

$$IG_D = -\frac{2}{4} \log \frac{2}{4} - \frac{2}{4} \log \frac{2}{4} = 1$$

$$IG_{windy} = \frac{3}{4} \left(-\frac{2}{3} \log \frac{2}{3} - \frac{1}{3} \log \frac{1}{3} \right)$$

$$+ \frac{1}{4} \left(-\frac{0}{4} \log 0 - 1 \log 1 \right)$$

$$= \frac{3}{4} (0.913) + \frac{1}{4} (0)$$

$$IG_{windy} = 0.6851$$

$$Gain_{windy} = 1 - 0.6851 = 0.3149$$

$$IG_{air\ quality} = \frac{2}{4} \left(-\frac{1}{2} \log \frac{1}{2} - \frac{1}{2} \log \frac{1}{2} \right)$$

$$+ \frac{2}{4} \left(-\frac{1}{2} \log \frac{1}{2} - \frac{1}{2} \log \frac{1}{2} \right)$$

$$IG_{air\ quality} = 1$$

$$Gain_{AQ} = 1 - 1 = 0$$

$$IG_{hot} = \frac{2}{4} \left(-\frac{1}{2} \log \frac{1}{2} - \frac{1}{2} \log \frac{1}{2} \right)$$

$$+ \frac{2}{4} \left(-\frac{1}{2} \log \frac{1}{2} - \frac{1}{2} \log \frac{1}{2} \right)$$

$$= 1$$

$$Gain_{hot} = 1 - 1 = 0$$

PLAY TENNIS Decision Tree

