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SLR (Simple LR) Parser

Dr.Y.Bevish Jinila
Department of Information Technology

Augmented Grammar

- If G is a grammar with start symbol, then G′ is the augmented grammar for G with a new start symbol S′ and production S′-> S

PURPOSE : To indicate the parser when it should stop parsing and announce acceptance of the input

Example

S -> AA

A -> aA | b

Soln:

The augmented grammar is

S'-> S

S -> AA

A -> aA | b

LR(0) items

- An LR (0) item is a **production G with dot at some position on the right side of the production**.
- LR (0) items is useful to indicate that how much of the input has been scanned up to a given point in the process of parsing.

Example

S -> AA

LR(0) items

S -> . AA (Not seen anything on right)
S - > A . A (Seen A, yet to see another A)
S -> A A . (Seen everything)

Construction of SLR Parsing Table

- Compute two functions
  - Closure
  - Goto

Closure operation

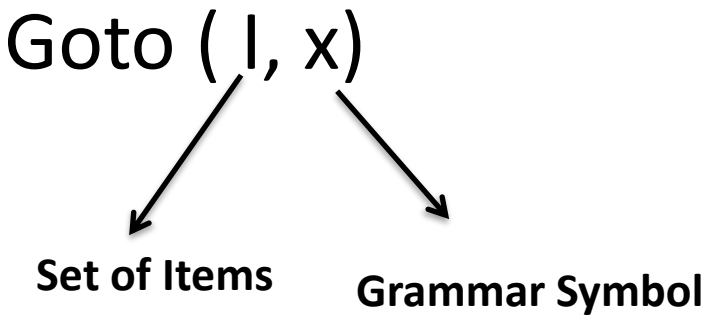
If I is a set of items for a grammar G, then closure(I) is the set of items constructed from I by the two rules.

(1)Initially, every item in I is added to closure (I)

(2)If A -> α.Bβ is in closure(I) and B->γ is a production, then add the item B ->.γ to I, if it is not already there.

(We apply this rule until no more new items can be added to closure(I)

Goto operation



It is defined to be the closure of the set of all items [A ->αx.β] such that [A ->α.xβ] is in I

Problem

Construct the SLR parsing table and parse the string abab for the following grammar

S -> AA

A -> aA | b

Soln:

1. Augmented Grammar

S'-> S
S -> AA
A -> aA | b

LR (0) Items

I_0
S'-> . S
S -> . AA
A -> . aA
A -> . b

Goto (I_0, S)

I_1
S'-> S .

Goto (I_0, A)

I_2
S -> A.A
A -> . aA
A -> . b

Goto (I_0, a)

I_3
A -> a.A
A -> . aA
A -> . b

Goto (I_0, b)

I_4
A -> b.

Goto (I_2, A)

I_5
S -> AA.

Goto (I_2, a)

I_3
A -> a . A
A -> . aA
A -> . b

Goto (I_2, b)

I_4
A -> b.

Goto (I_3, A)

I_6
A -> aA .

Goto (I_3, a)

I_3
A -> a.A
A -> . aA
A -> . b

Goto (I_3, b)

I_4
A -> b.

SLR Parsing Table

S -> AA ----------(1)
A -> aA ---------(2)
A -> b ----------(3)

State	Action			Goto	
	a	b	$	S	A
0	S3	S4		1	2
1			Accept		
2	S3	S4			5
3	S3	S4			6
4	R3	R3	R3		
5			R1		
6	R2	R2	R2		

Reduce Action

I4 :A -> b.
Follow(A)=
FIRST(A)= {a,b,$}

I5: S->AA.

Follow(S)= {$}

I6: A -> aA .
Follow(A)=
FIRST(A)= {a,b,$}

Parsing

Actions : Shift, Reduce, Accept, Error

Stack	Input	Action
0	abab $	Shift (S3)
0a3	bab $	Shift (S4)
0a3b4	ab $	Reduce (R3) A -> b
0a3A6	ab $	Reduce (R2) A -> aA
0A2	ab $	Shift (S3)
0A2a3	b$	Shift (S4)
0A2a3b4	$	Reduce (R3) A -> b
0A2a3A6	$	Reduce (R2) A -> aA
0A2A5	$	Reduce (R1) S -> AA
0S1	$	Accept

State	Action			Goto	
	a	b	$	S	A
0	S3	S4		1	2
1			Accept		
2	S3	S4			5
3	S3	S4			6
4	R3	R3	R3		
5			R1		
6	R2	R2	R2		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Thank you