

# Tutorial week 7

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We have three values for outlook: {sunny, overcast, rain}

$$S = [9(\text{Yes}), 5(\text{No})]$$

$$S_{\text{sunny}} = [2(\text{Yes}), 3(\text{No})]$$

$$S_{\text{overcast}} = [4(\text{Yes}), 0(\text{No})]$$

$$S_{\text{rain}} = [3(\text{Yes}), 2(\text{No})]$$

$$\begin{aligned} \textcircled{1} \text{IG}(S, \text{outlook}) &= \text{Entropy}(S) - \sum_{v \in \{\text{sunny, rain, overcast}\}} \frac{|S_v|}{|S|} \text{Entropy}(S_v) \\ &= \text{Entropy}(S) - \frac{5}{14} \text{Entropy}(S_{\text{sunny}}) - \frac{4}{14} \text{Entropy}(S_{\text{overcast}}) - \frac{5}{14} \text{Entropy}(S_{\text{rain}}) \\ &= 0.94 - \frac{5}{14} \times 0.971 - \frac{4}{14} \times 0 - \frac{5}{14} \times 0.971 \\ &= 0.247 \end{aligned}$$

Using the same way, we can calculate for the other attributes:

$$\textcircled{2} \text{IG}(S, \text{temperature}) = 0.029$$

$$\textcircled{3} \text{IG}(S, \text{humidity}) = 0.152$$

$$\textcircled{4} \text{IG}(S, \text{wind}) = 0.048$$

So we choose outlook first, and we can compute following:

$$\text{IG}(S_{\text{sunny}}, \text{temperature}) = 0.971 - \frac{2}{5} \times 0 - \frac{3}{5} \times 1 - \frac{1}{5} \times 0 = 0.571$$

$$\text{IG}(S_{\text{sunny}}, \text{humidity}) = 0.971 - \frac{2}{5} \times 0 - \frac{3}{5} \times 0 = 0.971 \quad \checkmark$$

$$\text{IG}(S_{\text{sunny}}, \text{wind}) = 0.971 - \frac{2}{5} \times 0.918 - \frac{3}{5} \times 1 = 0.02$$

$$\text{IG}(S_{\text{rain}}, \text{temperature}) = 0.02$$

$$\text{IG}(S_{\text{rain}}, \text{humidity}) = 0.02$$

$$\text{IG}(S_{\text{rain}}, \text{wind}) = 0.971$$

