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mata kuliah : penambangan data

1.) hitunglah secara manual information gain dari data
di samping
- Information gain (class : online course)
- Information gain (class : education background)
- Information gain (class : working status)

online Course	Education background	Working Status	Class
Y	maths	NW	Pass
N	maths	W	Fall
Y	maths	W	Fall
Y	CS	NW	Pas
N	Other	W	Fail
Y	Other	W	Fall
Y	maths	NW	Pass
Y	CS	NW	Pass
N	maths	W	Pass
N	CS	W	Pass
Y	CS	W	Pass
N	maths	NW	Pass
Y	other	W	Fall
N	other	NW	Fall
N	maths	W	Fall

}teaching

	Result	
Pass		Fail
8		4

$$E(\text{result}) = -\frac{8}{12} \times \log_2\left(\frac{8}{12}\right) - \frac{4}{12} \times \log_2\frac{4}{12}$$

$$= -0.667 \times \log_2(0.667) - 0.333 \times \log_2(0.333)$$

$$= -0.667 \times (-0.584) - 0.333 \times (-1.586)$$

$$= 0.917$$

Result online Course

	Pass	Fail	Sum	
Y	5	2	7	
N	3	2	5	Sum : 12

$$E(Y) = -\frac{5}{7} \times \log_2(5/7) - \frac{2}{4} \times \log_2(2/7)$$

$$= 0.714 \times (-0.486) - 0.285 \times (-1.811)$$

$$= 0.863$$

$$E(N) = -3/5 \times \log_2(3/5) - 2/5 \times \log_2(2/5)$$

$$= -0.6 \times (-0.737) - 0.4 \times (-1.322)$$

$$= 0.971$$

$$E\left(\begin{array}{c}R : \text{online} \\ \text{Course}\end{array}\right) = P(Y) \times E(Y) + P(N) \times E(N)$$

$$= 7/12 \times 0.863 + 5/12 \times 0.971$$

$$= 0.908$$

Result education background

	Pass	Fail	Sum
maths	4	2	6
CS	4	0	4
other	0	2	2
		Sum = 12	

$$E(\text{maths}) = -\frac{4}{6} \times \log_2\left(\frac{4}{6}\right) - \frac{2}{6} \times \log_2\left(\frac{2}{6}\right)$$
$$= -0.667 \times (-0.584) - 0.333 \times (-1.586)$$
$$= 0.917$$

$$E(CS) = -\frac{4}{4} \times \log_2\left(\frac{4}{4}\right) - \frac{0}{4} \times \log_2\left(\frac{0}{4}\right)$$
$$= 0 \times \log_2(1) - 0 \times \log_2(0)$$
$$= 0$$

$$E(\text{other}) = -\frac{0}{2} \times \log_2\left(\frac{0}{2}\right) - \frac{2}{2} \times \log_2\left(\frac{2}{2}\right)$$
$$= 0 - 1 \times 0$$
$$= 0$$

$$E\left(\begin{array}{l}R: \text{Education} \\ \text{Background}\end{array}\right) = P(\text{maths}) \times E(\text{maths}) + P(CS) +$$
$$P(\text{other}) \times E(\text{other})$$
$$= 0.5 \times 0.917 + 0 + 0$$
$$= 0.458$$

Result working status

	Pass	Fall	Sum	
W	4	3	7	
NW	5	0	5	Sum = 12

$$E(VI) = -\frac{4}{7} \times \log_2\left(\frac{4}{7}\right) - \frac{3}{7} \times \log_2\left(\frac{3}{7}\right)$$
$$= -0.571 \times (-0.808) - 0.928 \times (-1.229)$$
$$= 0.985$$

$$E(NW) = -\frac{5}{5} \times \log_2\left(\frac{5}{5}\right) - \frac{0}{5} \times \log_2\left(\frac{0}{5}\right)$$
$$= -1 \times 0 - 0$$
$$= 0$$

$$E(k: \text{working status}) = P(w) \times E(w) + P(NW) \times E(NW)$$
$$= \frac{7}{12} \times 0.985 \times \frac{5}{12} \times 0$$
$$= 0.574$$

$$E(k: \text{online Cours}) = 0.908$$
$$E(k: \text{education backgrad}) = 0.458$$
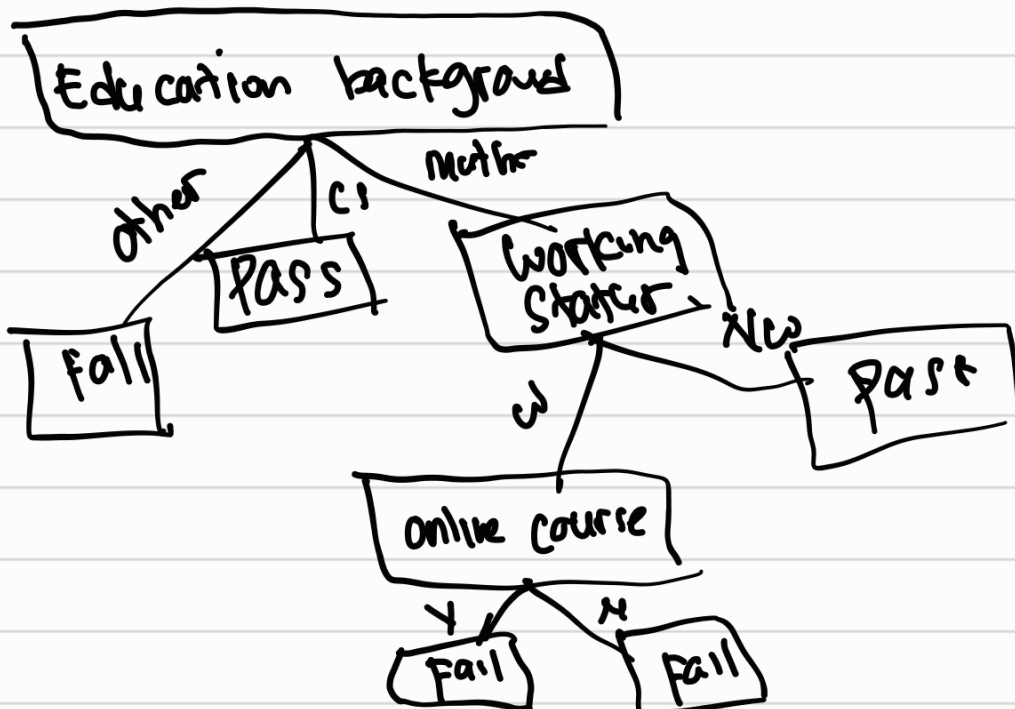$$E(k: \text{working status}) = 0.574$$

$$E(\text{result}) = 0.917$$
Information gain $(k: O-C) = 0.917 - 0.908 = 0.006$
Information gain $(k: E-B) = 0.917 - 0.458 = 0.459$
Information gain $(k: w-s) = 0.917 - 0.574 = 0.343$

R	OC	EB	WS
Fail	Y	Other	Fail
Fail	N	Other	Fail
Fail	N	month	Fail

2.)

Kelas Aktual	C_1	C_2	C_3
C_1	110	8	7
C_2	16	130	10
C_3	24	5	120

$$Akurasi = \frac{Jumlah\ prediksi\ yg\ benar}{total\ jumlah\ prediksi}$$

$$Akurasi = \frac{360}{432} = 0,83 = 83,3\%$$