Artificial Intelligence Assignment

Decision tree Regression Algorithm

outlook	temperature	Humidity	windy	hours to play
Rainy	Hot	high	False	25
Rainy	Hot	high	true	30
Overcast	Hot	High	False	46
Sunny	mild	Normal	False	45
Sunny	Cool	Normal	False	52
Sunny	Cool	Normal	true	23
Overcast	Cool	Normal	true	43
Rainy	mild	high	False	35
Rainy	Cool	Normal	False	38
Sunny	mild	Normal	False	46
Rainy	mild	Normal	true	48
Overcast	mild	high	true	52
Overcast	Hot	Normal	False	44
Sunny	mild	high	True	30

· Criteria = 6%   n = 4

=> Decision tree to predict the no. of hours Played

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Decision tree Regression algorithm...

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Rainy	mild	high	False	35
Rainy	Cool	Normal	False	38
Sunny	mild	Normal	False	46
Rainy	mild	Normal	true	48
overcast	mild	high	true	52
overcast	Hot	Normal	False	44
Sunny	mild	high	True	30

$\cdot$ criteria $= 10\%$ $n = 4$

$\Rightarrow$ Decision tree to predict the no. of hours played

Humidity	Mean	Standard deviation	count(n)
High	37·57	9·36	7
Normal	62	8·73	7

$$SD(Humdity) = \frac{7}{14} \times 436 + \frac{7}{14} \times 8·73 = 9·05$$

SDR· = 0·27

$\Rightarrow$

temperature	mean	Standard deviation	count(n)
Hot	27·5	2·5	2
Cool	38	0	1
mild	41·5	6·5	2

$$SD(temp) = \frac{2}{3} \times 2·5 + \frac{1}{5} \times 0 + \frac{2}{5} \times 6·5$$

$$= 3·6$$

SDR = 418

Humidity	mean	stand deviation	count (n)
High	30	4·08	3
normal	43·43	5	2

$$S.D(humidity) = \frac{3}{4} \times 6.08 + \frac{2}{5} \times 5 = 4.45$$

$$SDR = 0.35 \; 3.33.$$

windy	mean	Standard deviation	count (n)
true	29	9	2
False	32.66	5.56	3

out look — sunny

Rainy

temperature   4 6.25

27.5   38   41.5
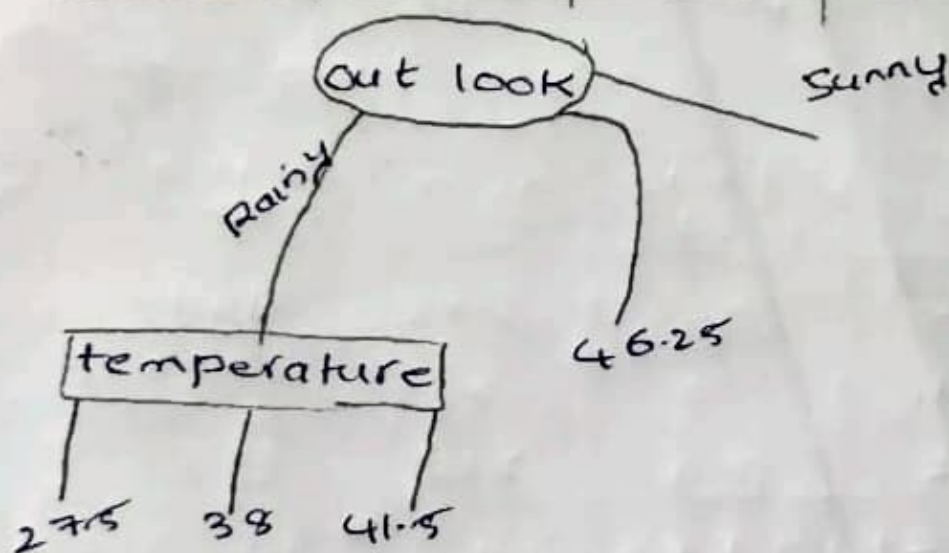
=) For   outlook   sunny :-

temperature	humidity	windy	It caus played
mild	high	False	45
cool	normal	False	52
cool	normal	true	23
mild	normal	false	46
mild	high	true	30

⟹ Standard deviation of hours played

$$SD(hours) = 9.32$$

⟹ calc... of standard deviation of features coloumns

outlook	mean	Stand desrivation	count(n)
Sunny	39.2	10.87	5
Rainy	35.2	7.78	5
overcost	45.2	3.32	4

$$outlook = \frac{5}{14} \times 10.87 + \frac{5}{14} \times 7.78 + \frac{4}{14} \times$$

$$3.49 = 7.66 \qquad SD := 1.66$$

temper -ature	mean	Standard derivat.	count(n)
Hot	36.25	8.8	4
coal	39	10.0	4
overcost	42.66	7.6	6

$$SD(temperature) = \frac{4}{14} \times 8.95 + \frac{4}{14} \times 10.51 +$$

$$\frac{6}{14} \times 7.65 = 8.84$$

$$SDR = 0.48$$

$SD(Hours\ played) = 10.87$

$$SD(temperature) = \frac{3}{5} \times 7.32 + \frac{2}{5} \neq 14.15$$

$$= 10.19$$

$SDR = 0.68$

humidity	mean	Standard Deviation	count(n)
high	37.5	2.5	2
normal	40.35	12.30	3

$$SD(humidity) = \frac{2}{5} \times 7.5 \times \frac{3}{4} \times 12.5 = 10.50$$

$SDR = 0.37$

windy	mean	Standard Dev.	count(n)
true	26.5	35	2
false	47.67	3.09	3

$$SD(windy) = \frac{2}{5} \times 35 + \frac{2}{3} \times 3.09$$

$$= 3.25$$

$SDR = 7.61$

=) windy has highest SDR It becomes
next node. branch

=> and nodes added with mean
values at output