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Roll : 2017 140 18

Dept: CSE-17

CT- 03

Ques 1	t	e	Ans 17
010 0	1	2	1/20
0	1	0	1/20

①

Ans. to the ques. no. - 01⊗ For Root Node calculation :

$$\text{slow}(s) = 2$$

$$\text{fast}(f) = 2$$

$$\therefore \text{Entropy}(s) = -\frac{2}{4} \log_2\left(\frac{2}{4}\right) - \frac{2}{4} \log_2\left(\frac{2}{4}\right)$$

$$= 1$$

for attribute : (Road Type) :values: steep, flat, ~~steep~~.

Road Type	s	f	Entropy
steep	2	1	0.918
flat	0	1	0

$$\therefore \text{Avg Entropy} = \left(\frac{2+1}{2+2} \times 0.918\right) + \left(\frac{1}{2+2} \times 0\right)$$

$$= 0.6885$$

$$\therefore \text{Information Gain} = 1 - 0.6885$$

$$= 0.3115$$

Answer

②

For attribute: (Obstruction)

values: yes, no

Obstruction	s	f	Entropy
yes	1	1	1
no	1	1	1

$$\therefore \text{Avg. Entropy} = \left(\frac{1+1}{2+2} \times 1 \right) + \left(\frac{1+1}{2+2} \times 1 \right)$$

$$= 1$$

$$\therefore \text{Information Gain} = 1 - 1$$

$$= 0$$

For attribute: (Speed Limit)

values: yes, no

Speed Limit	s	f	Entropy
yes	2	0	0
no	0	2	0

$$\therefore \text{Avg. Entropy} = \left(\frac{2}{2+2} \times 0 \right) + \left(\frac{2}{2+2} \times 0 \right)$$

$$= 0$$

$$\therefore \text{Information Gain} = 1 - 0$$

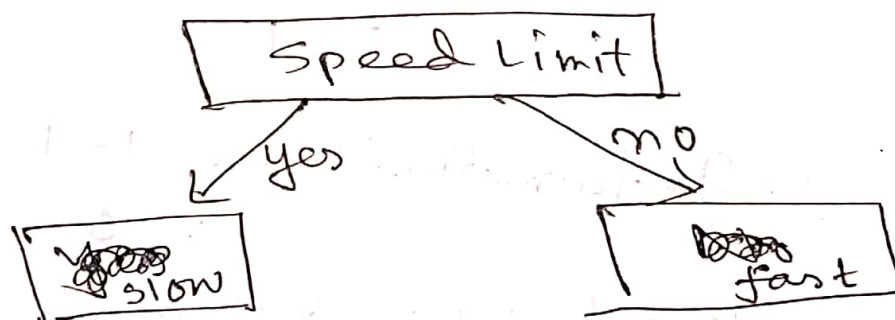
$$= 1$$

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Information Gain

Attributes	Information Gain
Road Type	0.3115
Obstruction	0
Speed Limit	1

So, highest IG is Speed Limit.
we choose Speed Limit as Root Node.



Since:

Speed Limit (yes):

Speed Limit	Road Type	Obstruction	Speed
yes	steep	yes	yes slow
yes	steep	no	Slow

Ayaz Fay

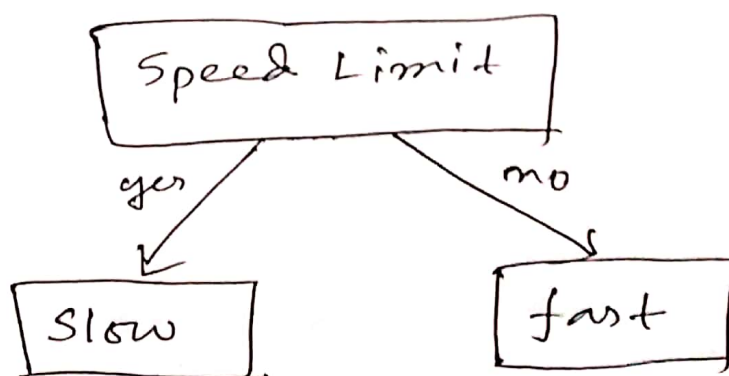
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Speed Limit: (no) :

Speed Limit	Road Type	Obstruction	Speed
no	flat	yes	fast
no	steep	no	fast

So, we can get to outcome with only attribute "Speed Limit".

Decision Tree:



(Ans)

Ayush