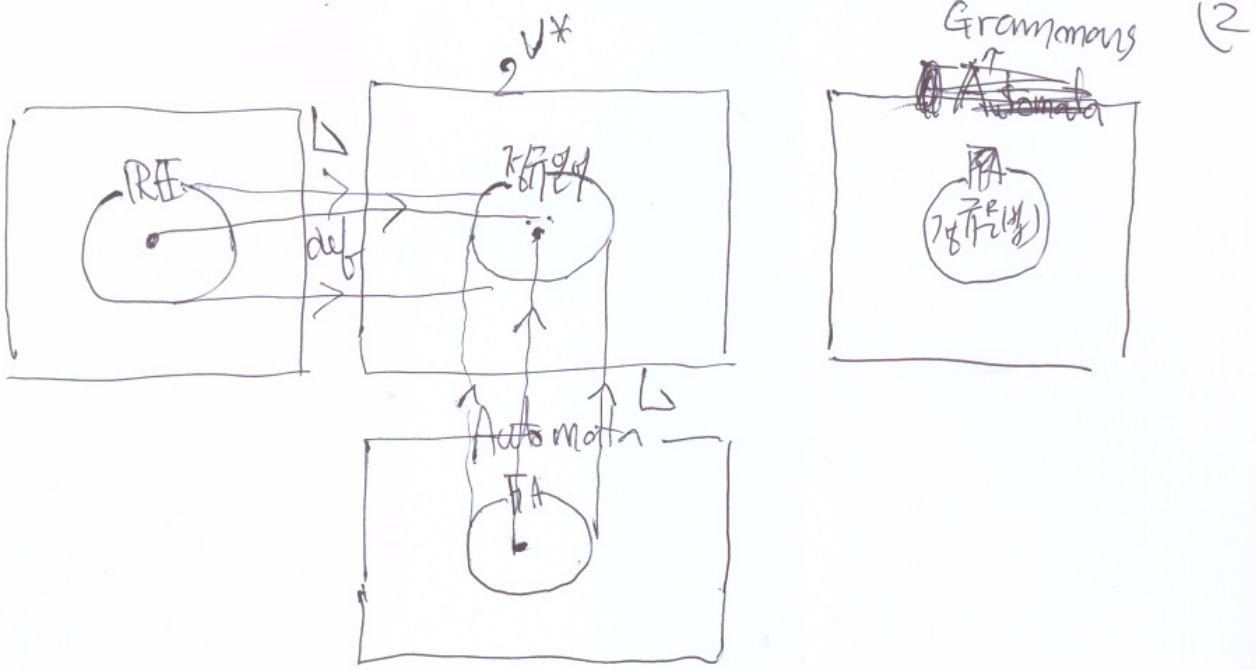
정의 ⓐ 정규언어 over V

$L = L(E)$ E는 정규식 over V.



Ambiguity of 정규식 ⇐ 표현력 of 정규식

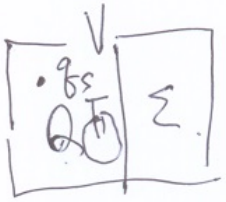
Succintness of 〃 (description power)


V*
RE
def
Automata
FA
Grammars
FA

3.2 Finite Automata

$M = (V, P)$ (is a rewriting system) is a Finite Automata

$V = Q \cup \Sigma$, $Q \cap \Sigma = \emptyset$, $q_s \in Q$, $F \subseteq Q$

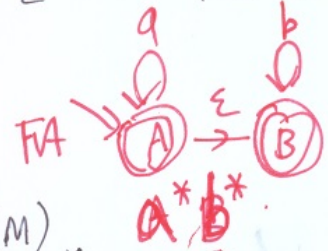


$M = (Q, \Sigma, P, q_s, F)$ is a FA

$q x \to p$, q

$q, p \in Q$, $x \in \Sigma^*$

$R.E\ a^*b^*$



If $q_s x \Rightarrow q \in F$ $x \in L(M)$

$L(M) = \{x \in \Sigma^* \mid q_s x \overset{*}{\Rightarrow} q \in F\}$

3.3 Regular Grammar

$G = (V, P)$ (is a r.s.) is a Regular Grammar

$G = (N, \Sigma, P, S)$, is vs $M = (Q, \Sigma, P, q_0, F)$

$V = N \cup \Sigma$, $N \cap \Sigma = \emptyset$, $S \in N$

$A \to xB$ or $A \to x \in P$, $A, B \in N$, $x \in \Sigma^*$. $qx \to p \in P$

$q, p \in Q$, $x \in \Sigma^*$.

Rew. (Derivation)

$A \overset{A \to aA}{\Rightarrow} aA \overset{A \to B}{\Rightarrow} aB \overset{B \to bB}{\Rightarrow} abB \overset{B \to \varepsilon}{\Rightarrow} ab$

Ex. $G = \{\{A, B\}, \{a, b\}, \{A \to aA, A \to B, B \to bB, B \to \varepsilon\}, A\}$

generating grammar

accepting automata

$L(G) = \{x \in \Sigma^* \mid S \overset{*}{\underset{G}{\Rightarrow}} x\}$ vs $L(M) = \{x \in \Sigma^* \mid q_s x \overset{*}{\underset{M}{\Rightarrow}} q \in F\}$

X Rewriting System

$R = (V, P)$

$P \subseteq V^* \times V^*$, $(\omega_1, \omega_2) \in P$, $\omega_1 \to \omega_2 \in P$

$\alpha \omega_1 \beta \Rightarrow \alpha \omega_2 \beta \Rightarrow^*$

(예) 강의노트 TP p.10의 FA

$FA = (\{A, B\}, \{a, b\}, \{Aa \to A, A \to B, Bb \to B\}, A, \{A, B\})$

δ $Aa \to A \leftrightarrow A \in \delta(A, a)$

$A \to B \leftrightarrow B \in \delta(A, \varepsilon)$

$Bb \to B \leftrightarrow B \in \delta(B, b)$

Ex. ab

$Aab \overset{Aa \to A}{\Rightarrow} Ab \overset{A \to B}{\Rightarrow} Bb \overset{Bb \to B}{\Rightarrow} B \in F$