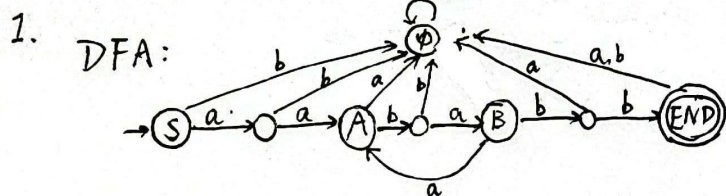


# 形式语言与自动机 第五次作业



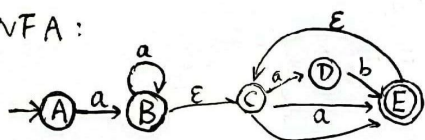
左线性文法:

$$V = \{E, B, A, S\} \quad T = \{a, b, \epsilon\} \quad S = E$$

$$P = \{E \rightarrow Bbb, B \rightarrow Aba, A \rightarrow Ba \mid Saa, S \rightarrow \epsilon\}$$

则  $G = (V, T, S, P)$  构成所求的左线性文法

2. 先画NFA:

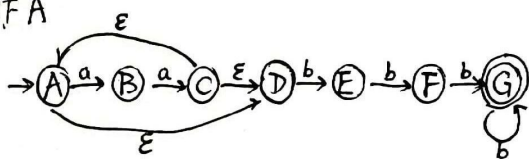


再写出文法  $V = \{A, B, C, D, E\} \quad T = \{a, b, \epsilon\} \quad S = A$

$$P = \{A \rightarrow aB, B \rightarrow aC, C \rightarrow aD \mid aEE, D \rightarrow bE, E \rightarrow C \mid \epsilon\}$$

则  $G = (V, T, S, P)$  构成所求的正则文法

3. 先画NFA



文法  $V = \{A, B, C, D, E, F, G\} \quad T = \{a, b, \epsilon\}$

对于右线性文法  $S = A$ ,

$$P = \{A \rightarrow aB \mid D, B \rightarrow aC, C \rightarrow A \mid D, D \rightarrow bE, E \rightarrow bF, F \rightarrow bG, G \rightarrow bG \mid \epsilon\}$$

$G = (V, T, S, P)$  构成所求右线性文法

对于左线性文法  $S' = G$

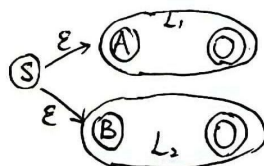
$$P' = \{G \rightarrow Fb \mid Gb, F \rightarrow Eb, E \rightarrow Db, D \rightarrow A \mid C, C \rightarrow Ba, B \rightarrow Aa, A \rightarrow C \mid \epsilon\}$$

$G' = (V, T, S', P')$  构成所求左线性文法

4. (1) 设  $L_1, L_2$  对应的正则语法分别为  $G_1 = (V_1, T_1, A, P_1), G_2 = (V_2, T_2, B, P_2)$

二者对应的DFA可化为

则构建新DFA



正则语法可写作  $G = (V_1 \cup V_2 \cup \{S\}, T_1 \cup T_2, S, P_1 \cup P_2 \cup \{S \rightarrow A \mid B\})$   
 $G$  对应的语言

$$L(G) = \{w \mid S \Rightarrow w, w \in (T_1 \cup T_2)^*\} = \{w \mid S_1 \Rightarrow w, w \in T_1^*\} \cup \{w \mid S_2 \Rightarrow w, w \in T_2^*\}$$

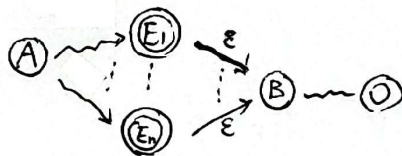
$$= L(G_1) \cup L(G_2)$$

则  $L(G_1) \cup L(G_2)$  是正则语言

(2) 设  $L_1, L_2$  对应的正则语法分别为  $G_1 = (V_1, T_1, A, P_1)$ ,  $G_2 = (V_2, T_2, B, P_2)$

二者对应的DFA可化为  $A \rightsquigarrow (E_1) \rightsquigarrow (E_2)$   $B \rightsquigarrow C$

则构建新DFA



正则语法可写作  $G = (V_1 \cup V_2, T_1 \cup T_2, A, P_1 \cup P_2 \cup \{E \rightarrow B \mid (E \in V_1) \wedge (E \rightarrow \epsilon \in P_1)\})$

$G$  对应的语言

$$\begin{aligned}
 L(G) &= \{w \mid A \xRightarrow{*} w, w \in (T_1 \cup T_2)^*\} \\
 &= \{wv \mid A \xRightarrow{*} w, w \in T_1^*, B \xRightarrow{*} v, v \in T_2^*\} \\
 &= L(G_1) \cdot L(G_2)
 \end{aligned}$$

则  $L(G_1) \cdot L(G_2)$  是正则语言