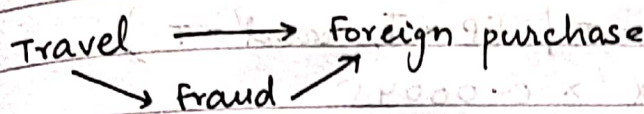


Tutorial 7ARKA HALDI
201830014

- * Increased probability of travel makes fraud more likely
- * Increased probability of foreign purchase makes fraud more likely
- * Foreign purchase is evidence for fraud.
- * Travel & fraud can cause foreign purchase. Travel explains foreign purchase & so is evidence against fraud.

True	False
0.05	0.95

travel	T	F
T	0.01	0.99
F	0.002	0.998

Travel	Fraud	T	F
T	T	0.9	0.1
F	T	0.1	0.9
T	F	0.9	0.1
F	F	0.01	0.99

1) travel = ? F.P. = true, fraud = ? [classify hidden variables]
 (foreign purchase)

$$P(\text{fraud} = T \mid \text{F.P.} = T)$$

$$= \alpha [P(\text{fraud} = T, \text{travel} = T) \times P(\text{F.P.} = T)]$$

$$= \alpha [P(\text{fraud} = T \mid \text{travel} = F) \times P(\text{FP} = T)$$

$$+ P(\text{travel} = F, \text{fraud} = T) \times P(\text{travel} = F)]$$

$$= \alpha [0.01 \times 0.9 \times 0.05 + 0.002 \times 0.1 \times 0.95]$$

$$= 0.00064 \alpha$$

Similarly,

$$P[\text{fraud} = F \mid \text{FP} = T]$$

$$= \alpha [0.99 \times 0.9 \times 0.05 + 0.998 \times 0.01 \times 0.95]$$

$$= 0.054051 \alpha$$

$$\alpha = \frac{1}{0.00064 + 0.05403} = 0.0117$$

$$P(\text{fraud} = T \mid FP = T) = 1.17\%$$

$$2) \quad P(\text{fraud} = T \mid FP = T, \text{travel} = T) = \alpha \times 0.00045$$

$$P(\text{fraud} = F \mid FP = T, \text{travel} = T)$$

$$= \alpha \times 0.04455$$

$$\alpha = \frac{22.222}{0.04455 + 0.00045}$$

$$P(\text{fraud} = T \mid FP = T, \text{travel} = T)$$

$$= \alpha \times 0.00045 = 22.222 \times 0.00045$$

$$P = 0.01 (1\%)$$