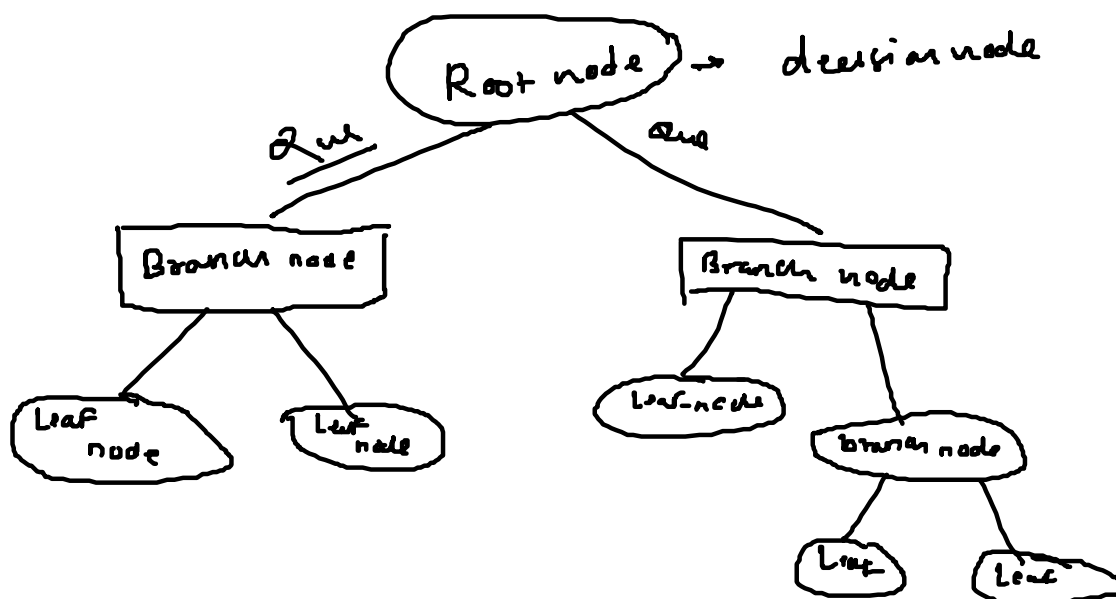
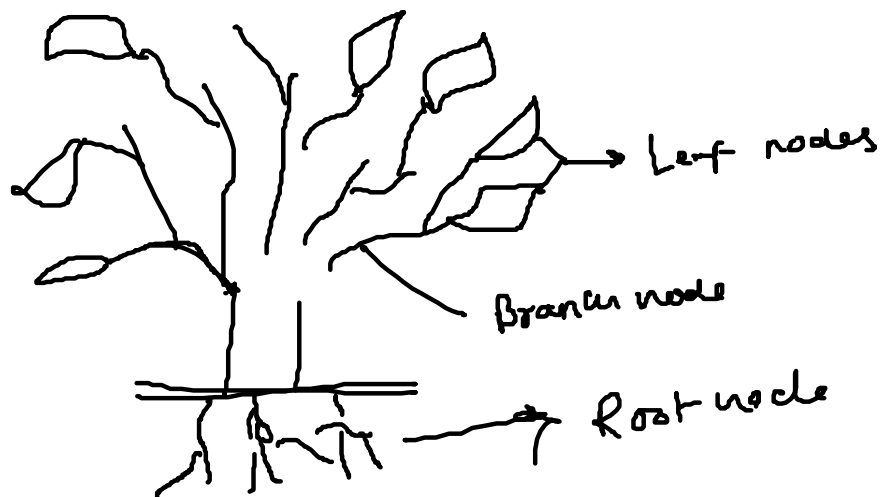
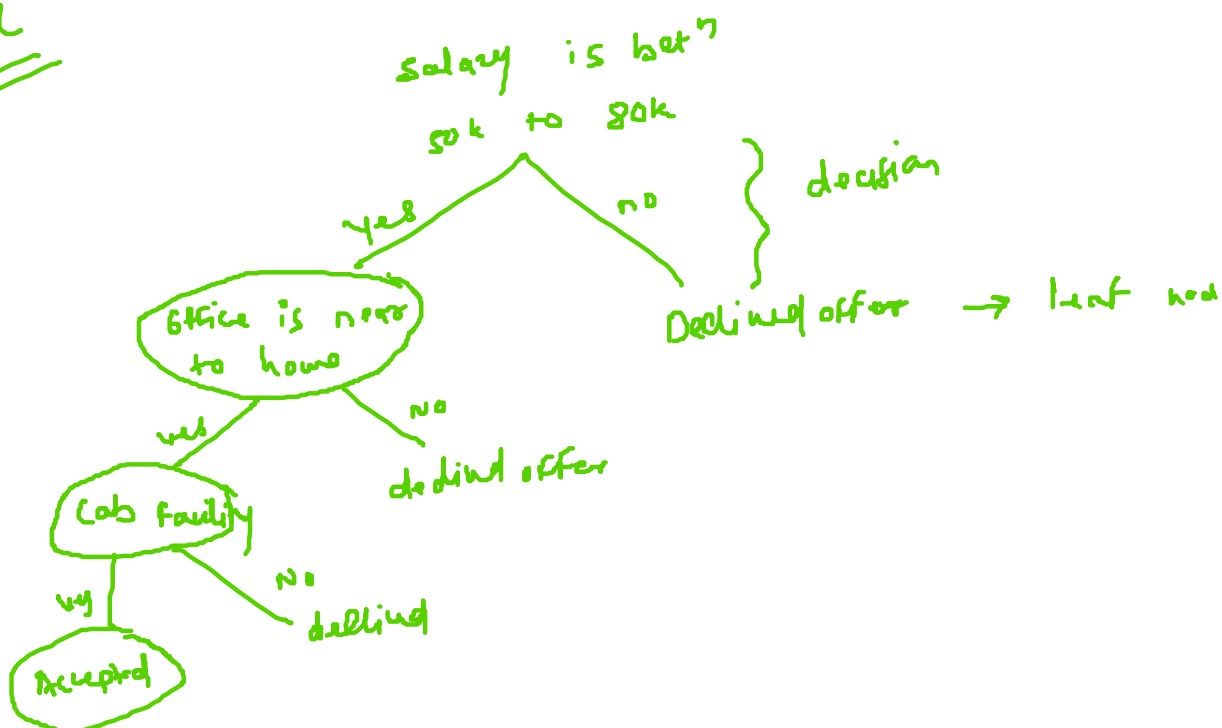


# Decision Tree Day 1

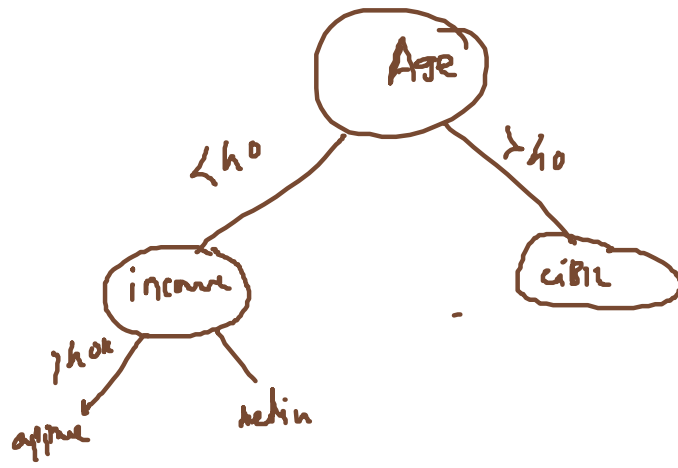
10 March 2022 07:11



ex



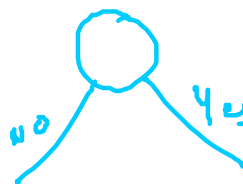
OK



OK

color	Da	label
green	3	Mango
yellow	3	Mango
red	1	Grape
red	1	Grape
yellow	2	Lemon

$R = 1 = \text{Grape}$   
 $R = 1 = \text{Grape}$   
          



Da  $\gamma = 2$

$3 = 3 = \text{Mango}$   
 $1 = 3 = \text{Mango}$   
 $4 = 2 = \text{Lemon}$

Gain impurity

↓  
Information Gain

for 1.G  $\gamma \gamma$  entropy

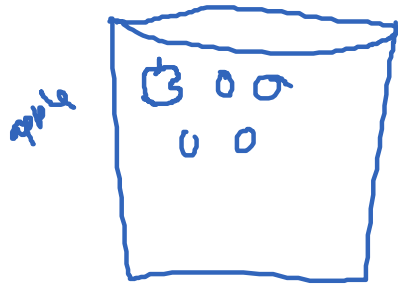
case ①

Apple



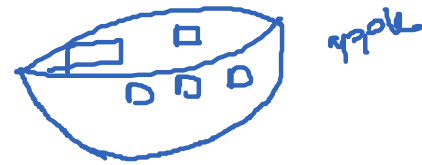
label



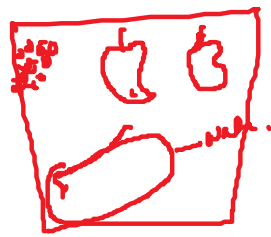


$$p = 1 \Rightarrow \text{highest}$$

$$\text{impurity} = \text{low} = 0$$



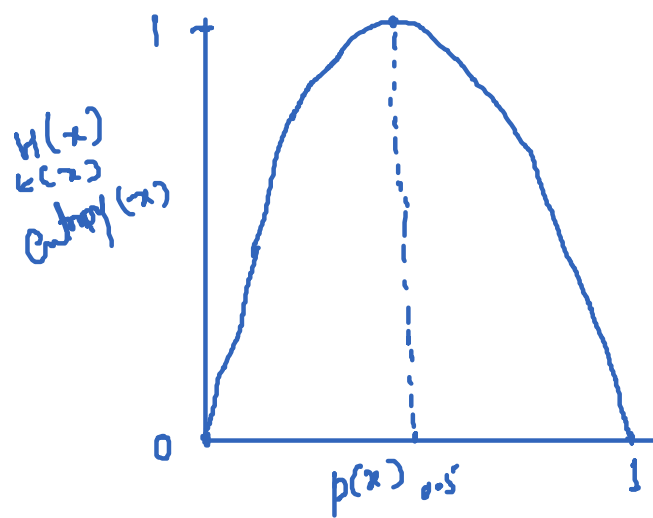
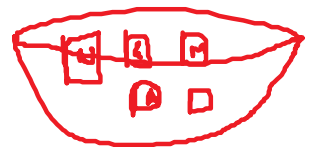
case 2



$$p = \text{low}$$

$$\neq 1$$

$$\text{impurity} \neq 0$$



$$\text{Entropy}(s) = -p(y) \log_2 p(y) - p(no) \log_2 p(N)$$

① IF no. of y = no. of no  $\Rightarrow p(s) = \underline{\underline{0.5}}$

$\Rightarrow \text{entropy} = 1$

② all yes  $\underline{\underline{or}}$  all no  $\Rightarrow p(s) = \underline{\underline{1}}$   $\underline{\underline{or}}$   $\underline{\underline{0}}$

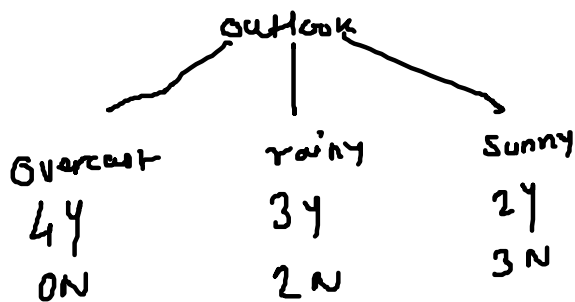
$$\rightarrow \text{entropy} = 0$$

$$H(S): E(S) = -p(Y) \log_2 p(Y) \\ = -p(Y) \log_2 p(Y) - p(N) \log_2 p(N)$$

$$p(N) = p(Y) = 0.5$$

$$E(S) =$$

## # Information Gain



$$E(\text{outlook} = \text{overcast}) = -\frac{4}{4} \log_2 \frac{4}{4} - 0 \log_2 0 \\ = 0$$

$$E(\text{out} = \text{rainy}) = -\frac{3}{5} \log_2 \frac{3}{5} - \frac{2}{5} \log_2 \frac{2}{5} \\ = 0.971$$

$$E(\text{out} = \text{sunny}) = -\frac{2}{5} \log_2 \frac{2}{5} - \frac{3}{5} \log_2 \frac{3}{5} \\ = 0.971$$



Information:  $\rightarrow$

$$\text{wt } Y = \frac{4}{14} \times 0$$

$$I(\text{outlook}) = \frac{4}{14} \times 0 + \frac{5}{14} \times 0.971 + \frac{5}{14} \times 0.971$$

$$= 0.693$$

$$T_{1/2} = 0.693 / 0.247$$

H Temp

