

Comp 341

Written Assignment

Yakup Ersoy GÜVEN

64045

$$Q1) P(A, D, S, T) = P(A) \cdot P(D) \cdot P(S|A, D) \cdot P(T|S)$$

$$Q2) P(+s | +t)$$

$$P(+s) = P(A) \cdot P(D) \cdot P(+s|A, D)$$

$$\begin{aligned} (+0, a, +s) &= 0.6 \cdot 0.2 \cdot 0.2 = 0.024 \\ (+0, n, +s) &= 0.6 \cdot 0.5 \cdot 0.5 = 0.150 \\ (+0, d, +s) &= 0.6 \cdot 0.3 \cdot 0.7 = 0.126 \\ (-0, a, +s) &= 0.4 \cdot 0.2 \cdot 0.4 = 0.032 \\ (-0, n, +s) &= 0.4 \cdot 0.5 \cdot 0.9 = 0.180 \\ (-0, d, +s) &= 0.4 \cdot 0.3 \cdot 0.9 = 0.108 \\ \hline &0.580 \end{aligned}$$

$$f(+s) = \underline{0.58}$$

$$f(-s) = 1 - 0.58 = \underline{0.42}$$

$$f(+s, +t) = P(+t|+s) f(+s) = 0.95 \cdot 0.58 = 0.551$$

$$f(-s, +t) = P(+t, -s) f(-s) = 0.19 \cdot 0.42 = 0.080$$

$$P(+s, +t) = \frac{f(+s, +t)}{f(+s, +t) + f(-s, +t)} = \frac{0.551}{0.551 + 0.080} = 0.873$$

Q3)

$$P(+S) = 0.58$$

Q4)

$$\begin{aligned} E(S|+b) &= P(+S) \cdot 5000 + P(-S) \cdot (-6000) \\ &= 0.58 \cdot 5000 + 0.42 \cdot (-6000) \\ &= 380 \end{aligned}$$

Q5)

$$U \cdot P(S|T) =$$

$$5000 \cdot 0.873 + (-6000) \cdot (1 - 0.873) = \underline{360.3}$$

$$3603 \cdot (f(+S, +t) + f(-S, +t))$$
$$(0.55) + 0.80)$$

$$3603 \cdot 0.631 = 2273.5$$

$$2273.5 - 380 = \underline{1893.50}$$

Q6)

A	D	S	T	Weight
+0	d	+s	+e	$0.6 \cdot 0.95 = 0.570$
+0	d	-s	+e	$0.6 \cdot 0.19 = 0.114$

Q7)

$$P(S | A, D, T) = \frac{P(S, A, D, T)}{\sum P(A, D, T)} = \frac{\cancel{P(A)} \cdot \cancel{P(D)} \cdot P(S | A, D) \cdot P(T | S)}{\sum (\cancel{P(A)} \cdot \cancel{P(D)} \cdot P(S | A, D) \cdot P(T | S))}$$

$$= \frac{P(S | A, D) \cdot P(T | S)}{P(+s | A, D) P(T | +s) + P(-s | A, D) P(T | -s)}$$

$$= \frac{0.7 \cdot 0.5}{0.7 \cdot 0.05 + 0.3 \cdot 0.81} = \frac{0.35}{0.035 + 0.243} = \frac{0.35}{0.278} = 0.126$$