Training data set: Who buys computer?

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

$Info(D) = I(9,5) = -\frac{9}{14}\log\left(\frac{9}{14}\right) - \frac{5}{14}\log\left(\frac{5}{14}\right) = 0.940$

$Info_{age}(D) = \frac{5}{14} I(2,3) + \frac{4}{14} I(4,0) + \frac{5}{14} I(3,2)$

$= \frac{5}{14}\left[-\frac{2}{5}\log\left[\frac{2}{5}\right] - \frac{3}{5}\log\left[\frac{3}{5}\right]\right] + \frac{4}{14}\left[-\frac{4}{4}\log\left[\frac{4}{4}\right] - \frac{0}{4}\log\left[\frac{0}{4}\right]\right] + \frac{5}{14}\left[-\frac{3}{5}\log\left[\frac{3}{5}\right] - \frac{2}{5}\log\left[\frac{2}{5}\right]\right] = 0.694$

$Info_{income}(D) = \frac{4}{14} I(3,1) + \frac{6}{14} I(4,2) + \frac{4}{14} I(3,1)$

$= \frac{4}{14}\left[-\frac{3}{4}\log\left[\frac{3}{4}\right] - \frac{1}{4}\log\left[\frac{1}{4}\right]\right] + \frac{6}{14}\left[-\frac{4}{6}\log\left[\frac{4}{6}\right] - \frac{2}{6}\log\left[\frac{2}{6}\right]\right] + \frac{4}{14}\left[-\frac{3}{4}\log\left[\frac{3}{4}\right] - \frac{1}{4}\log\left[\frac{1}{4}\right]\right] = 0.911$

$Info_{student}(D) = \frac{7}{14} I(3,4) + \frac{7}{14} I(6,1)$

$= \frac{7}{14}\left[-\frac{3}{7}\log\left[\frac{3}{7}\right] - \frac{4}{7}\log\left[\frac{4}{7}\right]\right] + \frac{7}{14}\left[-\frac{6}{7}\log\left[\frac{6}{7}\right] - \frac{1}{7}\log\left[\frac{1}{7}\right]\right] = 0.789$

$Info_{credit}(D) = \frac{8}{14} I(6,2) + \frac{6}{14} I(3,3)$

$= \frac{8}{14}\left[-\frac{6}{8}\log\left[\frac{6}{8}\right] - \frac{2}{8}\log\left[\frac{2}{8}\right]\right] + \frac{6}{14}\left[-\frac{3}{6}\log\left[\frac{3}{6}\right] - \frac{3}{6}\log\left[\frac{3}{6}\right]\right] = 0.892$

$Gain(age) = 0.940 - 0.694 = 0.246$

$Gain(income) = 0.940 - 0.911 = 0.029$

$Gain(student) = 0.940 - 0.789 = 0.151$

$Gain(credit) = 0.940 - 0.892 = 0.048$