

age	income	student	credit rating	buys computer
<=30	high	no	fair	no
<=30	high	no	excellent	no
31...40	high	no	fair	yes
>40	medium	no	fair	yes
>40	low	yes	fair	yes
>40	low	yes	excellent	no
31...40	low	yes	excellent	yes
<=30	medium	no	fair	no
<=30	low	yes	fair	yes
>40	medium	yes	fair	yes
<=30	medium	yes	excellent	yes
31...40	medium	no	excellent	yes
31...40	high	yes	fair	yes
>40	medium	no	excellent	no

$$\text{Info}(D) = (6, 4) = -\frac{6}{12} \log_2\left(\frac{6}{12}\right) - \frac{4}{12} \log_2\left(\frac{4}{12}\right) = 0.9183$$

$$\text{Info}_{\text{age}}(D) = \frac{4}{12} I(2, 2) + \frac{3}{12} I(3, 0) + \frac{5}{12} I(3, 2) = 0.738$$

$$\text{Gain}(\text{age}) = \text{Info}(D) - \text{Info}_{\text{age}}(D) = 0.1803$$

$$\text{Info}_{\text{income}}(D) = \frac{4}{12} I(2, 2) + \frac{5}{12} I(4, 1) + \frac{3}{12} I(2, 1) = 0.863$$

$$\text{Gain} = 0.0553$$

$$\text{Info}_{\text{student}}(D) = \frac{6}{12} I(3, 3) + \frac{6}{12} I(5, 1) = 0.825$$

$$\text{Gain} = 0.0933$$

$$\text{Info}_{\text{credit}}(D) = \frac{7}{12} I(6, 1) + \frac{5}{12} I(2, 3) = 0.748$$

$$\text{Gain} = 0.1703$$

