

CS378 Lecture 13

CKY, Dependency

Announcements

- A3 due Thurs

- midterm Tues, review next class

Recap PCFGs

N	T	S	R
symbols	words	start	rules (+probs)

DT \rightarrow the | S \rightarrow NP VP |

NN \rightarrow child | NP \rightarrow DT NN $\frac{1}{2}$

NNS \rightarrow raises | NP \rightarrow NN NNS $\frac{1}{2}$

VBZ \rightarrow raises | VP \rightarrow VBZ PRP |

PRP \rightarrow it |

$$\log\left(\frac{1}{2}\right) = -1$$

CKY:

$$\text{Base: } T(i, i+1, X) = \log P(w_i | X)$$

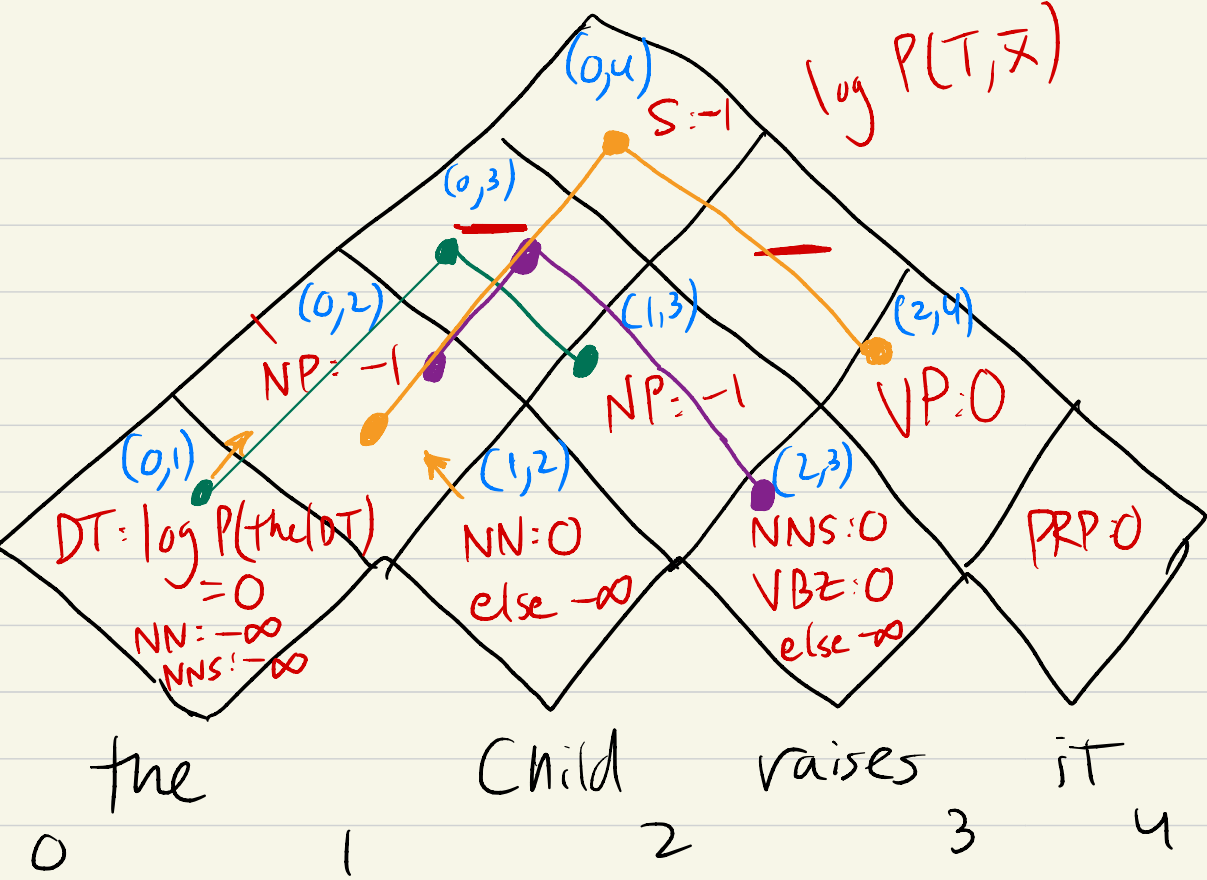
(loop over all $X \in \text{nonterminals}$)

Recursive case:

$$T(i, j, X) \quad \text{loop over all } i_s + j_s + X_s$$

loop over split points k

$$= \max_{k=i < k < j} \max_{X \rightarrow X_1 X_2} \left[\log P(X \rightarrow X_1 X_2) \right. \\ \left. + T[i, k, X_1] + T[k, j, X_2] \right]$$

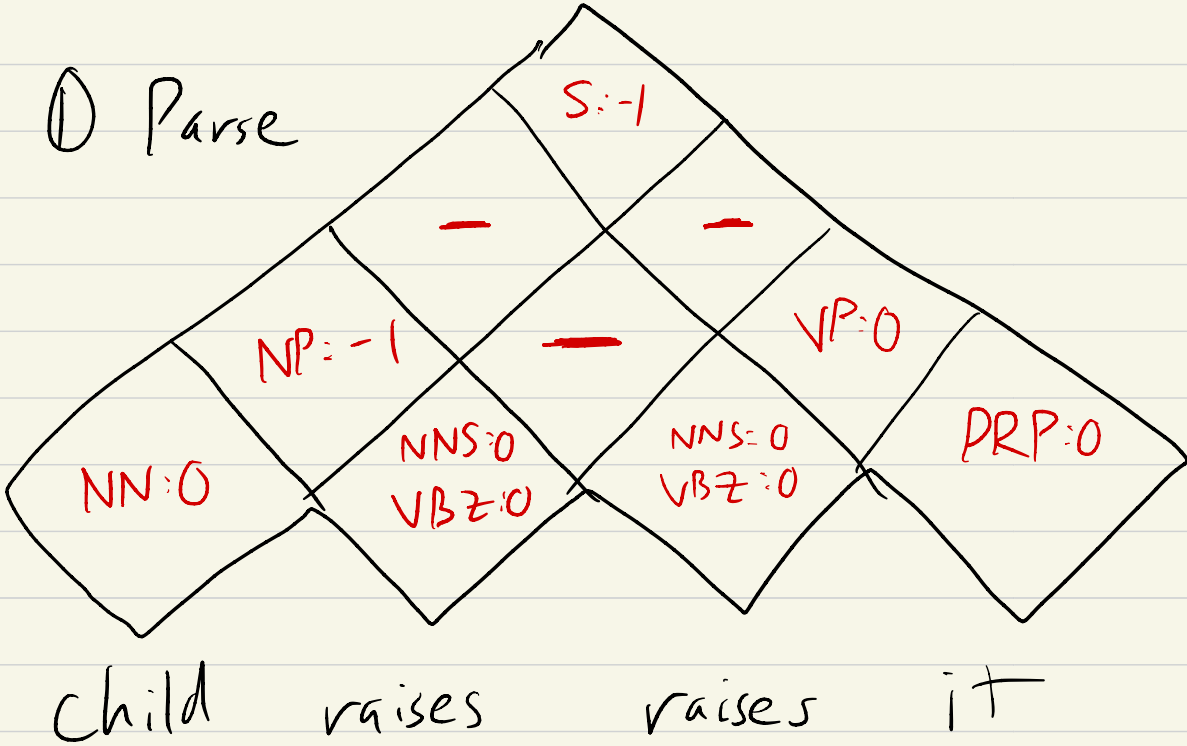


Grammar:

- DT \rightarrow the |
- NN \rightarrow child |
- NNS \rightarrow raises |
- VBZ \rightarrow raises |
- PRP \rightarrow it |

- S \rightarrow NP VP |
 - NP \rightarrow DT NN $1/2$
 - NP \rightarrow NN NNS $1/2$
 - VP \rightarrow VBZ PRP |
- $\log(1/2) = -1$

① Parse



VP \rightarrow VBZ NNS 0.5
decrease VP --- 0.5

② the child raises raises P=0

What rules can we add/change?
(add one rule, no new symbols)