编译原理作业

HW6-1

PB20111686 黄瑞轩

3.17

将原来的文法拓广为下面的文法 G'：

- $S' \to S$
- $S \to (L)$
- $S \to a$
- $L \to L, S$
- $L \to S$

开始状态是 $I_0 = closure([S' \to \cdot S])$

$I_0 = \{[S' \to \cdot S], [S \to \cdot (L)], [S \to \cdot a]\}$

$goto(I_0, S) = closure(\{[S' \to S\cdot]\}) = \{[S' \to S\cdot]\} = I_1$

$goto(I_0, () = closure(\{[S \to (\cdot L)]\}) = \{[S \to (\cdot L)], [L \to \cdot L, S], [L \to \cdot S], [S \to \cdot (L)], [S \to \cdot a]\} = I_2$

$goto(I_0, a) = closure(\{[S \to a\cdot]\}) = \{[S \to a\cdot]\} = I_3$

$goto(I_2, L) = closure(\{[S \to (L\cdot)], [L \to L\cdot, S]\}) = \{[S \to (L\cdot)], [L \to L\cdot, S]\} = I_4$

$goto(I_2, S) = closure(\{[L \to S\cdot]\}) = \{[L \to S\cdot]\} = I_5$

$goto(I_2, () = closure(\{[S \to (\cdot L)]\}) = I_2$

$goto(I_2, a) = closure(\{[S \to a\cdot]\}) = I_3$

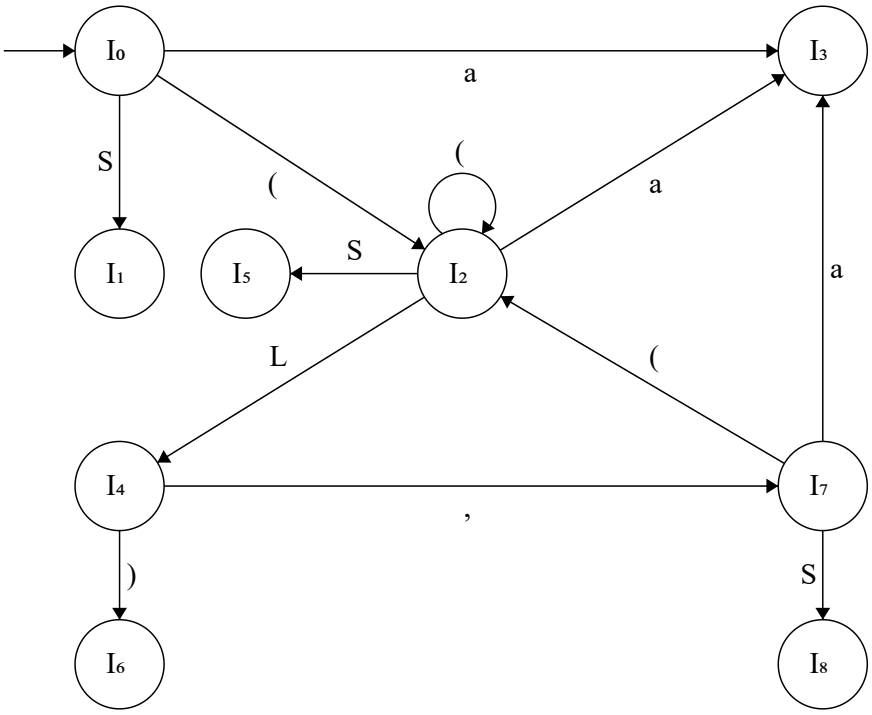
$goto(I_4,)) = closure(\{[S \to (L)\cdot]\}) = \{[S \to (L)\cdot]\} = I_6$

$goto(I_4, ,) = closure(\{[L \to L, \cdot S]\}) = \{[L \to L, \cdot S], [S \to \cdot (L)], [S \to \cdot a]\} = I_7$

$goto(I_7, S) = closure(\{[L \to L, S\cdot]\}) = \{[L \to L, S\cdot]\} = I_8$

$goto(I_7, () = I_2$

$goto(I_7, a) = I_3$



3.19

（1）将原来的文法拓广为下面的文法 G'：

1. $E' \to E$
2. $E \to E + T$
3. $E \to T$
4. $T \to TF$
5. $T \to F$
6. $F \to F*$
7. $F \to a$
8. $F \to b$

各非终结符的 FOLLOW 集合：

非终结符A	FOLLOW(A) 内容
E'	$
E	+, $
T	a, b, +, $
F	a, b, *, +, $

G' 的 SLR DFA 状态转换表如下：

	项集	状态编码
	c(E’ → • E)= E’ → • E E→ • E+T E→ • T T→ • TF T→ • F F→ • F* F→ • a F→ • b	0
goto(0,E)	c(E’ →E • , E→E • +T)= E’ →E • E→E • +T	1
goto(0,T)	c(E→T • , T→T • F)= E→T • T→T • F F→ • F* F→ • a F→ • b	2
goto(0,F)	c(T→F • , F→F • *)= T→F • F→F • *	3
goto(0,a)	c(F→a •)= F→a •	4
goto(0,b)	c(F→b •)= F→b •	5
goto(1,+)	c(E→E+ • T)= E→E+ • T T→ • TF T→ • F F→ • F* F→ • a F→ • b	6
goto(2,F)	c(T→TF • , F→F • *)= T→TF • F→F • *	7
goto(2,a)		4
goto(2,b)		5
goto(3,*)	c(F→F* •) = F→F* •	8

goto(6, T)	c(E→E+T•， T→T•F)= E→E+T• T→T•F F→•F* F→•a F→•b	9
goto(6, F)		3
goto(6, a)		4
goto(6, b)		5
goto(7, *)		8
goto(9, F)		7
goto(9, a)		4
goto(9, b)		5

G' 的 ACTION 表:

ACTION	a	b	*	+	$
0	s4	s5			
1				s6	接受
2	s4	s5		r3	r3
3	r5	r5	s8	r5	r5
4	r7	r7	r7	r7	r7
5	r8	r8	r8	r8	r8
6	s4	s5			
7	r4	r4	s8	r4	r4
8	r6	r6	r6	r6	r6
9	s4	s5		r2	r2

G' 的 GOTO 表:

GOTO	E'	E	T	F
0		1	2	3
1				
2				7
3				
4				
5				
6			9	3
7				
8				
9				7

（2）首先构造 LR(1) 项目集。拓广文法 G'：

1. $E' \to E$
2. $E \to E + T$
3. $E \to T$
4. $T \to TF$
5. $T \to F$
6. $F \to F*$
7. $F \to a$
8. $F \to b$

各非终结符的 FIRST 集合如下：

非终结符A	FIRST(A) 内容
E'	a, b
E	a, b
T	a, b
F	a, b

根据书上的算法构造 LR(1) 项目集

	项集	状态编码
	c(E’ -> • E, $)= E’ -> • E, $ E -> • E+T, $/+ E -> • T, $/+ T -> • TF, $/+/a/b T -> • F, $/+/a/b F -> • F*, $/+/a/b/* F -> • a, $/+/a/b/* F -> • b, $/+/a/b/*	0
goto(0,E)	c(E’ ->E • ,$ E -> E • +T, $/+)= E’ -> E • ,$ E -> E • +T, $/+	1
goto(0,T)	c(E -> T • , $/+ T -> T • F, $/+/a/b)= E -> T • , $/+ T -> T • F, $/+/a/b F -> • F*, $/+/a/b/* F -> • a, $/+/a/b/* F -> • b, $/+/a/b/*	2
goto(0,F)	c(T -> F • , $/+/a/b F -> F • *, $/+/a/b/*)= T -> F • , $/+/a/b F -> F • *, $/+/a/b/*	3
goto(0,a)	c(F -> a • , $/+/a/b/*)= F -> a • , $/+/a/b/*	4
goto(0,b)	c(F -> b • , $/+/a/b/*)= F -> b • , $/+/a/b/*	5
goto(1,+)	c(E -> E+ • T, $/+)= E -> E+ • T, $/+ T -> • TF, $/+/a/b T -> • F, $/+/a/b F -> • F*, $/+/a/b/* F -> • a, $/+/a/b/* F -> • b, $/+/a/b/*	6

goto(2,F)	c(T -> TF•, $/+/a/b F -> F•*, $/+/a/b/*)= T -> TF•, $/+/a/b F -> F•*, $/+/a/b/*	7
goto(2,a)		4
goto(2,b)		5
goto(3,*)	c(F -> F*•, $/+/a/b/*)= F -> F*•, $/+/a/b/*	8
goto(6,T)	c(E -> E+T•, $/+ T -> T•F, $/+/a/b)= E -> E+T•, $/+ T -> T•F, $/+/a/b F ->•F*, $/+/a/b/* F ->•a, $/+/a/b/* F ->•b, $/+/a/b/*	9
goto(6,F)		3
goto(6,a)		4
goto(6,b)		5
goto(7,*)		8
goto(9,F)		7
goto(9,a)		4
goto(9,b)		5

因为这个项目集不存在同心项目集，不用合并，则结果应该与SLR分析表一致：

G' 的 ACTION 表：

ACTION	a	b	*	+	$
0	s4	s5			
1				s6	接受
2	s4	s5		r3	r3
3	r5	r5	s8	r5	r5
4	r7	r7	r7	r7	r7
5	r8	r8	r8	r8	r8
6	s4	s5			
7	r4	r4	s8	r4	r4
8	r6	r6	r6	r6	r6
9	s4	s5		r2	r2

G' 的 GOTO 表：

GOTO	E'	E	T	F
0		1	2	3
1				
2				7
3				
4				
5				
6			9	3
7				
8				
9				7