

5.2

(1) 构造 LR(0) 项目集规范族. 构造 LR(0) 分析表.

分析: 首先对产生式编号. 并引入 S'

- 0 $S' \rightarrow S$
- 1 $S \rightarrow AS$
- 2 $S \rightarrow b$
- 3 $A \rightarrow SA$
- 4 $A \rightarrow a$

之后构造 $I_0 = \{ S' \rightarrow \cdot S, S \rightarrow \cdot AS, S \rightarrow \cdot b, A \rightarrow \cdot SA, A \rightarrow \cdot a \}$

$$I_1 = G_0(I_0, a) = \{ A \rightarrow \cdot a \}$$

$$I_2 = G_0(I_0, b) = \{ A \rightarrow \cdot b \}$$

$$I_3 = G_0(I_0, A) = \{ S \rightarrow A \cdot S, S \rightarrow \cdot AS, S \rightarrow \cdot b, A \rightarrow \cdot SA, A \rightarrow \cdot a \}$$

$$I_4 = G_0(I_0, S) = \{ S' \rightarrow S \cdot, A \rightarrow S \cdot A, A \rightarrow \cdot a, A \rightarrow \cdot SA, A \rightarrow \cdot b, S \rightarrow \cdot AS \}$$

$$I_5 = G_0(I_4, S) = \{ A \rightarrow S \cdot A, A \rightarrow \cdot SA, A \rightarrow \cdot a, S \rightarrow \cdot AS, S \rightarrow \cdot b \}$$

$$I_6 = G_0(I_5, S) \quad I_7 = G_0(I_5, a) \quad I_8 = G_0(I_5, b)$$

$$I_9 = G_0(I_3, S) \quad I_{10} = G_0(I_3, a) \quad I_{11} = G_0(I_3, b)$$

$$I_{12} = G_0(I_3, S) = \{ S \rightarrow AS \cdot, A \rightarrow S \cdot A, A \rightarrow \cdot a, S \rightarrow \cdot AS, S \rightarrow \cdot b \}$$

$$I_{13} = G_0(I_{12}, a) \quad I_{14} = G_0(I_{12}, b) \quad I_{15} = G_0(I_{12}, S)$$

$$I_{16} = G_0(I_{12}, A) = \{ S \rightarrow SA \cdot, S \rightarrow \cdot AS, S \rightarrow \cdot b, A \rightarrow \cdot SA, A \rightarrow \cdot a \}$$

$$I_{17} = G_0(I_4, A) \quad I_{18} = G_0(I_5, A)$$

$$I_{19} = G_0(I_5, a) \quad I_{20} = G_0(I_5, b)$$

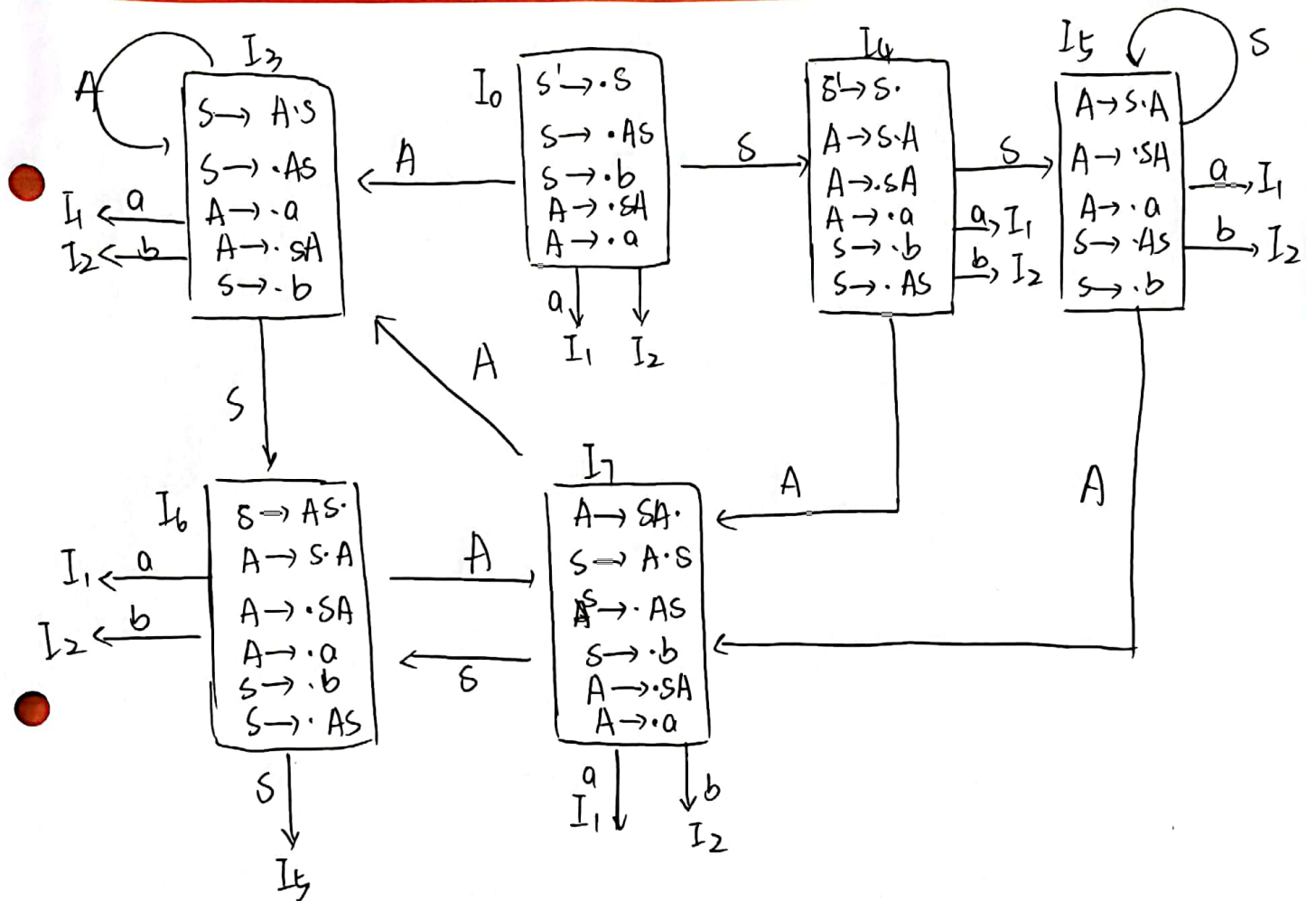
$$I_{21} = G_0(I_4, a) \quad I_{22} = G_0(I_4, b)$$

$$I_{23} = G_0(I_7, a) \quad I_{24} = G_0(I_7, b)$$

因此

因此, 根据上述 G_0 函数, 可得如下 DFA





最后构造 LR(0) 分析表

状态	Action			Goto	
	a	b	#	S	A
0	S ₁	S ₂		4	3
1	r ₄	r ₄	r ₄		
2	r ₂	r ₂	r ₂		
3	S ₁	S ₂		5	3
4	S ₁	S ₂	acc	5	7
5	S ₁	S ₂		5	7
6	S ₁ /r ₁	S ₂ /r ₁	r ₁	5	7
7	S ₁ /r ₃	S ₂ /r ₃	r ₃	6	3



(2) 构造 SLR(1) 分析表.

分析:

$$\text{Follow}(A) = \{a, b\}.$$

$\text{Follow}(S) = \{a, b, \#\}$ 、故由(1)可得 SLR(1) 分析表如下:

状态	Action			Goto	
	a	b	#	S	A
0	s ₁	s ₂		4	3
1	r ₄	r ₄			
2	s ₁ r ₂	r ₂	r ₂	6	3
3	s ₁	s ₂			
4	s ₁	s ₂	acc	5	7
5	s ₁	s ₂		5	7
6	s ₁ /r ₁	s ₂ /r ₁	r ₁	5	7
7	s ₁ /r ₃	s ₂ /r ₃		6	3

(3) 构造 LR(1) 分析表、画出 DFA

首先引入 S' 并初始化 $I_0 = \{ [S' \rightarrow S, \#], [S \rightarrow \cdot AS, \#|a|b], [S \rightarrow \cdot b, \#|a|b], [A \rightarrow \cdot a, a|b], [A \rightarrow \cdot SA, a|b] \}$

之后分析 Go 函数

$$I_0 = \{ [S' \rightarrow S, \#], [S \rightarrow \cdot AS, \#|a|b], [S \rightarrow \cdot b, \#|a|b], [A \rightarrow \cdot a, a|b], [A \rightarrow \cdot SA, a|b] \}$$

$$I_1 = \text{Go}(I_0, S)$$

$$= \{ [S' \rightarrow S \cdot, \#], [A \rightarrow S \cdot A, a|b], [A \rightarrow \cdot SA, a|b], [A \rightarrow \cdot a, a|b], [S \rightarrow \cdot AS, a|b], [S \rightarrow \cdot b, a|b] \}$$

$$I_2 = \text{Go}(I_0, A) = \text{Go}(I_2, A)$$

$$= \{ [S \rightarrow A \cdot S, \#|a|b], [S \rightarrow \cdot AS, \#|a|b], [S \rightarrow \cdot b, a|b| \#], [A \rightarrow \cdot SA, a|b], [A \rightarrow \cdot a, a|b] \}$$



$$I_3 = G_0(I_0, a) = \{ [A \rightarrow a, a|b] \} = G_0(I_2, a) = G_0(I_1, a) = G_0(I_5, a) \\ = G_0(I_6, a) = G_0(I_8, a) = G_0(I_{10}, a) \\ I_4 = G_0(I_0, b) = \{ [A \rightarrow b, \#|ab] \} = G_0(I_2, b) = G_0(I_6, b)$$

$$I_5 = G_0(I_1, s) = G_0(I_5, s) = G_0(I_8, s) \\ = \{ [A \rightarrow s \cdot A, alb], [A \rightarrow \cdot a, alb], [A \rightarrow \cdot SA, alb] \\ [S \rightarrow \cdot AS, alb], [S \rightarrow \cdot b, alb] \}$$

$$I_6 = G_0(I_1, A) = G_0(I_5, A) = G_0(I_8, A) \\ = \{ [A \rightarrow SA \cdot, alb], [S \rightarrow A \cdot s, alb], [S \rightarrow \cdot AS, alb] \\ [S \rightarrow \cdot b, alb], [A \rightarrow \cdot SA, alb], [A \rightarrow \cdot a, alb] \}$$

$$I_7 = G_0(I_2, b) = \{ [A \rightarrow b \cdot, alb] \} = G_0(I_5, b) = G_0(I_6, b) = G_0(I_8, b) \\ = G_0(I_{10}, b)$$

$$I_8 = G_0(I_2, s) \\ = \{ [S \rightarrow AS \cdot, \#|alb], [A \rightarrow s \cdot A, alb], [A \rightarrow \cdot SA, alb] \\ [A \rightarrow \cdot a, alb], [S \rightarrow \cdot AS, alb], [S \rightarrow \cdot b, alb] \}$$

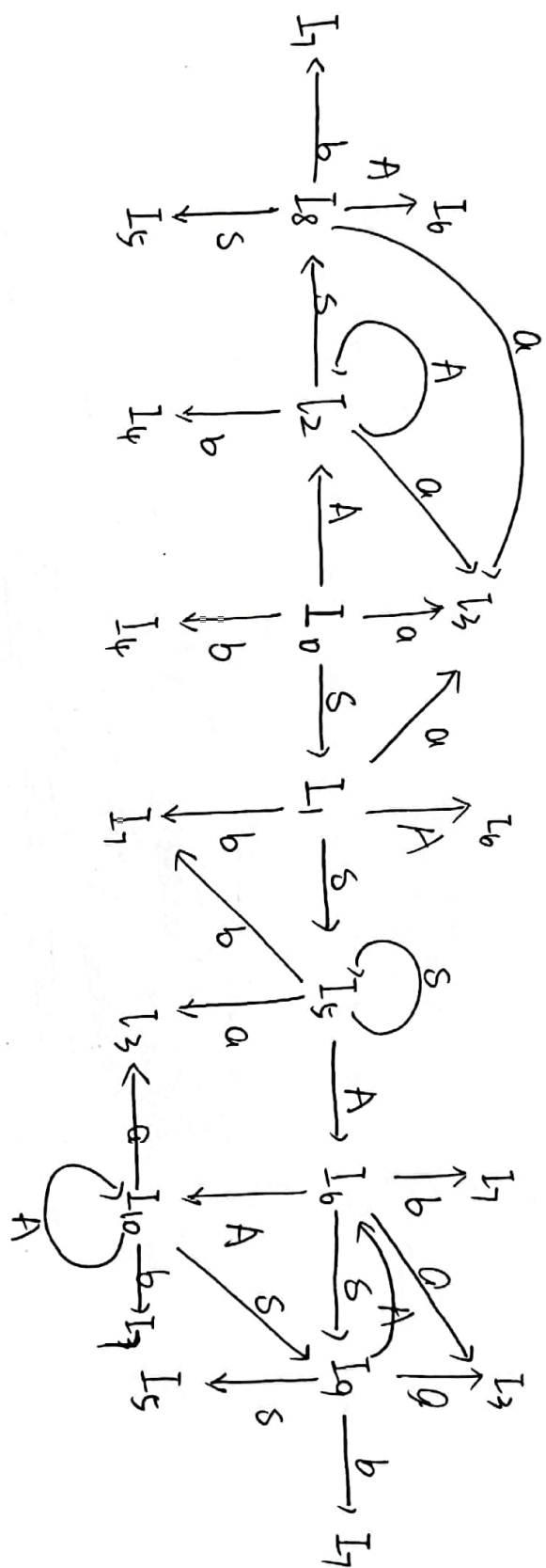
$$I_9 = G_0(I_4, s) = G_0(I_{10}, s) \\ = \{ [S \rightarrow AS \cdot, alb], [A \rightarrow s \cdot A, alb], [A \rightarrow \cdot SA, alb] \\ [A \rightarrow \cdot a, alb], [S \rightarrow \cdot AS, alb], [S \rightarrow \cdot b, alb] \}$$

$$I_{10} = G_0(I_6, A) = G_0(I_{10}, A) \\ = \{ [S \rightarrow A \cdot s, alb], [S \rightarrow \cdot AS, alb], [S \rightarrow \cdot b, alb] \\ [A \rightarrow \cdot SA, alb], [A \rightarrow \cdot a, alb] \}$$

因此, 根据 G_0 函数, 有如下示意图.

DTA





棚子



相应的 LR(1) 分析表为:

状态	a	b	#	S	A
I_0	S_3	S_4		1	2
I_1	S_3	S_7	acc	5	6
I_2	S_3	S_4		5 8	6 2
I_3	r_4	r_4			
I_4	r_2	r_2	R r_2		
I_5	S_3	S_7		5	6
I_6	S_3/r_3	S_7/r_3		I_9	I_{10}
I_7	r_2	r_2			
I_8	I_3/r_1	I_7/r_1	r_1	5	6
I_9	I_3/r_1	I_7/r_1		5 5	6
I_{10}	I_3	I I_7		9	10

(4) 合并同心集

I_4 与 I_7 可合并为 $\{[S \rightarrow b, \#|a|b], [A \rightarrow \cdot SA, a|b]\}$

I_2 和 I_{10} 可合并为 $\{[S \rightarrow A \cdot S, \#|a|b], [S \rightarrow \cdot AS, \#|a|b], [S \rightarrow \cdot b, \#|a|b], [A \rightarrow \cdot SA, a|b], [A \rightarrow a, \#|a|b]\}$

I_8 和 I_9 可合并为 $\{[S \rightarrow AS \cdot, \#|a|b], [A \rightarrow S \cdot A, a|b], [A \rightarrow \cdot SA, a|b], [S \rightarrow \cdot a, a|b], [S \rightarrow \cdot b, a|b], [S \rightarrow \cdot AS, a|b]\}$



15) 识别 baab

序号	状态	符号	输入
0	0	#	baab#
1	04	#b	aab#
2	01	#S	aab#
3	013	#Sa	ab#
4	016	#SA	ab#

若此时移进,则有

5	0163	#SAa	b#
6	01610	#SAA	b#
7	0167	#SAAb	#

则报错

若序号4之后归约,则有

5	016	#SA	ab#
6	02	#A	ab#
7	023	#Aa	b#
8	022	#AA	b#
9	0224	#AAb	#
10	0228	#AAS	#
1011	028	#AS	#
12	01	#S	#
13	01	# SA acc	#

故识别成功

