root node

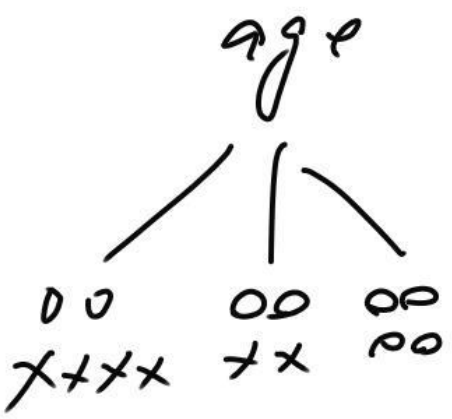
$$\text{Info}(D) =$$

$$-\left(\frac{8}{14}\log_2\frac{8}{14} + \frac{6}{14}\log_2\frac{6}{14}\right)$$

$$= 0.985$$

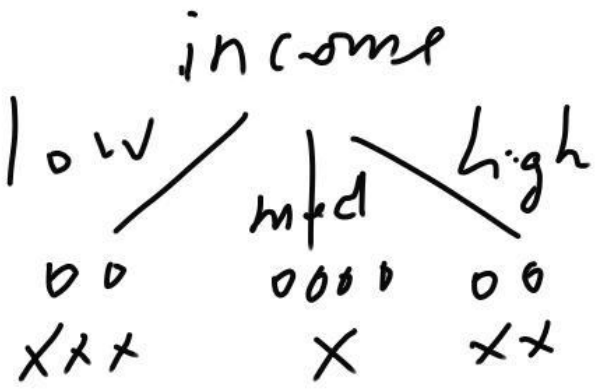
root

$Info(D) = I(8.6) = 0.985$



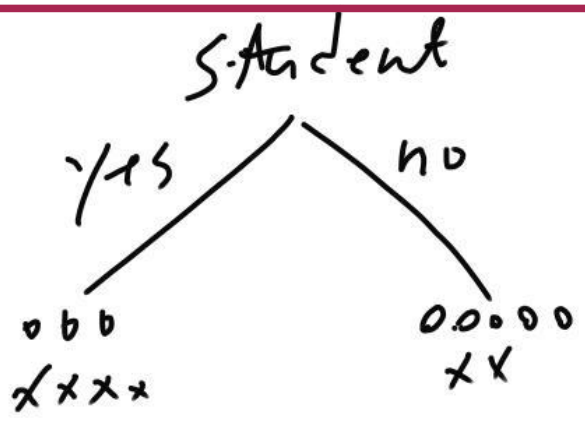
$$Info_{age} = \frac{6}{14} I(2.4) + \frac{4}{14} I(2.2) + \frac{4}{14} I(4.0)$$

$$= 0.679$$



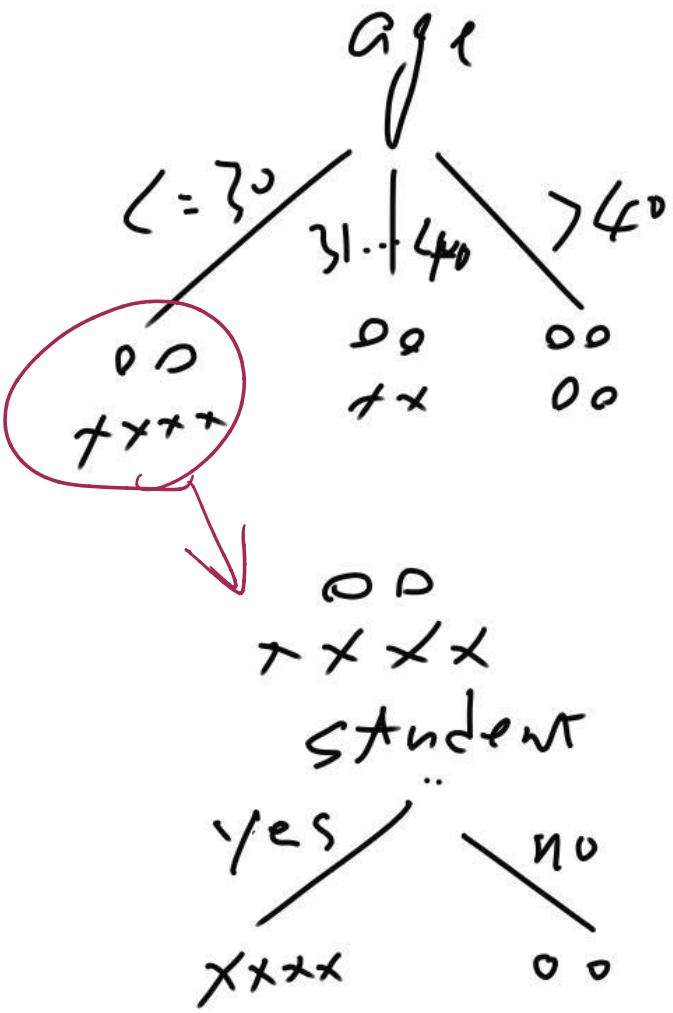
$$Info_{income} = \frac{5}{14} I(2.3) + \frac{5}{14} I(4.1) + \frac{4}{14} I(2.2)$$

$$= 0.89$$

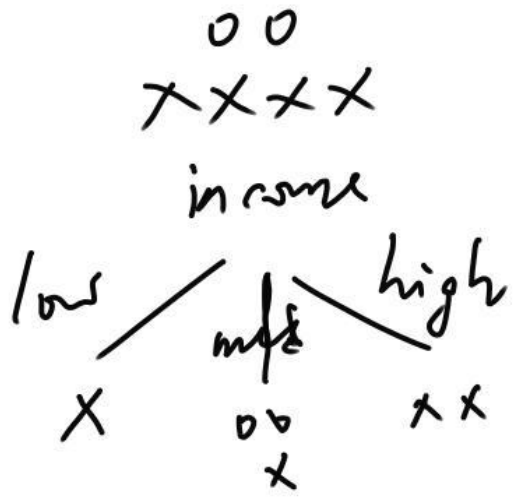


$$Info_{stu} = \frac{7}{14} I(3.4) + \frac{7}{14} I(5.2)$$

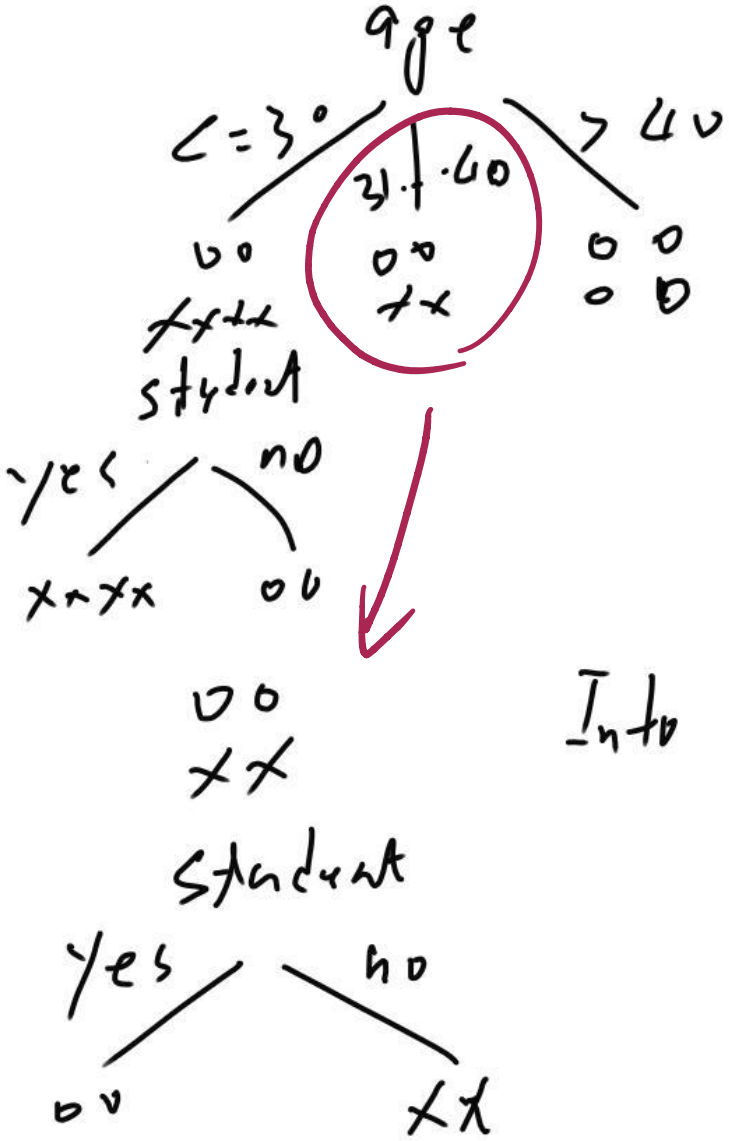
$$= 0.924$$



$$Info_{age<=30}(student) = \frac{4}{6} I(0.4) + \frac{2}{6} I(2,0) = 0$$



$$Info_{age<=30}(income) = \frac{1}{6} I(0,1) + \frac{3}{6} I(2,1) + \frac{2}{6} I(0,2)$$

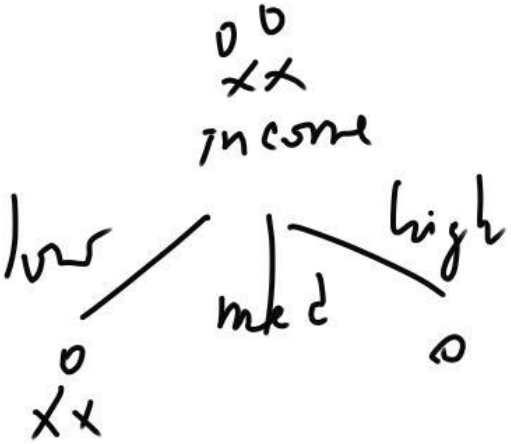


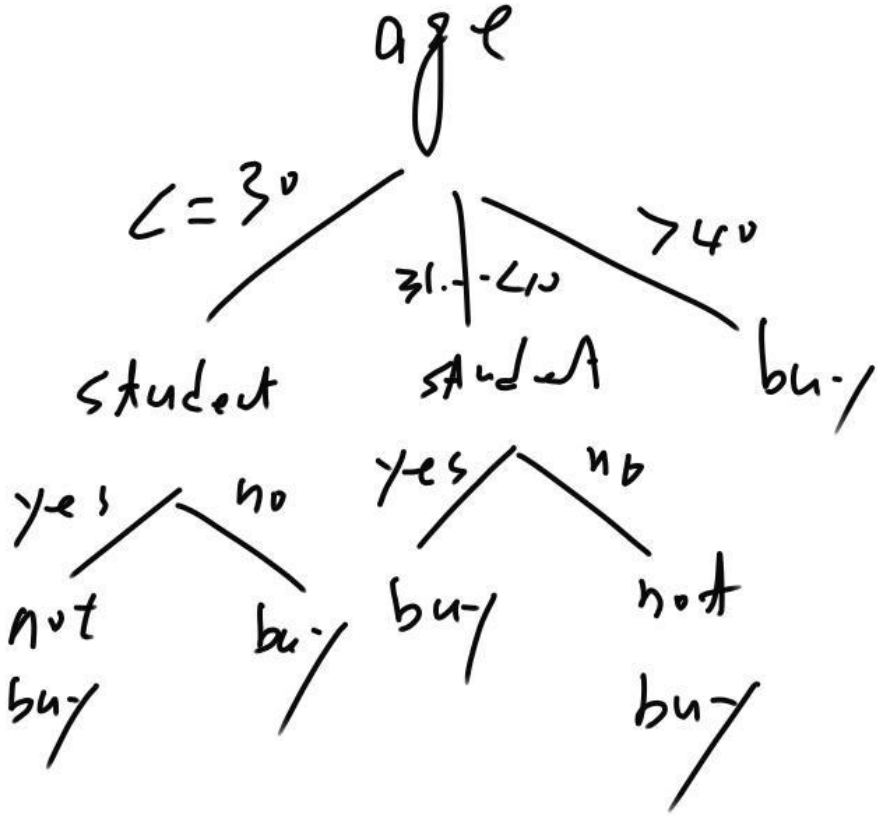
$$I_{nfo} = \frac{2}{4} I(2.0) +$$

$$\frac{2}{4} I(0,2) = 0$$

$$Info = \frac{3}{4} I(1,2) +$$

$$\frac{1}{4} I(1.0)$$




age
<=30
31...40
>40
student
student
buy
yes
no
yes
no
not buy
buy
buy
not buy

buy: $\frac{8}{14}$

$P(<30 \mid buy) = \frac{2}{8}$

$P(high \mid buy) = \frac{2}{8}$

$P(yes \mid buy) = \frac{3}{8}$

$$\frac{2}{8} \times \frac{2}{8} \times \frac{3}{8} \times \frac{8}{14} = 0.013$$

not buy: $\frac{6}{14}$

$P(<=30 \mid not) = \frac{4}{6}$

$P(high \mid not) = \frac{2}{6}$

$P(yes \mid not) = \frac{4}{6}$

$$\frac{4}{6} \times \frac{2}{6} \times \frac{4}{6} \times \frac{6}{14} = 0.063$$