

Hoja 3: Análisis sintáctico ascendente

LR(0) y SLR

Ejercicio 1 Comprueba si la siguiente gramática es LR(0):

$X \rightarrow Y \mid Z$

$Y \rightarrow aYb \mid c$

$Z \rightarrow aZbb \mid d$

Grammar

$X \rightarrow Y$
 $\mid Z \cdot$
 $Y \rightarrow a Y b$
 $\mid c \cdot$
 $Z \rightarrow a Z b b$
 $\mid d \cdot$

LR(0) Table

	S	d	b	a	c	X	Y	Z
0		s6		s5	s4	s3	s2	s1
1	r(X → Z)	r(X → Z)	r(X → Z)	r(X → Z)	r(X → Z)			
2	r(X → Y)	r(X → Y)	r(X → Y)	r(X → Y)	r(X → Y)			
3	acc	acc	acc	acc	acc			
4	r(Y → c)	r(Y → c)	r(Y → c)	r(Y → c)	r(Y → c)			
5		s6		s5	s4	s8	s7	
6	r(Z → d)	r(Z → d)	r(Z → d)	r(Z → d)	r(Z → d)			
7			s10					
8			s9					
9	r(Y → a Y b)	r(Y → a Y b)	r(Y → a Y b)	r(Y → a Y b)	r(Y → a Y b)			
10			s11					
11	r(Z → a Z b b)	r(Z → a Z b b)	r(Z → a Z b b)	r(Z → a Z b b)	r(Z → a Z b b)			

SLR(1) Table

	S	d	b	a	c	X	Y	Z
0		s6		s5	s4	s3	s2	s1
1	r(X → Z)							
2	r(X → Y)							
3	acc							
4	r(Y → c)	r(Y → c)						
5		s6		s5	s4	s8	s7	
6	r(Z → d)	r(Z → d)						
7		s10						
8		s9						
9	r(Y → a Y b)	r(Y → a Y b)						
10		s11						
11	r(Z → a Z b b)	r(Z → a Z b b)						

The grammar is LR(0).

En caso de serlo, utiliza el analizador LR(0) resultante para analizar la palabra aacbb.

JFLAP : <untitled1>

File Input Test Convert Help

Editor Build SLR(1) Parse SLR(1) Parsing

Table Text Size

	a	b	c	d	\$	X	Y	Z
0	s4		s5	s6		1	2	3
1					acc			
2					r1			
3					r2			
4	s4		s5	s6			7	8
5		r4			r4			
6		r6			r6			
7		s9						
8		s10						
9		r3			r3			
10		s11						
11		r5			r5			

Start Step Noninverted Tree

Input aacbb

Input Remaining\$

Stack 8Z4a0

LHS	RHS
X'	→ X
X	→ Y
X	→ Z
Z	→ aYb
Z	→ c
Z	→ aZbb
Z	→ d

String rejected

Ejercicio 2 Comprueba si la siguiente gramática es SLR:

$S' \rightarrow S$

$S \rightarrow V = S \mid S + P \mid P$

$P \rightarrow (S) \mid id$

$V \rightarrow id$

(en calgary el "=" me da error, como se solucionaria este problema?)

Grammar

```

S' → S .
S → V = S
    | S + P
    | P .
P → ( S )
    | i .
V → i .
    
```

Line 1: ignoring bad character '='.

The grammar is ambiguous. Some sentences with ambiguous derivation: $i\ i + i$.

Some sentences generated by this grammar: $\{i, i\ i, i + i, i\ i\ i, (i), (i\ i), i\ i + i, i\ i(i), ($

- All nonterminals are reachable and realizable.
- There are no nullable nonterminals.
- The endable nonterminals are: $P\ S'\ S$.
- No cycles.

nonterminal	first set	follow set	nullable	endable
S'	(i	\emptyset	no	yes
P	(i	+)	no	yes
S	(i	+)	no	yes
V	i	(i	no	no

The grammar is not LL(1) because:

- S is left recursive.
- S has a first set conflict.

CORRIGIDO:

JFLAP: <untitled2>

File Input Test Convert Help

Editor Build SLR(1) Parse

Do Selected Do Step Do All Next Parse

Parse table complete. Press "parse" to use it.

		FIRST	FOLLOW
P		{ (, i }	{ \$,), + }
S		{ (, i }	{ \$,), + }
V		{ i }	{ = }

	()	+	=	i	\$	P	S	V
0	s1				s5		2	3	4
1	s1				s5		2	6	4
2		r3	r3			r3			
3			s7			acc			
4				s8					
5		r5	r5	r6		r5			
6		s9	s7						
7	s1				s11		10		
8	s1				s5		2	12	4
9		r4	r4			r4			
10		r2	r2			r2			
11		r5	r5			r5			
12		r1	r1			r1			

En caso de serlo, utiliza el analizador SLR resultante para analizar la palabra $id1 + (id2 = id3)$.

JFLAP : <untitled2>

File Input Test Convert Help

Editor Build SLR(1) Parse SLR(1) Parsing

Table Text Size

	()	+	=	i	\$	P	S	V
0	s1				s5		2	3	4
1	s1				s5		2	6	4
2		r3	r3		r3				
3			s7		acc				
4				s8					
5		r5	r5	r6	r5				
6		s9	s7						
7	s1				s11		10		
8	s1				s5		2	12	4
9		r4	r4		r4				
10		r2	r2		r2				
11		r5	r5		r5				
12		r1	r1		r1				

Start Step Noninverted Tree

Input $i+(i=i)$

Input Remaining \$

Stack S0

LHS	RHS
S'	→ S
S	→ V=S
S	→ S+P
S	→ P
P	→ (S)
P	→ i
V	→ i

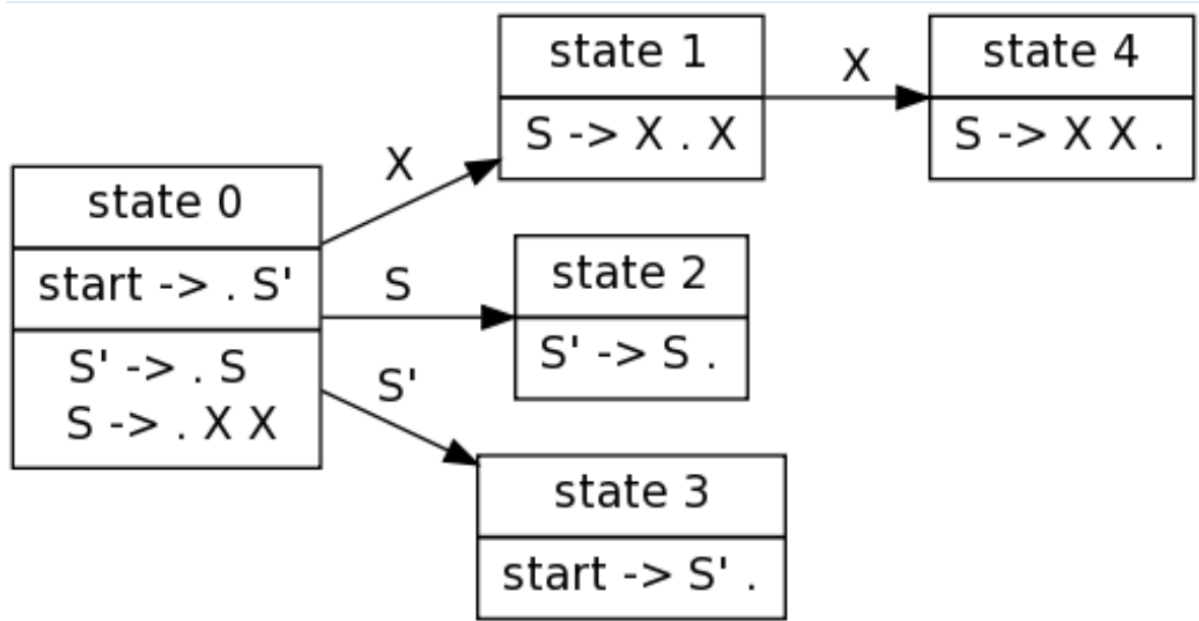
String accepted

Ejercicio 3 Comprueba si la siguiente gramática es LR(0) o SLR:

$S' \rightarrow S$

$S \rightarrow XX$

$X \rightarrow aX \mid b$



Grammar

$S' \rightarrow S .$
 $S \rightarrow X X .$
 $P \rightarrow a X$
 $\quad \mid b .$

LR(0) Table

	S	b	a	S'	S	P	X
0				s3	s2		s1
1							s4
2	r(S' → S)	r(S' → S)	r(S' → S)				
3	acc	acc	acc				
4	r(S → X X)	r(S → X X)	r(S → X X)				

SLR(1) Table

	S	b	a	S'	S	P	X
0				s3	s2		s1
1							s4
2	r(S' → S)						
3	acc						
4	r(S → X X)						

The grammar is LR(0).

En caso de serlo, utiliza el analizador más sencillo para analizar la palabra aabb.

JFLAP : <untitled3>

File Input Test Convert Help

Editor Build SLR(1) Parse SLR(1) Parsing

Table Text Size

	a	b	\$	S	X
0	s3	s4		1	2
1			acc		
2	s3	s4			5
3	s3	s4			6
4	r3	r3	r3		
5			r1		
6	r2	r2	r2		

Start Step Noninverted Tree

Input aabb

Input Remaining \$

Stack S0

LHS		RHS
S'	→	S
S	→	XX
X	→	aX
X	→	b

The parse tree for the string 'aabb' is shown. The root node is S (green). S has two children: X (green) and X (green). The left X has two children: a (yellow) and X (green). The right X has one child: b (yellow). The left X has two children: a (yellow) and X (green). The right X has one child: b (yellow).

String accepted

Ejercicio 4 Comprueba si la siguiente gramática es LR(0) o SLR:

$S' \rightarrow S$

$S \rightarrow Aa \mid bAc \mid dc \mid bda \mid$

$A \rightarrow d$

Grammar	
$S' \rightarrow S \cdot$	
$S \rightarrow A \cdot a$	
$\quad \mid b \cdot A c$	
$\quad \mid d \cdot c$	
$\quad \mid b d \cdot a \cdot$	
$A \rightarrow d \cdot$	

LR(0) Table

	\$	d	a	b	c	S'	S	A
0		s5		s4		s3	s2	s1
1			s9					
2	$r(S' \rightarrow S)$	$r(S' \rightarrow S)$	$r(S' \rightarrow S)$	$r(S' \rightarrow S)$	$r(S' \rightarrow S)$			
3	acc	acc	acc	acc	acc			
4		s8						s7
5	$r(A \rightarrow d)$	$r(A \rightarrow d)$	$r(A \rightarrow d)$	$r(A \rightarrow d)$	$r(A \rightarrow d)/s6$			
6	$r(S \rightarrow d c)$	$r(S \rightarrow d c)$	$r(S \rightarrow d c)$	$r(S \rightarrow d c)$	$r(S \rightarrow d c)$			
7					s11			
8	$r(A \rightarrow d)$	$r(A \rightarrow d)$	$r(A \rightarrow d)/s10$	$r(A \rightarrow d)$	$r(A \rightarrow d)$			
9	$r(S \rightarrow A a)$	$r(S \rightarrow A a)$	$r(S \rightarrow A a)$	$r(S \rightarrow A a)$	$r(S \rightarrow A a)$			
10	$r(S \rightarrow b d a)$	$r(S \rightarrow b d a)$	$r(S \rightarrow b d a)$	$r(S \rightarrow b d a)$	$r(S \rightarrow b d a)$			
11	$r(S \rightarrow b A c)$	$r(S \rightarrow b A c)$	$r(S \rightarrow b A c)$	$r(S \rightarrow b A c)$	$r(S \rightarrow b A c)$			

SLR(1) Table

	\$	d	a	b	c	S'	S	A
0		s5		s4		s3	s2	s1
1			s9					
2	$r(S' \rightarrow S)$							
3	acc							
4		s8						s7
5			$r(A \rightarrow d)$		$r(A \rightarrow d)/s6$			
6	$r(S \rightarrow d c)$							
7					s11			
8			$r(A \rightarrow d)/s10$		$r(A \rightarrow d)$			
9	$r(S \rightarrow A a)$							
10	$r(S \rightarrow b d a)$							
11	$r(S \rightarrow b A c)$							

The grammar is not LR(0) because:

- shift/reduce conflict in state 5.
- shift/reduce conflict in state 8.

Neither is it SLR(1) because:

- shift/reduce conflict in state 5.
- shift/reduce conflict in state 8.

En caso de serlo, utiliza el analizador más sencillo para analizar la palabra bdc.