

16 Oct 2018

## Assignment 2 Problem 2

### CKY Parser

0 1 2 3 4 5 6

An Army officer ordered the American troops

0 An Det 0.5

1 Army Adj 0.3  
NP 0.2  
N 0.3

2 officer NP 0.5  
N 0.1

3 ordered VP 0.4 x  
V 0.9

4 the Det 0.5

5 American NP 0.2  
Adj 0.1  
N 0.9 x

6 troops VP 0.2  
NP 0.1  
N 0.2  
V 0.1 x

[0:1] An Army DP → Det NP  $0.7 \times 0.5 \times 0.2 = 0.07$

[1:2] Army officer DP → Adj NP  $0.2 \times 0.3 \times 0.5 = 0.03 *$

DP → NN  $0.5 \times 0.3 \times 0.1 = 0.015$

NP → NN  $0.8 \times 0.3 \times 0.1 = 0.024 *$

\* NP → Adj NP  $0.6 \times 0.3 \times 0.5 = 0.09 *$

[2:3] officer ordered -

[3:4] ordered the -

[4:5] the American DP → Det NP  $0.7 \times 0.5 \times 0.2 = 0.07$

[5:6] American troops DP → Adj NP  $0.2 \times 0.1 \times 0.1 = 0.002$

NP → Adj NP  $0.6 \times 0.1 \times 0.1 = 0.006$

\* DP → NN  $0.5 \times 0.9 \times 0.2 = 0.09 *$

\* NP → NN  $0.8 \times 0.9 \times 0.2 = 0.144 *$

[0:2] [0][1:2] DP → Det NP  $0.7 \times 0.5 \times 0.024 = 0.0084$

\* DP → Det NP  $0.7 \times 0.5 \times 0.09 = 0.0315 *$

[0:1] [2] -

-

[1:3] [1][2:3] -

[1:2][3] \* S → DP VP  $1.0 \times 0.03 \times 0.4 = 0.012 *$

\* S → DP VP  $1.0 \times 0.015 \times 0.4 = 0.006$

[2:4] [2] [3:4] - 9H 5.1 + 90 un-A 1A 111

[2:3] [4:] -

[3:5] [3] [4:5] 2.0 VP  $\rightarrow$  V DP  $0.4 \times 0.9 \times 0.07 = 0.0252 \times$

[3:4] [5:] 80 - 1.1 + 90

[4:6] [4] [5:6] DP  $\rightarrow$  Det NP 0.7 0.5 0.09 = 0.0315

$\times$  PP  $\rightarrow$  Det NP 0.7 0.5 0.144 = 0.0504 \*

[4:5] [5:] S  $\Rightarrow$  DP VP 1.0 0.07 0.2 = 6.014 \*

[0:3] [0] [1:3] - 9H 5.1 + 90 un-A 1A 111

[0:1] [2:3] -

[0:2] [3:] 2.0  $\times$  S  $\Rightarrow$  DP VP 1.0 0.0084 0.4 = 0.00336 \*

$\times$  S  $\Rightarrow$  DP VP 1.0 0.0063 0.4 = 0.00252

[1:4] [1] [2:4] 80 - 1.1 + 90

[1:2] [3:4] -

[1:3] [4:] - 9H 5.1 + 90

[2:5] [2] [3:5] - [2] [3:6]

[2:3] [4:5] - [2:4] [1] [2:3]

[2:4] [5:] - [2:3] [4:5]

$$[3:6] [3][4:6] \times VP \rightarrow V DP \quad 0.4 \cdot 0.9 \quad 0.0315 = 0.01134$$
$$\times VP \rightarrow V DP \quad 0.4 \cdot 0.9 \quad 0.0504 = 0.018144 *$$

[3:4] [5:6] -

[3:5] [6] -

[0:4] [0][1:4] -

[0:1] [2:4] -

[0:2] [3:9] -

[0:3] [4] -

[1:5] [1][2:5] -

[1:2] [3:5]  $S \rightarrow DP VP \quad 1.0 \cdot 0.3 \quad 0.0252 = 0.00756 *$

$S \rightarrow DP VP \quad 1.0 \cdot 0.015 \quad 0.0252 = 0.000378$

[1:3] [4:5] -

[1:4] [5] -

[2:6] [2][3:6] -

[2:3] [4:6] -

[2:4] [5:6] -

[2:5] [6] -

$$[0:5] [0:1:5] - \quad S \rightarrow DP VP \quad 1.0 \times 0.0084 \times 0.0252 = 0.00021168$$

$$\times S \rightarrow DP VP \quad 1.0 \times 0.0315 \times 0.0252 = 0.0007938$$

[0:3][4:5] -

[0:4][5] -

[1:6] [1][2:6] -

$$\times S \rightarrow DP VP \quad 1.0 \quad 0.03 \quad 0.01134 = 0.0003402$$

$$\times S \rightarrow DP VP \quad 1.0 \quad 0.015 \quad 0.01134 = 0.0001701$$

$$\times S \rightarrow DP VP \quad 1.0 \quad 0.03 \quad 0.018144 = 0.00054432$$

$$\times S \rightarrow DP VP \quad 1.0 \quad 0.015 \quad 0.018144 = 0.00027216$$

[0:6] [0][1:6] -

[0:1][2:6] -

$$\times S \rightarrow DP VP \quad 1.0 \quad 0.0084 \quad 0.01134 = 9.5256 \times 10^{-5}$$

$$\times S \rightarrow DP VP \quad 1.0 \quad 0.0084 \quad 0.018144 = 1.52496 \times 10^{-4}$$

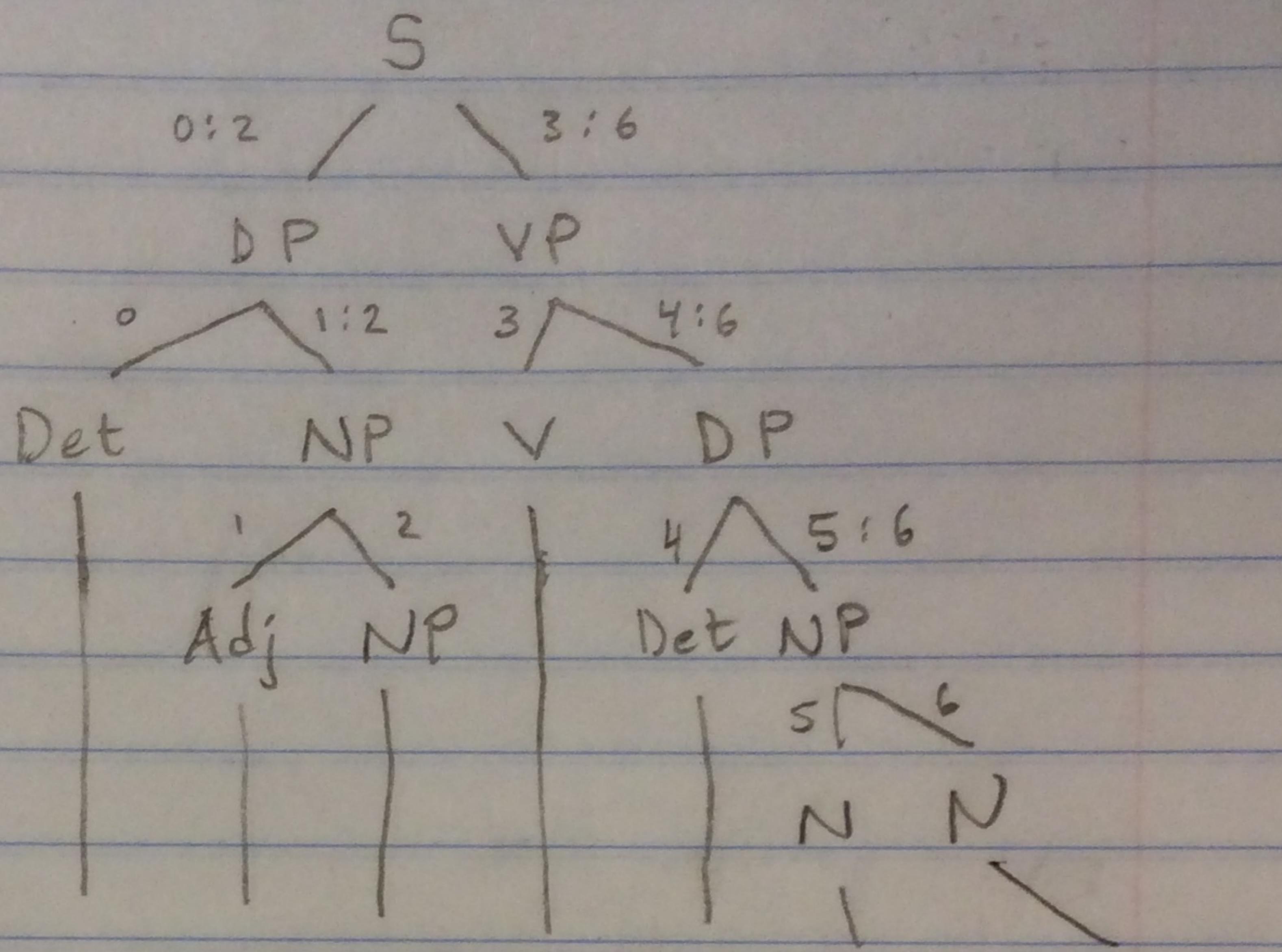
$$\times S \rightarrow DP VP \quad 1.0 \quad 0.0315 \quad 0.01134 = 3.5721 \times 10^{-4}$$

$$\times S \rightarrow DP VP \quad 1.0 \quad 0.0315 \quad 0.018144 = 5.71536 \times 10^{-4}$$

[0:3][4:6] -

[0:4][5:6] -

[0:5][6] -



The Army officer ordered the American Troops