

Parsing

Homework 9 (Left corner), due 07 June 2022, 10.30 am

Laura Kallmeyer

SS 2022, Heinrich-Heine-Universität Düsseldorf

Question 1 (Left Corner)

Consider a CFG with the following productions: $S \rightarrow A \mid BU \mid BA$, $A \rightarrow aA \mid a$, $B \rightarrow bBb \mid b$, $U \rightarrow a$.

Given an input word aa , give the Left Corner Recognition trace, i.e., the set of stack triples, for this input. We assume a Reduce operation with lookahead, i.e., Reduce with a new X -production is applied only if the topmost symbol Y of the stack of predicted categories stands in the relation LC^* to X , i.e., $Y \xRightarrow{*} X \dots$

Question 2 (Left Corner chart parsing)

Consider the left corner chart parsing deduction rules from slide 15. Extend the algorithm with a rule for ε -productions in order to make it work for arbitrary CFGs.

Question 3 (Left Corner Chart Parsing)

Consider the CFG G with non-terminals $N = \{S\}$, terminals $T = \{a, b, c\}$, start symbol S and productions $S \rightarrow aSa \mid Sb \mid c$.

Given an input word $acba$, give the Left Corner Recognition Chart one obtains with the chart parsing version.¹

¹Parsing Schema:

Scan: $\frac{}{[w_i, i, 1]} \quad 1 \leq i \leq n$ Reduce: $\frac{[X, i, l]}{[A \rightarrow X \bullet \alpha, i, l]} \quad A \rightarrow X\alpha \in P$

Remove: $\frac{[A \rightarrow \alpha \bullet X\beta, i, l_1], [X, j, l_2]}{[A \rightarrow \alpha X \bullet \beta, i, l_1 + l_2]} \quad j = i + l_1$ Move: $\frac{[A \rightarrow \alpha X \bullet, i, l]}{[A, i, l]}$

Goal item: $[S, 1, n]$.