

Example for agenda-based chart parsing

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Consider the version of the Unger parsing for CNF, formulated with deduction rules:

$$\text{Axiom: } \frac{}{[\bullet S, 0, n]} \quad |w| = n$$

$$\text{Predict: } \frac{[\bullet A, i, k]}{[\bullet B, i, j], [\bullet C, j, k]} \quad A \rightarrow BC \in P, i < j < k$$

$$\text{Scan: } \frac{[\bullet A, i, i+1]}{[A\bullet, i, i+1]} \quad A \rightarrow w_{i+1} \in P$$

$$\text{Complete: } \frac{[\bullet A, i, k], [B\bullet, i, j], [C\bullet, j, k]}{[A\bullet, i, k]} \quad A \rightarrow BC \in P$$

Furthermore, take the CFG G with $N = \{S, A\}$, $T = \{a, b, c\}$, start symbol S and productions

$$S \rightarrow SS \mid SA \mid a, \quad A \rightarrow b \mid c$$

We consider an agenda-based chart parsing of the input word aac , using the CNF Unger chart parser. The items that are generated are given in a table, showing each time the new agenda and the new items generated from the item that has just been removed from the agenda (possibly in combination with other chart items).

More precisely: From one line to the next we 1. remove the first item from the agenda and 2. compute all new items that one can generate from this item and other chart items. These new items are listed in the left column and are appended to the agenda.

new chart items	agenda items
$[\bullet S, 0, 3]$	$[\bullet S, 0, 3]$
$[\bullet S, 0, 1] \quad [\bullet S, 0, 2] \quad [\bullet S, 1, 3] \quad [\bullet S, 2, 3] \quad [\bullet A, 1, 3]$ $[\bullet A, 2, 3]$	$[\bullet S, 0, 1] \quad [\bullet S, 0, 2] \quad [\bullet S, 1, 3] \quad [\bullet S, 2, 3] \quad [\bullet A, 1, 3]$ $[\bullet A, 2, 3]$
$[S\bullet, 0, 1]$	$[\bullet S, 0, 2] \quad [\bullet S, 1, 3] \quad [\bullet S, 2, 3] \quad [\bullet A, 1, 3] \quad [\bullet A, 2, 3]$ $[S\bullet, 0, 1]$
$[\bullet S, 1, 2] \quad [\bullet A, 1, 2]$	$[\bullet S, 1, 3] \quad [\bullet S, 2, 3] \quad [\bullet A, 1, 3] \quad [\bullet A, 2, 3] \quad [S\bullet, 0, 1]$ $[\bullet S, 1, 2] \quad [\bullet A, 1, 2]$
–	$[\bullet S, 2, 3] \quad [\bullet A, 1, 3] \quad [\bullet A, 2, 3] \quad [S\bullet, 0, 1] \quad [\bullet S, 1, 2]$ $[\bullet A, 1, 2]$
–	$[\bullet A, 1, 3] \quad [\bullet A, 2, 3] \quad [S\bullet, 0, 1] \quad [\bullet S, 1, 2] \quad [\bullet A, 1, 2]$
–	$[\bullet A, 2, 3] \quad [S\bullet, 0, 1] \quad [\bullet S, 1, 2] \quad [\bullet A, 1, 2]$
$[A\bullet, 2, 3]$	$[S\bullet, 0, 1] \quad [\bullet S, 1, 2] \quad [\bullet A, 1, 2] \quad [A\bullet, 2, 3]$
–	$[\bullet S, 1, 2] \quad [\bullet A, 1, 2] \quad [A\bullet, 2, 3]$
$[S\bullet, 1, 2]$	$[\bullet A, 1, 2] \quad [A\bullet, 2, 3] \quad [S\bullet, 1, 2]$
–	$[A\bullet, 2, 3] \quad [S\bullet, 1, 2]$
$[S\bullet, 1, 3]$	$[S\bullet, 1, 2] \quad [S\bullet, 1, 3]$
$[S\bullet, 0, 2]$	$[S\bullet, 1, 3] \quad [S\bullet, 0, 2]$
$[S\bullet, 0, 3]$	$[S\bullet, 0, 2] \quad [S\bullet, 0, 3]$
–	$[S\bullet, 0, 3]$
–	–

The left part gives the chart, we only add items, nothing gets deleted, while the right column lists the subsequent agenda contents (in each step we delete something and possibly also add something).