Conditional PRobability Task-23

Medical example $P(Cancer) = 0.1$

Q1: $P(\neg Cancer) = 1 - 0.1 = 0.9$

Q2: $P(Positive \mid \neg Cancer) = 0.2$

$P(negative \mid \neg Cancer) = 0.8$

$P(Positive \mid Cancer) = 0.9$

$P(negative \mid cancer) = 0.1$

Conditional Probability

Q3:

Truth table for "Cancer or Not" "Positive or negative"

Cancer	Test	P( )
Y	P	$0.9 * 0.1 = 0.09$
Y	N	$0.1 * 0.1 = 0.01$
N	P	$0.2 * 0.9 = 0.18$
N	N	$0.8 * 0.9 = 0.72$

$\Sigma = 1$

Q4: P(Positive Result)

for Positive $= 0.09 + 0.18 =$ ∴ 0.27

$P(C) \rightarrow [P(\neg C)]$

$P(P \mid C) \rightarrow [P(N \mid C)]$

$P(P \mid \neg C) \rightarrow [P(N \mid \neg C)]$

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$* P(P) = P(P \mid C) \cdot P(C) + P(P \mid \neg C) \cdot P(\neg C)$ ← Total probability

Q5: for Two Coins ① ② $P_2(H) = 0.9$

$P_1(T) = 0.5$

$P_1(H) = 0.5$

$P_2(T) = 0.1$

$P(1) = 0.5$ $P(2) = 0.5$

Q6: $P(H) = ??$

Pick	Flip	P( )
1	H	$0.5 * 0.5 = 0.25$
1	T	$0.5 * 0.5 = 0.25$
2	H	$0.9 * 0.5 = 0.45$
2	T	$0.1 * 0.5 = 0.05$

$\Sigma = 1$

$P(H) = 0.25 + 0.45 = 0.7$

$P(T) = 1 - 0.7 = 0.3$

Q7: for two flips $P(H, T)$

flip1	flip2	P( )
H	H	
H	T	$P(1) * P_1(T) * P_1(H) = 0.5 * 0.5 * 0.5 = 0.125$
T	H	
T	T	
H	H	
H	T	$= 0.9 * 0.1 * 0.5 = 0.045$
T	H	
T	T	

$P(H, T) = 0.125 + 0.045 = 0.17$

Q8: ① ② → P(2)=0 P(T,T)=??

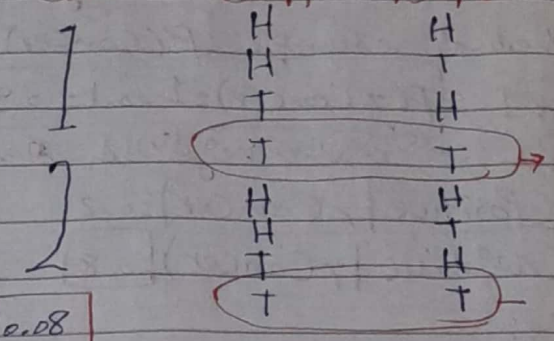
P(1)=0.5, P(2)=0.5

P(H|1)=1 P(H|2)=0.6

P(T|1)=0 P(T|2)=0.4

for (1,T,T) = 0*0*0.5=0

for (2,T,T) = 0.5*0.4*0.9=0.08 → P(T,T)=0.08



SUMMARY Conditional Probability

P(TEST|DISEASE)

→ P(Test) = P(test|Disease)*P(Disease) + P(Test|¬Disease)*P(¬Disease)

الاحتمالية الشرطية طريقة للتعبير عن احتمالية حدوث فعل بناءً على حقيقة

نرى ان اقرب احتمالية ظهور للعملات لو عندك عملتين فكل واحدة لها

احتمالية وظهور ال Head او ال Tail كل واحد لها احتمالية ومن خلال

استخدام Truth table اقدر احسبها من خلال قانون لو عايز اعرف نتيجة test

→ P(test) = P(test|Dise)*P(Disea) + P(Test|¬Dise)*P(¬Disea)