

Class P : bug-Computer = 'yes', Class N : bug-Computer = 'no'
 $\text{Info}(D) = I(8, A) = -\frac{8}{12} \log_2 \frac{8}{12} - \frac{4}{12} \log_2 \frac{4}{12} = 0.918$

$\approx \text{Info}_{\text{age}}(D)$

age	P_i	n_i	$I(P_i, n_i)$
≤ 30	2	2	1
31...40	3	0	0
> 40	3	2	0.971

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

$$= \frac{4}{12} (1) + \frac{3}{12} (0) + \frac{5}{12} (0.971)$$

$$= \frac{4}{12} + \frac{4.855}{12} = \frac{8.855}{12} = 0.738$$

$$\text{Gain}(\text{age}) = \text{Info}(D) - \text{Info}_{\text{age}}(D) = 0.918 - 0.738 = 0.18$$

$\approx \text{Info}_{\text{student}}(D)$

student	P_i	n_i	$I(P_i, n_i)$
no	3	3	1
yes	5	1	0.650

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

$$= \frac{6}{12} (1) + \frac{6}{12} (0.650) = \frac{6+3.9}{12} = 0.825$$

$$\text{Gain}(\text{student}) = \text{Info}(D) - \text{Info}_{\text{student}}(D) = 0.918 - 0.825 = 0.093$$

$\approx \text{Info}_{\text{Income}}(D)$

Income	P_i	n_i	$I(P_i, n_i)$
high	2	2	1
medium	4	1	0.722
low	2	1	0.918

$$\text{Info}_{\text{Income}}(D) = \frac{4}{12} I(2,2) + \frac{6}{12} I(4,1) + \frac{2}{12} I(2,1)$$

$$= \frac{4}{12} (1) + \frac{6}{12} (0.722) + \frac{2}{12} (0.918) = \frac{4+4.34+2.754}{12} = 0.864$$

$$\text{Gain}(\text{Income}) = \text{Info}(D) - \text{Info}_{\text{Income}}(D) = 0.918 - 0.864 = 0.054$$

$\approx \text{Info}_{\text{credit}}(D)$

Credit	P_i	n_i	$I(P_i, n_i)$
fair	6	1	0.592
excellent	2	3	0.971

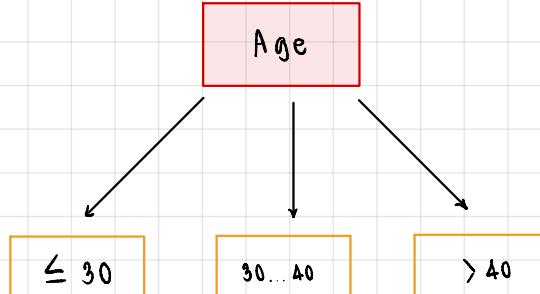
$$\text{Info}_{\text{credit}}(D) = \frac{7}{12} I(2,2) + \frac{5}{12} I(4,1)$$

$$= \frac{7}{12} (0.592) + \frac{5}{12} (0.971) = \frac{4.144 + 4.866}{12} = 0.750$$

$$\text{Gain}(\text{Income}) = \text{Info}(D) - \text{Info}_{\text{Income}}(D) = 0.918 - 0.750 = 0.168$$

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

ໃຫຍ່ນວ່າ Gain(Age) ແມ່ນກຳລັງ
ກະບົດ



択らう Age ≤ 30

Class P : bug-Computer = "Yes", Class P : bug-Computer = "No"

$$\text{Info}(D_{\text{Age}} \leq 30) = I(2,2) = -\frac{2}{4} \log_2 \frac{2}{4} - \frac{2}{4} \log_2 \frac{2}{4} = 1$$

択らう Info(D_{\text{Age}} \leq 30)

Income	P_i	n_i	$I(P_i, n_i)$
high	0	2	0
medium	1	0	0
low	1	0	0

$$\begin{aligned} \text{Info}_{\text{Income}}(D_{\text{Age}} \leq 30) &= \frac{2}{4} I(0,2) + \frac{1}{4} I(1,0) + \frac{1}{4} I(1,0) \\ &= 0 \end{aligned}$$

$$\text{Gain}(\text{Income}) = \text{Info}(D_{\text{Age}}) - \text{Info}_{\text{Income}}(D_{\text{Age}}) = 1 - 0 = 1$$

択らう Info_{student}(D_{\text{Age}} \leq 30)

Student	P_i	n_i	$I(P_i, n_i)$
NO	0	2	0
YES	2	0	0

$$\begin{aligned} \text{Info}_{\text{student}}(D_{\text{Age}} \leq 30) &= \frac{2}{4} I(0,2) + \frac{2}{4} I(2,0) \\ &= 0 \end{aligned}$$

$$\text{Gain}(\text{student}) = \text{Info}(D_{\text{Age}}) - \text{Info}_{\text{student}}(D_{\text{Age}}) = 1 - 0 = 1$$

択らう Info_{credit}(D_{\text{Age}} \leq 30)

Credit	P_i	n_i	$I(P_i, n_i)$
fair	1	1	1
excellent	1	1	1

$$\begin{aligned} \text{Info}_{\text{Income}}(D_{\text{Age}} \leq 30) &= \frac{2}{4} I(1,1) + \frac{2}{4} I(1,1) \\ &= \frac{2+2}{4} = 1 \end{aligned}$$

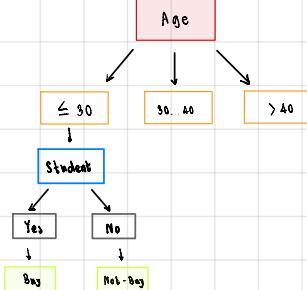
$$\text{Gain}(\text{credit}) = \text{Info}(D_{\text{Age}} \leq 30) - \text{Info}_{\text{credit}}(D_{\text{Age}} \leq 30) = 1 - 1 = 0$$

択らう Gain(Income) = Gain(Student) = 1

択らう Gain(Student) = Gain(Credit) = 0

択らう Gain(Credit) = Gain(Income) = 1

択らう student

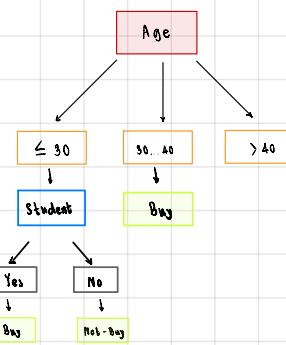


択らう $30 < \text{Age} \leq 40$

Class P : bug-Computer = "Yes", Class P : bug-Computer = "No"

$$\text{Info}(30 < \text{Age} \leq 40) = I(3,0) = -\frac{3}{3} \log_2 \frac{3}{3} - \frac{0}{3} \log_2 \frac{0}{3} = 0$$

択らう Info(30 < D_{\text{Age}} \leq 40) = 0
bug-Computer = "Yes" なら 0.971



択らう $\text{Age} \geq 40$

Class P : bug-Computer = "Yes", Class P : bug-Computer = "No"

$$\text{Info}(\text{Age} \geq 40) = I(3,2) = -\frac{3}{5} \log_2 \frac{3}{5} - \frac{2}{5} \log_2 \frac{2}{5} = 0.971$$

択らう Info_{Income}(D_{\text{Age}} \geq 40)

Income	P_i	n_i	$I(P_i, n_i)$
high	0	0	0
medium	2	1	0.971
low	1	1	1

$$\begin{aligned} \text{Info}_{\text{Income}}(D_{\text{Age}} \geq 40) &= 0 + \frac{3}{5} I(2,1) \\ &\quad + \frac{2}{5} I(1,1) \\ &= \frac{3}{5} (0.971) + \frac{2}{5} (1) \\ &= \frac{2.914}{5} + \frac{2}{5} \\ &= 0.9508 \end{aligned}$$

$$\text{Gain}(\text{Income}) = \text{Info}(D_{\text{Age}}) - \text{Info}_{\text{Income}}(D_{\text{Age}}) = 0.971 - 0.9508 = 0.02$$

択らう Info_{student}(D_{\text{Age}} \geq 40)

Student	P_i	n_i	$I(P_i, n_i)$
NO	1	1	1
YES	2	1	0.971

$$\begin{aligned} \text{Info}_{\text{student}}(D_{\text{Age}} \geq 40) &= \frac{2}{5} I(1,1) + \frac{3}{5} I(2,1) \\ &= \frac{2}{5} (1) + \frac{3}{5} (0.971) \\ &= 0.9508 \end{aligned}$$

$$\text{Gain}(\text{student}) = \text{Info}(D_{\text{Age}} \geq 40) - \text{Info}_{\text{student}}(D_{\text{Age}} \geq 40) = 0.971 - 0.9508 = 0.02$$

択らう Info_{credit}(D_{\text{Age}} \geq 40)

Credit	P_i	n_i	$I(P_i, n_i)$
fair	3	0	0
excellent	0	2	0

$$\text{Info}_{\text{credit}}(D_{\text{Age}} \geq 40) = 0$$

$$\begin{aligned} \text{Gain}(\text{credit}) &= 0.971 - 0 \\ &= 0.971 \end{aligned}$$

択らう Gain(Credit-rating) または Gain(Credit) = 0

択らう

Age

