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CPTS 440

Artificial Intelligence

11-21-2019

### Homework 11

1.

A)

$U[2,2*] = +1000$ ,  $U[2,1,*] = -1000$ ,  $Goforward = 1$ ,  $Turnleft \& Turnright = 0.8$

$\gamma = 0.9$ .

Other States = -1

Equation:  $Reward + \gamma[(P(Turnleft))(Utility) + (P(DoNothing))(Utility) + (P(GoForward))(Utility)]$

Or  $Reward + \gamma[(P(DoNothing))(Utility) + (P(TurnRight))(Utility) + (P(GoForward))(Utility)]$

Utilities after 1 run through

State	Action	Equation	Utility
[1,1,Right]	TurnLeft	$-1 + (0.9) [(0.8)(0) + (0.2)(0) + (0)(-1000)]$	-1
[1,1,Up]	GoForward	$-1 + (0.9) [(0)(0) + (0)(-1) + (1)(0)]$	-1
[1,1,Left]	TurnRight	$-1 + (0.9) [(0.2)(0) + (0.8)(-1) + (0)(0)]$	-1.72
[1,1,Down]	TurnRight	$-1 + (0.9) [(0.2)(-1) + (0.8)(-1.72) + (0)(0)]$	-2.42
[1,2,Right]	GoForward	$-1 + (0.9) [(0)(0) + (0)(0) + (1)(1000)]$	899
[1,2,Up]	TurnRight	$-1 + (0.9) [(0.2)(0) + (0.8)(899) + (0)(0)]$	646.28
[1,2,Left]	TurnRight	$-1 + (0.9) [(0.2)(0) + (0.8)(646.28) + (0)(0)]$	464.32
[1,2,Down]	TurnLeft	$-1 + (0.9) [(0.8)(899) + (0.2)(464.32) + (0)(-2.42)]$	729.86

B)

$Q([1,1,Right], TurnLeft) = -1$ ,  $Q([1,1,Up], GoForward) = -1$ ,  $Q([1,2,Up], TurnRight) = 646.28$ ,

$Q([1,2,Right], GoForward) = 899$ ,  $Q([2,2,Right], *) = 1000$

2. W = “the agent are the Wumpus”

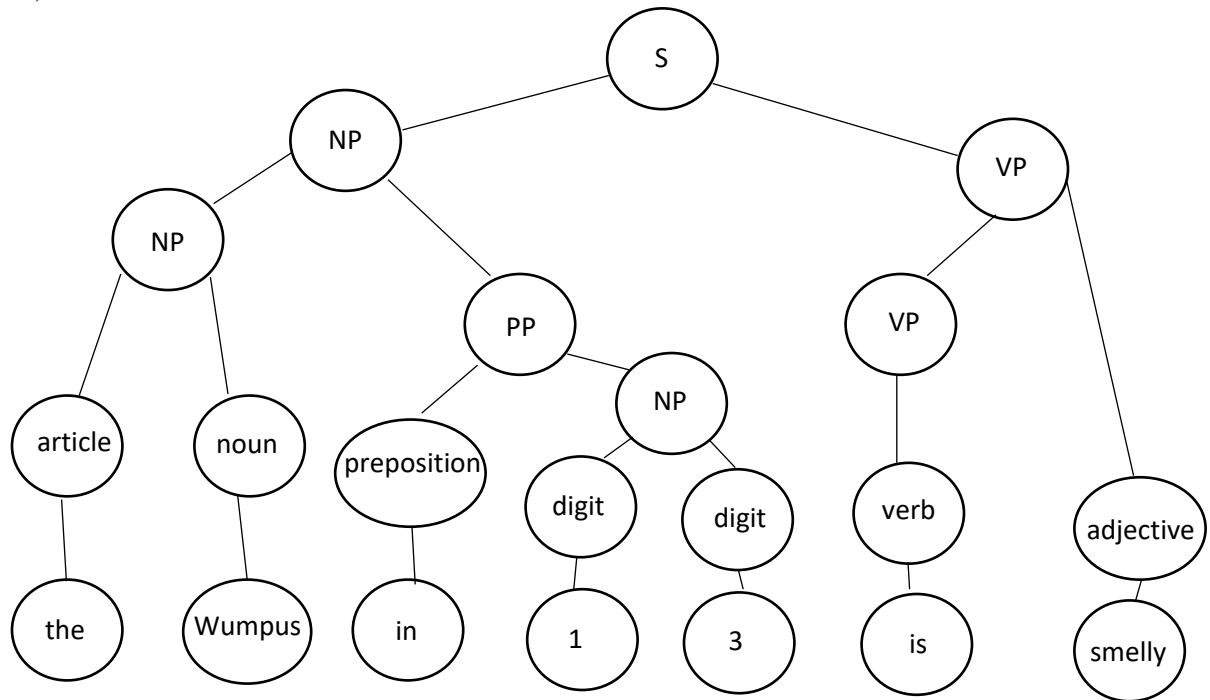
W = [“the”, “agent”, “ate”, “the”, “wumpus”]

$$P(W_{1:4}) = \prod_{i=1}^4 P(W_i | W_{i-1}) = P(W_1 | W_0) * P(W_2 | W_1) * P(W_3 | W_2) * P(W_4 | W_3) = \\ P(agent|the) * P(ate|agent) * P(the|ate) * P(Wumpus|the) = \frac{5000}{6000} * \frac{100}{600} * 1 * \frac{1000}{6000} =$$

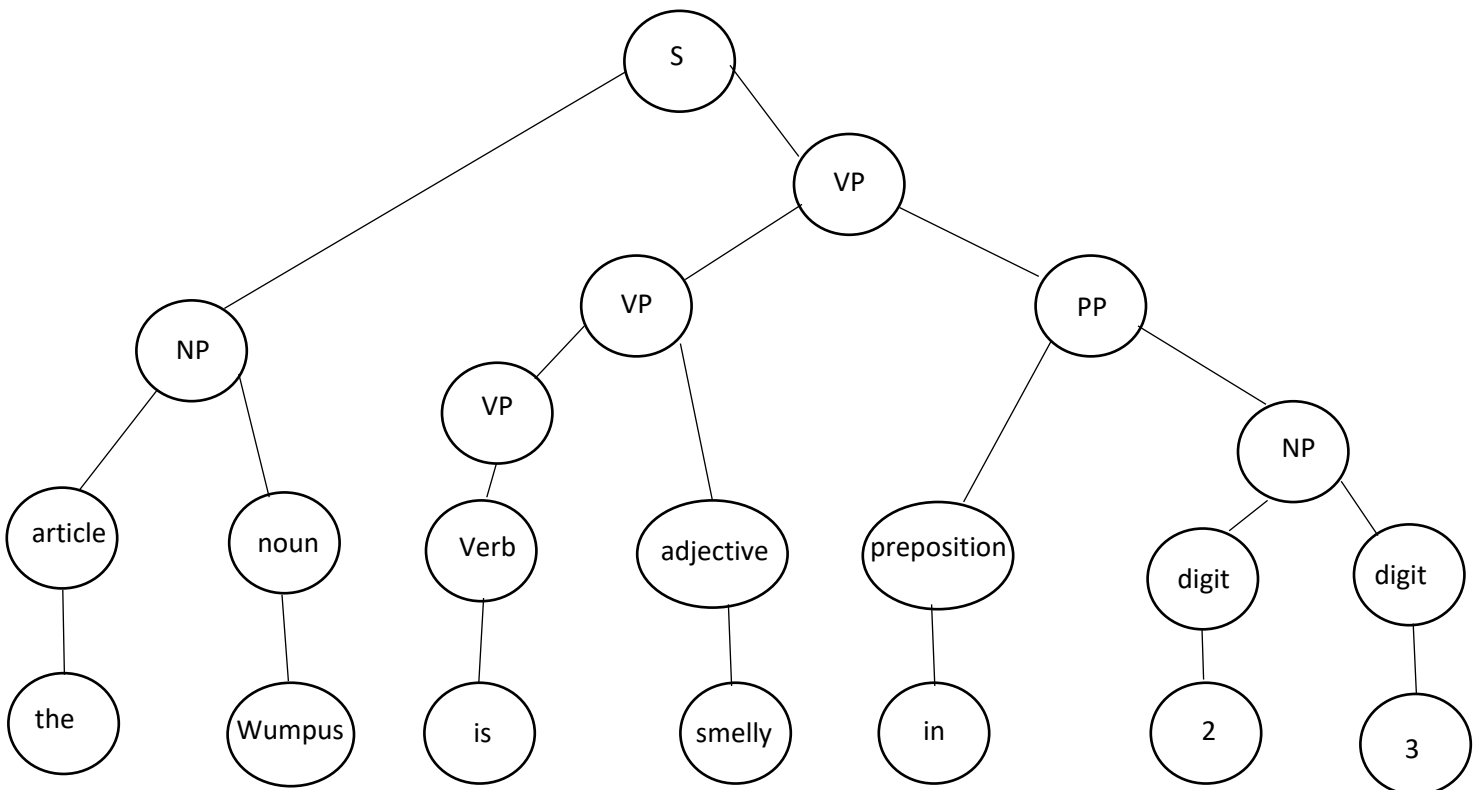
**0.023**

3.

A)



B)



C) No Parse

4.

C1,C3,C4,C6

P(phone|sequence)

•Onset, Onset, Mid, End

$$(0.5)*[(0.3)(0.3)]*[(0.7)(0.7)]*[(0.1)(0.5)]*(0.6) = \mathbf{6.62 * 10^{-4}}$$

•Onset, Mid, Mid, End

$$(0.5)*[(0.7)(0.2)]*[(0.9)(0.7)]*[(0.1)(0.5)]*(0.6) = \mathbf{1.32 * 10^{-3}}$$

•Onset, Mid, End, End

$$(0.5)*[(0.7)(0.2)]*[(0.1)(0.1)]*[(0.4)(0.5)]*(0.6) = \mathbf{8.4 * 10^{-5}}$$

•Onset, Onset, End, End

Skips Middle Can't Be Calculated