

HW. 14

$$\text{Info (D)} = I(10,3) = -\frac{2}{5} \log_2 \left(\frac{2}{5}\right) - \frac{3}{5} \log_2 \left(\frac{3}{5}\right) = 0.5388 + 0.4122 = 0.951$$

$$\text{Info income (D)} = \frac{2}{5} I(0,2) + \frac{2}{5} I(1,1) + \frac{1}{5} I(1,0)$$

$$= \frac{2}{5} \left[\left(-\frac{1}{2} \log_2 \frac{1}{2} \right) - \frac{2}{3} \log_2 \left(\frac{2}{3} \right) \right] + \frac{2}{5} \left[\frac{-1}{2} \log_2 \left(\frac{1}{2} \right) - \frac{1}{3} \log_2 \left(\frac{1}{3} \right) \right] + \frac{1}{5} \left[-1 \log_2 \left(\frac{1}{1} \right) \right]$$

$$= 0 + \frac{2}{5} (0.5 + 0.5) + 0 = 0.40$$

$$\text{Info credit (D)} = \frac{3}{5} I(1,2) + \frac{1}{5} I(1,1)$$

$$= \frac{3}{5} \left[\frac{1}{3} \log_2 \left(\frac{1}{3} \right) - \frac{1}{3} \log_2 \left(\frac{2}{3} \right) \right] + \frac{2}{5} \left[\frac{-1}{2} \log_2 \left(\frac{1}{2} \right) - \frac{1}{2} \log_2 \left(\frac{1}{2} \right) \right]$$

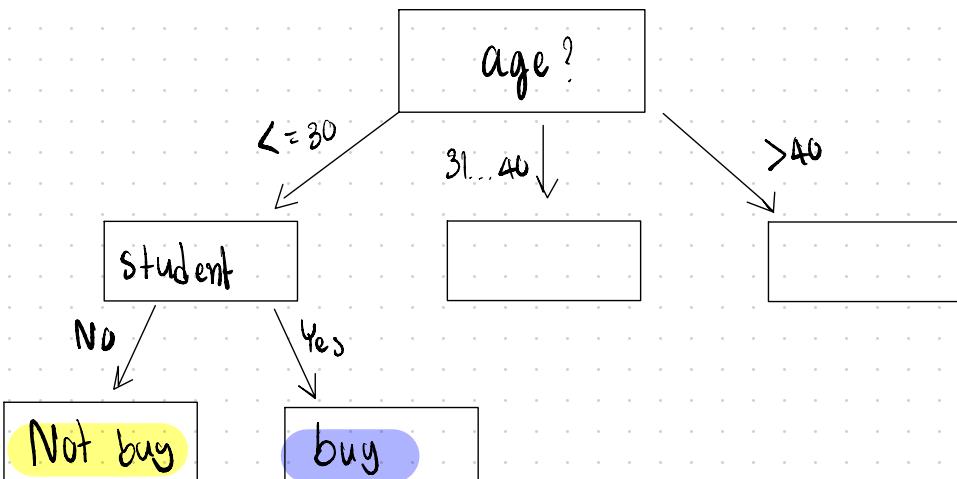
$$= \frac{3}{5} [(-0.3333)(-1.5851) + (0.6667)(0.5849)] + \frac{2}{5} [(0.5)(0.1) + (-0.5)(-1)]$$

$$= 0.5510 + 0.4 = 0.9510$$

$$\text{Gain (income)} = \text{Info (D)} - \text{Info income (D)} = 0.951 - 0.40 = 0.551$$

$$\text{Gain (student)} = \text{Info (D)} - \text{Info student (D)} = 0.951 - 0 = 0.951$$

$$\text{Gain (credit)} = \text{Info (D)} - \text{Info credit (D)} = 0.951 - 0.9510 = 0.02$$



$$\text{Info (0)} = I(4,0) = -\frac{4}{4} \log_2 \left(\frac{4}{4}\right) - \frac{0}{4} \log_2 \left(\frac{0}{4}\right) = 0$$

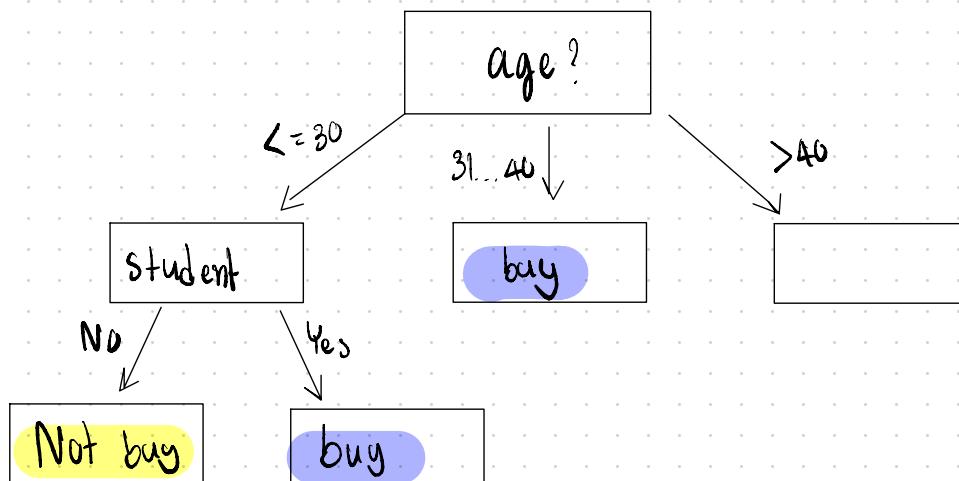
$$\begin{aligned} \text{Info income (D)} &= \frac{2}{4} I(2,0) + \frac{1}{4} I(1,0) + \frac{1}{4} I(1,0) \\ &= \frac{2}{4} \left[-\frac{2}{0} \log_2 \left(\frac{2}{0}\right) - \frac{0}{2} \log_2 \left(\frac{0}{2}\right) \right] + \frac{1}{4} \left[\frac{1}{4} \left[-\frac{1}{0} \log_2 \left(\frac{1}{0}\right) - \frac{0}{1} \log_2 \left(\frac{0}{1}\right) \right] \right. \\ &\quad \left. + \frac{1}{4} \left[-\frac{1}{0} \log_2 \left(\frac{1}{0}\right) - \frac{0}{1} \log_2 \left(\frac{0}{1}\right) \right] \right] = 0 \end{aligned}$$

$$\begin{aligned} \text{Info credit (D)} &= \frac{2}{4} I(2,0) + \frac{2}{4} I(2,0) \\ &= \frac{2}{4} \left[-\frac{2}{0} \log_2 \left(\frac{2}{0}\right) - \frac{0}{2} \log_2 \left(\frac{0}{2}\right) \right] + \frac{2}{4} \left[-\frac{2}{0} \log_2 \left(\frac{2}{0}\right) - \frac{0}{2} \log_2 \left(\frac{0}{2}\right) \right] \end{aligned}$$

$$\text{Gain (income)} = \text{Info (0)} - \text{Info income (D)} = 0 - 0 = 0$$

$$\text{Gain (credit)} = \text{Info (D)} - \text{Info credit (D)} = 0 - 0 = 0$$

* Wenn age 31...40 buy wird gekauft



$$\text{Info (D)} = I(3,2) = -\frac{3}{5} \log_2 \left(\frac{3}{5}\right) - \frac{2}{5} \log_2 \left(\frac{2}{5}\right) = 0.4422 + 0.5288 = 0.9710$$

$$\begin{aligned}\text{Info income (D)} &= \frac{2}{5} I(0,0) + \frac{3}{5} I(2,1) + \frac{2}{5} I(1,1) \\ &= \frac{3}{5} \left[-\frac{2}{5} \log_2 \left(\frac{2}{3}\right) - \frac{1}{3} \log_2 \left(\frac{1}{3}\right) \right] + \frac{2}{5} \left[-\frac{1}{2} \log_2 \left(\frac{1}{2}\right) - \frac{1}{2} \log_2 \left(\frac{1}{2}\right) \right] \\ &= 0.7510 + 0.4 = 0.9510\end{aligned}$$

$$\begin{aligned}\text{Info (credit) (D)} &= \frac{3}{5} I(3,0) + \frac{2}{5} I(0,2) \\ &= \frac{3}{5} \left[-\frac{3}{5} \log_2 \left(\frac{3}{5}\right) - \frac{0}{3} \log_2 \left(\frac{0}{3}\right) \right] + \frac{2}{5} \left[-\frac{0}{2} \log_2 \left(\frac{0}{2}\right) - \frac{2}{0} \log_2 \left(\frac{0}{2}\right) \right] \\ &= 0\end{aligned}$$

$$\text{Gain (income)} = \text{Info (D)} - \text{Info income (D)} = 0.9710 - 0.9510$$

$$\text{Gain (credit)} = \text{Info (D)} - \text{Info credit (D)} = 0.9710 - 0 = 0.9710$$

