

Computing Information Gain

$$Gain(A, S) = I(S) - I(A, S) = I(S) - \sum_{v \in \text{Values}(A)} \frac{|S_v|}{|S|} \times I(S_v)$$

$$I(T) = -0.5 \log_2 0.5 - 0.5 \log_2 0.5 = 1$$

$$I(\text{Pat}, T) = \frac{2}{12}(0) + \frac{1}{3}(0) + \frac{1}{2} \left(-\frac{1}{3} \log_2 \frac{1}{3} - \frac{2}{3} \log_2 \frac{2}{3} \right) = 0.459$$

$$I(\text{Type}, T) = 1$$

$$Gain(\text{Pat}, T) = 1 - 0.459 = 0.541$$

$$Gain(\text{Type}, T) = 0$$

French		Y	N
Italian		Y	N
Thai	N	Y	N Y
Burger	N	Y	N Y
	Empty	Some	Ful