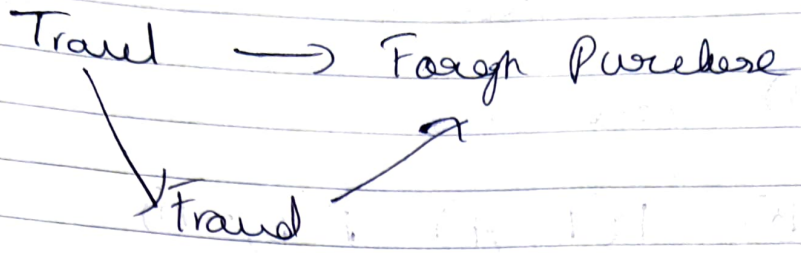
TUTORIAL 7



True	False
0.05	0.95

Travel	True	False
True	0.01	0.99
False	0.002	0.998

Travel	Fraud	True	False
T	T	0.90	0.10
F	T	0.10	0.90
T	F	0.90	0.10
F	F	0.01	0.99

PAGE No.
DATE

1)

$P(\text{fraud} = \text{true} \mid \text{Foreignpurch} = \text{true})$

$= \alpha * (P(\text{Fraud} = \text{True}) \text{fraud} = \text{true}) * P(\text{foreign} = \text{true} / \text{fraud} = \text{true} / \text{fraud} = \text{true}) * P(\text{fraud} = \text{true}) +$

$P(\text{Fraud} = \text{true} / \text{fraud} = \text{false}) * P(\text{foreign} = \text{true} / \text{fraud} = \text{true}) * P(\text{fraud} = \text{true}) * P(\text{fraud} = \text{false})]$

$= \alpha * [0.00005 + 0.00019]$

$= 0.00024\alpha$

$P(\text{Fraud} = \text{False} \mid \text{FP} = \text{true})$

$= \alpha * (P(\text{fraud} = \text{False} / \text{fraud} = \text{true}) * P(\text{FP} = \text{true} / \text{fraud} = \text{true}, \text{fraud} = \text{false}) * P(\text{fraud} = \text{true}) +$

$P(\text{fraud} = \text{False} / \text{fraud} = \text{false}) * P(\text{foreignpurch} = \text{true} / \text{fraud} = \text{false}, \text{fraud} = \text{false}) * P(\text{fraud} = \text{false}))$

$= \alpha * (0.99 * 0.90 * 0.005 + 0.998 * 0.01 * 0.95)$

$= 0.00513\alpha$

$$\alpha = \frac{1}{0.000864 + 0.054031} = 18.291$$

$P(\text{fraud} = \text{true} / FP = \text{true}) = 0.000064 \times$

$= 0.01170$

$= 1.17\%$

2) $P(\text{fraud} = \text{true} / FP = \text{true}, \text{fraud} \neq \text{true})$

$= \alpha \times 0.00045$

$P(\text{fraud} = \text{False} / FP = \text{true}, \text{fraud} = \text{true})$

$= \alpha \times 0.04455$

$\therefore \alpha = \frac{1}{0.00045 + 0.04455} = 22.222$

$P(\text{Fraud} = \text{true} / FP = \text{true}, \text{fraud} = \text{true})$

$= \alpha \times 0.00045$

$= 0.00 \; 0.01$

$= 1\%$