

SLR Parse Table Construction

- item
- item set
- closure (of items)
- goto
- set-of-items construction
- populating the table

Item

Given a production, $A \rightarrow XYZ$, an LR(0) item is any string of the following form

$$A \rightarrow \cdot XYZ$$

$$A \rightarrow X \cdot YZ$$

$$A \rightarrow XY \cdot Z$$

$$A \rightarrow XYZ \cdot$$

Item con't

- the dot represents the concept that the input seen up to the dot could have been derived, top down, to that point in the production
- LR(0) item for $A \rightarrow \varepsilon$ is $A \rightarrow \cdot$

Closure(I), I is a set of items

1. I is in the closure of I
2. Until fixed-point
 - if $A \rightarrow \alpha \cdot B \beta$ is in closure of I,
then add $B \rightarrow \cdot \gamma$ to the closure of I

goto(I,X)

goto

{items} x any grammar symbol $\xrightarrow{\text{goto}}$ {items}

If $A \rightarrow \alpha . X \beta$ is in I,
then

add $A \rightarrow \alpha X . \beta$ to J,

$\text{Goto}(I,X) = \text{closure}(J)$

set-of-items construction

If S is the start symbol of grammar G ,
augment the grammar with the production $S' \rightarrow S$
call the new grammar G'

- Reduction to S' will indicate we are done.
- (does this change the language?)

set-of-items construction

Let C be the sets-of-items (*set of item sets*)

$C = \text{closure}(\{S' \rightarrow \cdot S\})$

until fixed-point

let $c \in C$ and X a symbol of G' ,

add $\text{goto}(c, X)$ to C

SLR table construction

1. Construct sets-of-items
2. Create action table,
 - one row for each item-set, // which forms a state
 - one column for each token + \$
3. Create goto table
 - same rows as action
 - one column for nonterminal

Populate the action table:

The i^{th} row, corresponds to the i^{th} item set, I_i

1. If $[A \rightarrow \alpha . a \beta]$ is in I_i , and $\text{goto}(I_i, a) = I_j$
 - then set $\text{action}[i, a]$ to shift j ,
2. If $[A \rightarrow \alpha .]$ is in I_i , and a is in $\text{Follow}(A)$
 - then set $\text{action}[i, a]$ to reduce $A \rightarrow \alpha$
3. If $[S' \rightarrow S .]$ is in I_i ,
 - then set $\text{action}[i, \$]$ to accept

Populate the goto table

For each nonterminal A

If $\text{goto}(I_i, A) = I_j$

then $\text{goto}[i, A] = j$