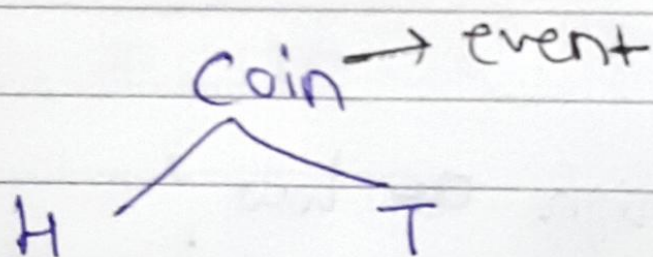
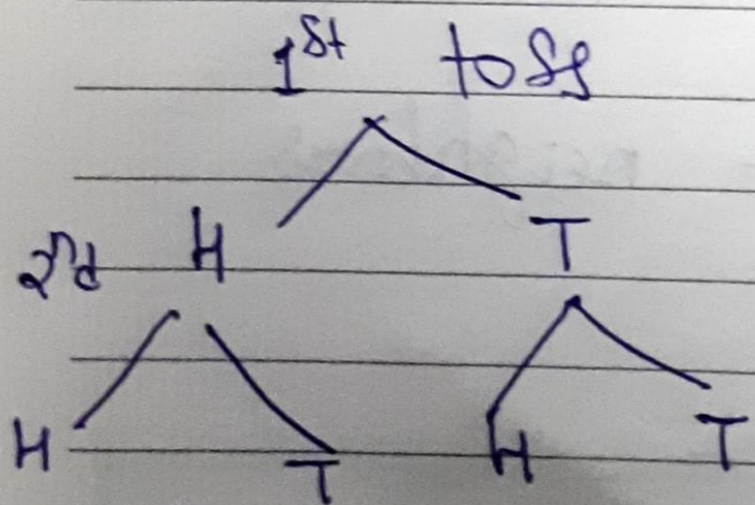


## ② Naive Bayes Classifier -

Ex -



$\{H, T\}$  - Sample Space



①  $\{HH, HT, TH, TT\}$

②

f P of (at least 1H)  $\cong 3/4$

•

P(2H) =  $1/4$





$$P(1\text{Head} / 1\text{tail}) = \frac{1}{4}$$

↓  
Conditional  
probability

means  
(probability of 1Head  
if 1tail has already  
come  
or given)

Bayes Theorem -

$$P(A|B) = \frac{P(B|A) \cdot P(A)}{P(B)}$$

Probability of  
occurring A if B  
has already taken  
place

Events  $\begin{cases} E_1 \\ E_2 \end{cases}$



Both of events takes place

$$= P(E_1) * P(E_2)$$

either of the events takes place

$$= P(E_1) + P(E_2)$$

How it works?

Question Data to be classified :  $x = (\text{age} \leq 30, \text{income} = \text{medium}, \text{Student} = \text{yes}, \text{Credit rating} = \text{Fair})$

a	b	c	d	
age	income	Student	credit rating	Computer
$\leq 30$	high	no	Fair	no
$\leq 30$	high	no	excellent	no
31 - 40	high	no	F	yes
$> 40$	medium	no	F	yes
$> 40$	low	yes	F	yes
31 - 40	low	yes	E	no
$\leq 30$	low	yes	E	yes
$\leq 30$	medium	no	<del>F</del> F	no
⊙ $> 40$	low	yes	F	yes
⊙ $\leq 30$	medium	yes	F	yes
f 31 - 40	medium	yes	E	yes
31 - 40	medium	no	E	yes
⋄ $> 40$	medium	yes	F	yes



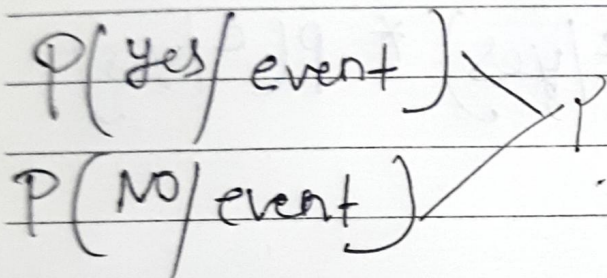
Events: -

a: age  $\leq 30$

b: income = medium

c: Student = yes

d: Credit rating = Fair



Bayes theorem -

$$P(A/B) = \frac{P(B/A) \cdot P(A)}{P(B)}$$

$$P(\text{yes/event}) = \frac{P(\text{Event/yes}) \cdot P(\text{yes})}{P(\text{Event})}$$

$$P(\text{no/event}) = \frac{P(\text{Event/no}) \cdot P(\text{no})}{P(\text{Event})}$$



$$P(\text{yes}) = 9/13$$

$$P(\text{no}) = 4/13$$

$$\begin{aligned} P(\text{Event}/\text{yes}) &= P(a, b, c, d/\text{yes}) \\ &= P(a/\text{yes}) * P(b/\text{yes}) * \\ &\quad P(c/\text{yes}) * P(d/\text{yes}) \end{aligned}$$

$$P(a/\text{yes}) = \frac{2}{9}$$

$$P(b/\text{yes}) = 5/9$$

$$P(c/\text{yes}) = 6/9$$

$$P(d/\text{yes}) = 6/9$$

$$\begin{aligned} P(\text{Event}/\text{yes}) &= 2/9 \times 5/9 \times 6/9 \times 6/9 \\ &= 360/6561 \\ &= 0.0549 \end{aligned}$$



$$P(\text{Event/no}) = P(a/\text{no}) * P(b/\text{no}) * \\ P(c/\text{no}) * P(d/\text{no})$$

$$= \frac{3}{4} * \frac{1}{4} * \frac{1}{4} * \frac{1}{4}$$

$$= 0.0234$$

$$P(\text{yes/event}) = 0.0549 * \frac{9}{13} = 0.0380$$

$$P(\text{no/event}) = 0.0192 * \frac{4}{13} = 0.0059$$

$$\therefore P(\text{yes/event}) > P(\text{no/event})$$

then Person will buy the computer.