

$$G[A]: (1) A \rightarrow aAB | a$$

$$(2) B \rightarrow Bb | Bd | c$$

计科1803
李若昊 (0269)

解: (1) $B \rightarrow Bb$ 与 $B \rightarrow Bd$ 存在直接左递归,
分别可改为以下直接右递归:

$$\begin{cases} B \rightarrow cB' \\ B' \rightarrow bB' | \varepsilon \end{cases}, \begin{cases} B \rightarrow cB'' \\ B'' \rightarrow dB'' | \varepsilon \end{cases}$$

$$\therefore G[A]: (1) A \rightarrow aA'$$

$$(2) B \rightarrow cB''$$

$$(3) B' \rightarrow bB' | \varepsilon$$

$$(4) B'' \rightarrow dB'' | \varepsilon$$

$$(5) A' \rightarrow AB | \varepsilon,$$

$$(6) B''' \rightarrow B' | B''$$

添加了(5)(6)并更改了(1)(2)以消除左公因子.

(2)(3)直接通过构造 $G[A]$ 的分析表判断文法类型:

求(1)的 FIRST 集:

$$FIRST(a) = \{a\}$$

$$FIRST(aA') = \{a\}$$

求(2)的 FIRST 集:

$$FIRST(c) = \{c\}$$

$$FIRST(cB''') = \{c\}$$

求(3)的 FIRST 集:

$$FIRST(\varepsilon) = \{\varepsilon\}$$

$$FIRST(b) = \{b\}$$

$$FIRST(bB') = \{b\}$$

求(4)的 FIRST 集:

$$FIRST(\varepsilon) = \{\varepsilon\}$$

$$FIRST(d) = \{d\}$$

$$FIRST(dB'') = \{d\}$$

求(5)的 FIRST 集:

$$FIRST(A) = \{a\}$$

求(6)的 FIRST 集:

$$FIRST(B') = \{b, \varepsilon\}$$

$$FIRST(B) = \{c\}$$

$$FIRST(AB) = \{a\}$$

$$FIRST(z) = \{z\}$$

$$FIRST(B') = \{d, z\}$$

$$FOLLOW(A) = \{\#\}$$

$$FOLLOW(B) = \{\#\}$$

$$FOLLOW(A') = \{\#\}$$

$$FOLLOW(B') = \{\#\}$$

$$FOLLOW(B'') = \{\#\}$$

$$FOLLOW(B''') = \{\#\}$$

	a	b	c	d	z	#
A	$A \rightarrow aA'$					
B			$B \rightarrow cB'''$			
B'		$B' \rightarrow bB'$			$B' \rightarrow z$	$B'^* \rightarrow z$
B''				$B'' \rightarrow dB''$	$B'' \rightarrow z$	$B''^* \rightarrow z$
A'	$A' \rightarrow AB$				$A' \rightarrow z$	$A'^* \rightarrow z$
B'''		$B''' \rightarrow B'$		$B''' \rightarrow B''$	$B''' \rightarrow B'$ $B''' \rightarrow B''$	$B'''^* \rightarrow z$

由分析表含多重定义知, 该文法并非LL(1)文法

(4) 用B1论B', 有

B1()

用B2论B'', 有

B2()

}

if (ch == 'b')

{

ch = next();

B1();

}

else if (ch == '#')

return;

else

error();

}

}

if (ch == 'd')

{

ch = next();

B2();

}

else if (ch == '#')

return;

else

error();

}