7/14(목) 제6강 NFA 2, ε-NFA

NFA $\delta: Q \times \Sigma \rightarrow 2^Q$) set ext DFA $\delta: Q \times \Sigma \rightarrow Q$

$\delta': 2^Q \times \Sigma \rightarrow 2^Q$) string ext

$\delta^*: 2^Q \times \Sigma^* \rightarrow 2^Q$ $\delta^*: Q \times \Sigma^* \rightarrow Q$

$q \in Q$
$\delta^*(q, \epsilon) = q$
$\delta^*(q, xa) = \delta(\delta^*(q, x), a)$
$x \in \Sigma^*, a \in \Sigma$

$\delta': 2^Q \times \Sigma \rightarrow 2^Q$ (1) set extension – Union

Let $P \subseteq Q$, $a \in \Sigma$. Then

$\delta'(P, a) = \bigcup_{p \in P} \delta(p, a) = \delta'(\{p_1, p_2, \ldots, p_k\}) = \bigcup_{i=1}^{k} \delta(p_i, a)$

(2) string extension – recursion

$\delta^*(P, \epsilon) = P$ $P \subseteq Q$ δ'^* 대신에

$\delta^*(P, xa) = \delta'(\delta^*(P, x), a)$ $x \in \Sigma^*, a \in \Sigma$ $P \subseteq Q$. δ^* (또는 δ)을 쓴다

2.3.4 The Language of an NFA

Let $N = (Q, T, \delta, q_0, F)$ be a NFA.

$L(N) = \{x \in T^* \mid \delta^*(q_0, x) \cap F \neq \emptyset\}$

— 을 할까 말까 — 안 관형의 질문.

수신제가 치국평천하 (修身齊家 治國平天下) — 孔子 大學

格物致知 誠意正心.
격 물 치 지 성 의 정 심

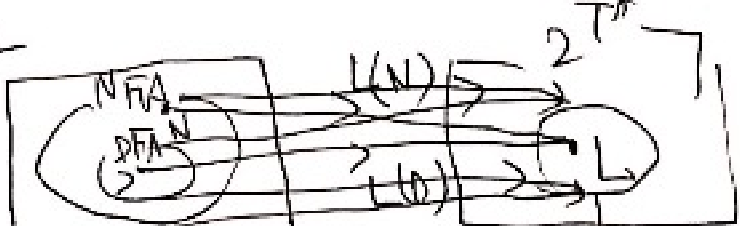
Thm 2.11 Given NFA $N = (Q_N, T, \delta_N, q_{0N}, F_N)$

Subset construction $D = (Q_D, T, \delta_D, q_{0D}, F_D)$

Thm 2.11 Prove $L(N) = L(D)$

$Q_D = 2^{Q_N}$
$\delta_D = \delta_N'$
$q_{0D} = \{q_{0N}\}$
$F_D = \{F \mid F \cap F_N \neq \emptyset\}$

Thm 2.12



Type 3 언어는 Nondeterministic 하게 표현해도 (NFA) Deterministic 하게 구현 (DFA) 할 수 있다 — regular

DFA with partial function — Read P67
(dead states)

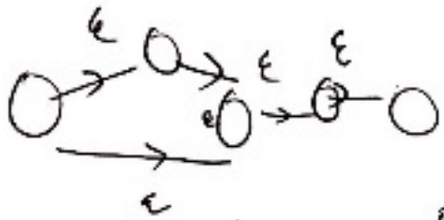
2.4 — Text search — read text.

2.5 Finite-Automaton with ε-moves.

$E = (Q, T, \delta, q_0, F)$

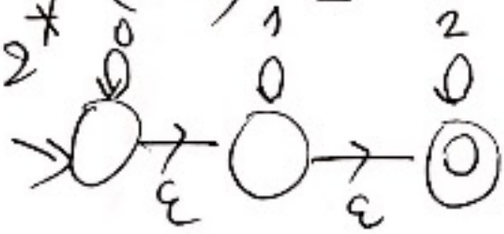
(2) Q, (3) T, (4) q_0, (5) F 는 DFA 와 같고

(1) $\delta : Q \times (\Sigma \cup \{\varepsilon\}) \to 2^Q$



$\varepsilon^* : Q \to 2^Q$

예) $0^* 1^* 2^*$



equivalent $D = (Q_D, T, \delta_D, q_{0D}, F_D)$

$q_{0D} = \varepsilon^*(q_{0N})$

$\delta_D(P, a) = \varepsilon^*(\delta_N(P, a))$

$\delta(q_0, a_1 a_2 \cdots a_n) =$

$\varepsilon^*(\delta'(\cdots \varepsilon^*(\delta'(\delta^*(q_0), a_1)) \cdots)) = \delta^n$

$\delta^n = \varepsilon^* \circ (\delta' \varepsilon^*) \circ (\delta' \varepsilon^*) \circ \cdots \circ (\delta' \circ \varepsilon^*)$