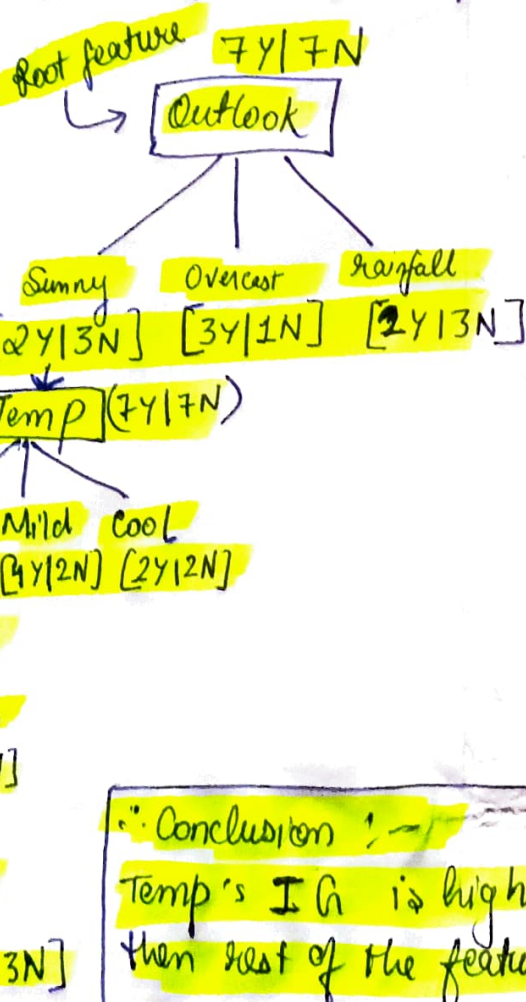


Data Set

outlook	Temp	humidity	wind	Decision
Day	Outlook	Temp	humidity	Wind
Sunny	hot	high	Weak	No
Sunny	hot	high	strong	No
Overcast	h	h	w.	Yes
Rainfall	mild	h	w	Yes
Rain	cool	h	w	N
Rain	cool	normal	S	N
Overcast	cool	normal	S	Y
Sunny	m	h	w	Y
S	c	n	w	Y
R	m	n	w	n
S	m	n	S	n
O	m	h	S	Y
O	h	n	w	n
R	m	h	S	Y



Conclusion :-
Temp's IG is higher than rest of the feature.

1) entropy[outlook]

Root feature entropy 0.30

$$H(S) = -\sum_{i=1}^n P_i \log(P_i)$$

$$\Rightarrow -P_Y \log(P_Y) - P_N \log(P_N)$$

$$\Rightarrow -\frac{2}{5} \log(\frac{2}{5}) - \frac{3}{5} \log(\frac{3}{5})$$

$$\Rightarrow 0.29$$

$$\Rightarrow -\frac{3}{4} \log(\frac{3}{4}) - \frac{1}{4} \log(\frac{1}{4})$$

$$\Rightarrow 0.24$$

$$\Rightarrow -\frac{2}{5} \log(\frac{2}{5}) \rightarrow 0.29$$

Information Gain [outlook]

$$H(S) - \sum \frac{|S_v|}{|S|} H(S_v)$$

$$\Rightarrow 0.30 - \left[\frac{5}{14} \times 0.29 + \frac{4}{14} \times 0.24 + \frac{5}{14} \times 0.29 \right]$$

$$\Rightarrow 0.024$$

2) entropy(Temp)

$$\hookrightarrow 0.24 \rightarrow \text{Hot}$$

$$\hookrightarrow 0.27 \rightarrow \text{Mild}$$

$$\hookrightarrow 0.30 \rightarrow \text{Cool}$$

$$\hookrightarrow \text{Info Gain} \rightarrow 0.03$$

3) entropy(Humidity)

$$\hookrightarrow 0.28 \rightarrow \text{high}$$

$$\hookrightarrow 0.27 \rightarrow \text{Normal}$$

$$\hookrightarrow \text{Info Gain} \rightarrow 0.024$$

4) entropy(wind)

$$\hookrightarrow 1 \rightarrow \text{weak}$$

$$\hookrightarrow 1 \rightarrow \text{strong}$$

$$\hookrightarrow \text{Info Gain} \rightarrow 0.024$$