CSCI-GA.2590 – NLP # Assignment 7

YUQIAN ZHANG #N19945556

Q1. probability assigned to each production

S	=	np	vp	1.0
vp	=	v	np pp	0.4
vp	=	v	np	0.6
np	=	n		0.8
np	=	n	pp	0.2
pp	=	p	np	1.0

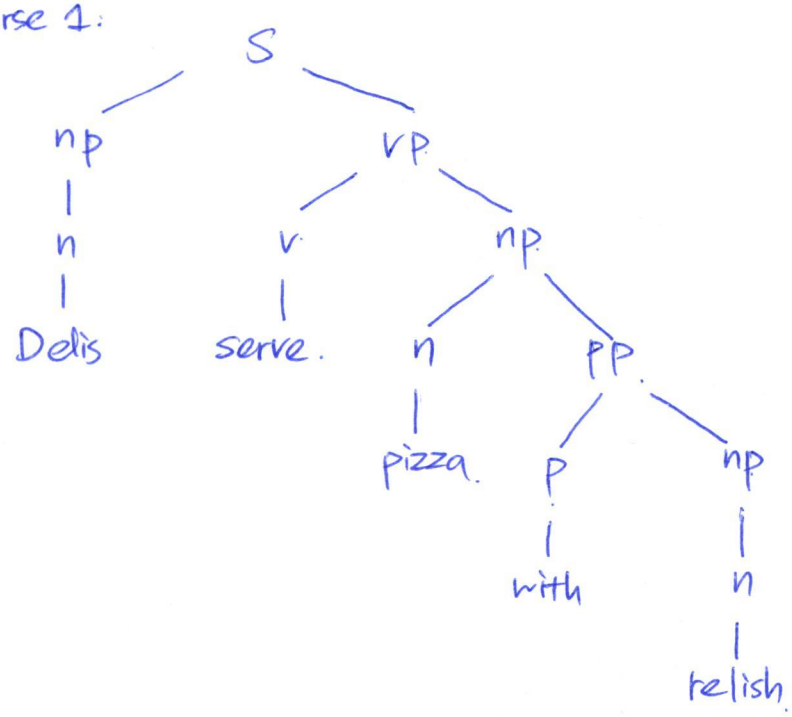
According to the training corpus, we have.

{ 3 vp → v np out of 5 ⇒ 0.6
  2 vp → v np pp out of 5 ⇒ 0.4

{ 3 np → n pp out of 15 ⇒ 0.2
  12 np → n out of 15 ⇒ 0.8

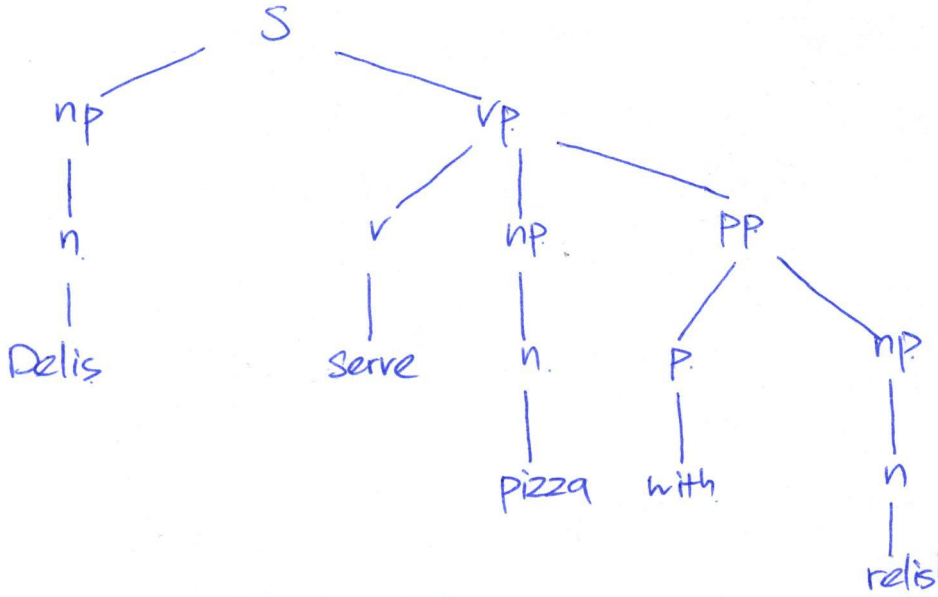
probability assigned to the two parses for 'Delis serve pizza with relish'

parse 1:



The probability = $0.8 \times 0.6 \times 0.2 \times 0.8 = 0.0768$.

parse 2:



The probability = $0.8 \times 0.4 \times 0.8 \times 0.8 = 0.2048$ ✓ Thus, we will choose second one.

Q2. (a) We will still choose the second parse.

The probability of the expansion of the vp node.

$P(VP(like, V)) \rightarrow V(like, V)$ np PP $= 0/2$

$P(VP(like, V)) \rightarrow V(like, V)$ np $= 2/2$

$P(VP(serve, V)) \rightarrow V(serve, V)$ np PP $= 2/3$

$P(VP(serve, V)) \rightarrow V(serve, V)$ np $= 1/3$

S = np vp $\rightarrow 1.0$

vp = V(serve) np PP $\rightarrow 2/3$

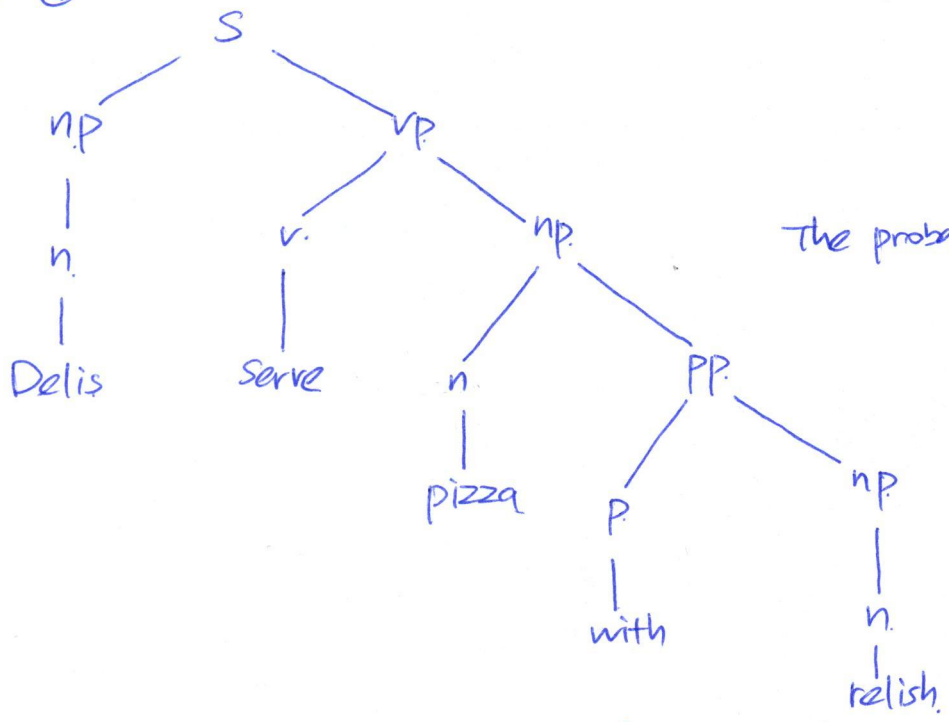
vp = V(serve) np $\rightarrow 1/3$

np = n $\rightarrow 0.8$

np = n PP $\rightarrow 0.2$

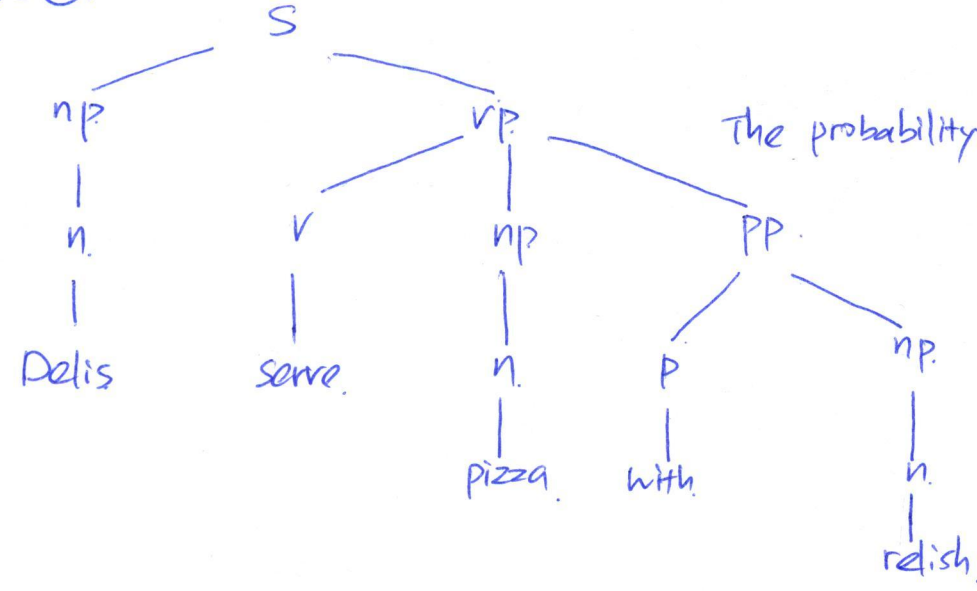
PP = P np $\rightarrow 1.0$

parse ①



The probability = $0.8 \times 1/3 \times 0.2 \times 0.8$
= 0.04267

parse ②



The probability = $0.8 \times 2/3 \times 0.8 \times 0.8$
= 0.3413 ✓

Thus, we will still choose the second parse.

Q2(b) "Men like pizza with relish"

Non-lexicalized probability is the same as Q1. which.
parse ① has the probability of 0.0768
parse ② has the probability of 0.2048. ✓ Still choose parse ②

lexicalized probability is different.
parse ① = $0.8 \times 1.0 \times 0.2 \times 0.8 = 0.128$ ✓ Thus, we will choose parse ①.
parse ② = $0.8 \times 0 \times 0.8 \times 0.8 = 0$