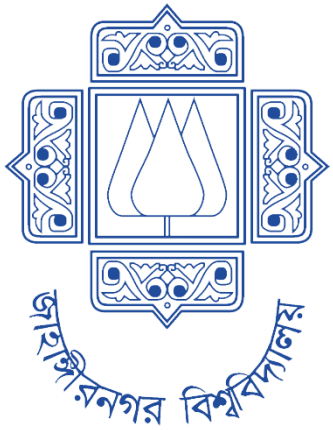
Institute of Information Technology (IIT)

Jahangirnagar University



Course Code: MICT 5402

Course Title: Advanced Machine Learning

Assignment - 01

Submitted to:

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IIT, JU

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Example : 02

Let, Predicted = Pre

$(130 - Pre) + (90 - Pre) + (93 - Pre) + (128 - Pre) + (95 - Pre) + (88 - Pre) + (135 - Pre) = 0$

$\Rightarrow 759 - 7Pre = 0$

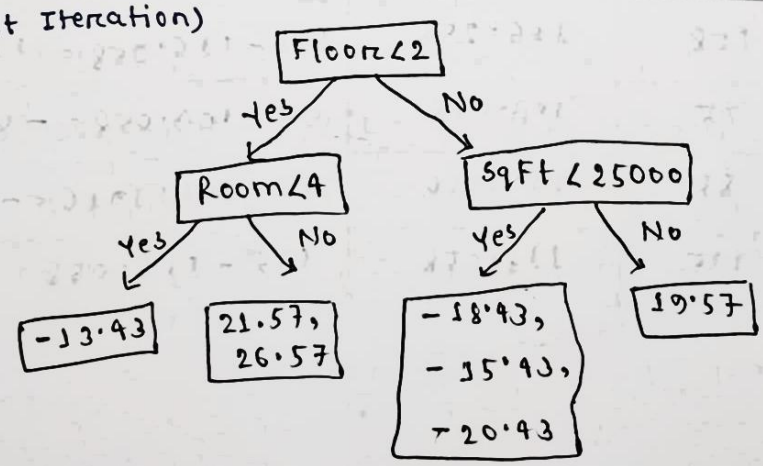
$\therefore Pre = \frac{759}{7}$

$= 108.4285$

$= 108.43$

Sno.	Sq Ft	Floor	No of rooms	Price	Initial Predicted value	Residuals
1	3300	1	4	130	108.43	130 - 108.43 = 21.57
2	2200	2	3	90	108.43	90 - 108.43 = -18.43
3	2900	3	2	93	108.43	93 - 108.43 = -15.43
4	2900	2	5	128	108.43	128 - 108.43 = 19.57
5	1800	1	3	95	108.43	95 - 108.43 = -13.43
6	1700	3	4	88	108.43	88 - 108.43 = -20.43
7	3400	1	5	135	108.43	135 - 108.43 = 26.57

Tree: (1st Iteration)



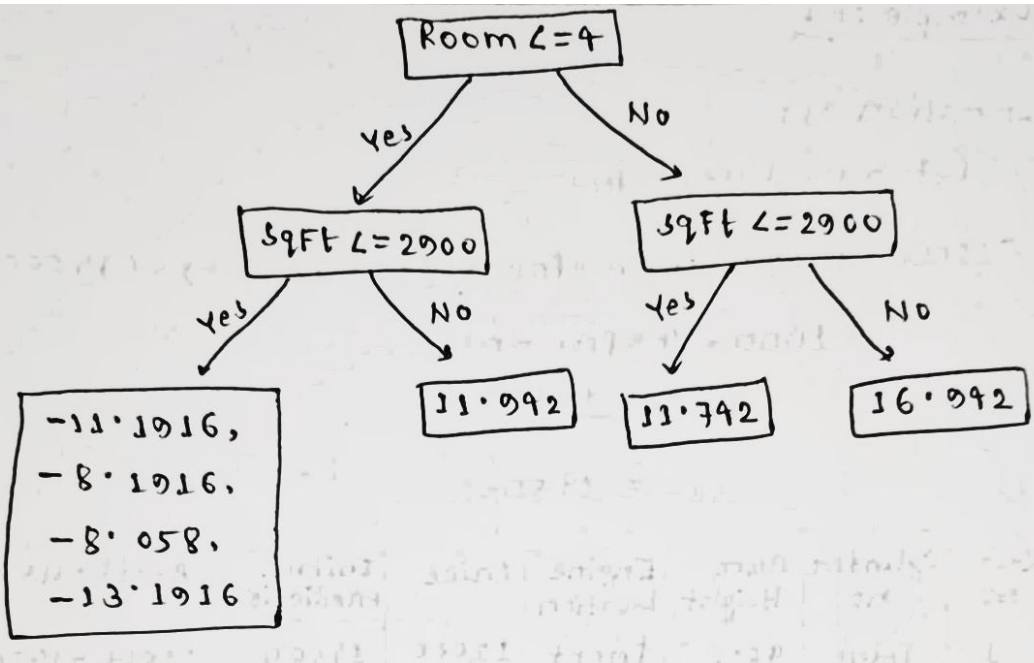
$$\frac{21.57 + 26.57}{2} = 24.07$$

$$\frac{-18.93 - 15.93 - 20.93}{3} = -18.096$$

Price	Initial Prediction	Residual	Residual From Tree	Prediction, $F_1(x)$ = Initial + (α × Residual From Tree)
130	108.93	21.57	24.07	$108.93 + 0.9 \times 24.07 = 118.058$
90	108.93	-18.93	-18.096	$108.93 - 0.9 \times 18.096 = 101.1916$
93	108.93	-15.93	-18.096	$108.93 - 0.9 \times 18.096 = 101.1916$
128	108.93	19.57	19.57	$108.93 + 0.9 \times 19.57 = 116.258$
95	108.93	-13.93	-13.93	$108.93 - 0.9 \times 13.93 = 103.058$
88	108.93	-20.93	-18.096	$108.93 - 0.9 \times 18.096 = 101.1916$
135	108.93	26.57	24.07	$108.93 + 0.9 \times 24.07 = 118.058$

2nd Iteration:

Price	Prediction, $F_1(x)$	Residuals = Observed Price - $F_1(x)$
130	118.058	$130 - 118.058 = 11.942$
90	101.1916	$90 - 101.1916 = -11.1916$
93	101.1916	$93 - 101.1916 = -8.1916$
128	116.258	$128 - 116.258 = 11.742$
95	103.058	$95 - 103.058 = -8.058$
88	101.1916	$88 - 101.1916 = -13.1916$
135	118.058	$135 - 118.058 = 16.942$



$$\frac{-11.1916 - 8.1916 - 8.058 - 13.1916}{4} = -10.1582$$

Price	Prediction $F_1(x)$	Residuals from tree	Prediction, $F_2(x) = F_1(x) + 0.4 \times \text{Res}$
130	118.058	11.992	$118.058 + 0.4 \times 11.992 = 122.8348$
90	101.1916	-10.1582	$101.1916 - 0.4 \times 10.1582 = 97.13$
93	101.1916	-10.1582	$101.1916 - 0.4 \times 10.1582 = 97.13$
128	116.258	11.792	$116.258 + 0.4 \times 11.792 = 120.95$
95	103.058	-10.1582	$103.058 - 0.4 \times 10.1582 = 98.99$
88	101.1916	-10.1582	$101.1916 - 0.4 \times 10.1582 = 97.128$
135	118.058	16.992	$118.058 + 0.4 \times 16.992 = 124.83$

Example : 03

Iteration 01:

Let ⇒ Predicted = Pre

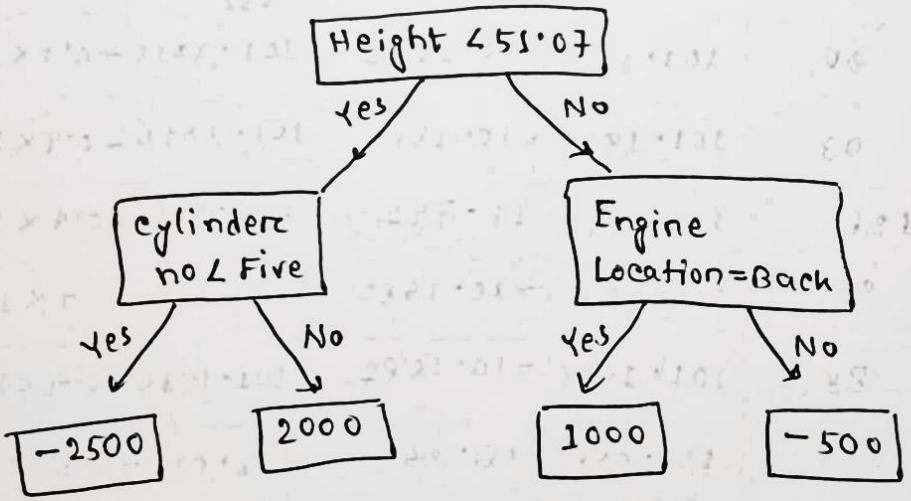
$(12000 - Pre) + (16500 - Pre) + (15500 - Pre) + (14000 - Pre) = 0$

$58000 - 4 \times Pre = 0$

$Pre = \frac{58000}{4}$

$= 14500$

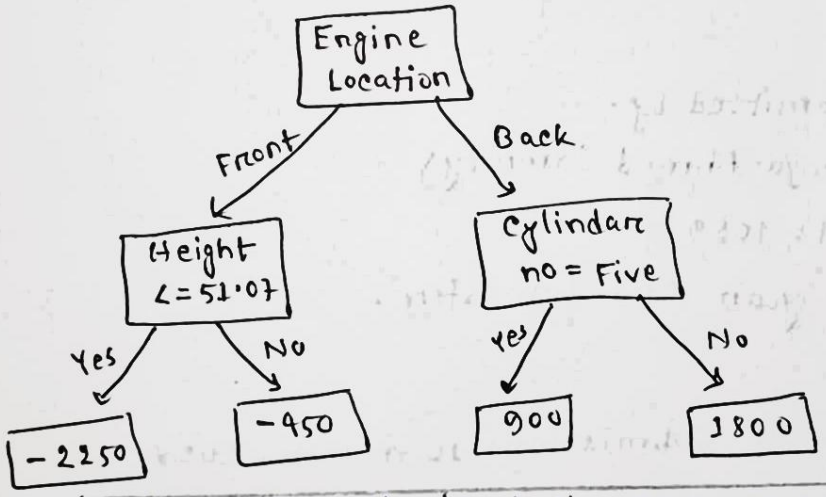
Row no.	Cylinder no	Car Height	Engine Location	Price	Initial Prediction	Residuals = Price - Initial
1	Four	48.8	Front	12000	14500	12000 - 14500 = - 2500
2	Six	48.8	Back	16500	14500	16500 - 14500 = 2000
3	Five	52.4	Back	15500	14500	15500 - 14500 = 1000
4	Four	54.3	Front	14000	14500	14000 - 14500 = - 500



Price	Initial Prediction	Residual	Residual from tree	Prediction, $F_1(x)$ = Initial x(0.1x Res)
12000	14500	-2500	-2500	14500 + 0.1 x (-2500) = 14250
16500	14500	2000	2000	14500 + (0.1 x 2000) = 14700
15500	14500	1000	1000	14500 + (0.1 x 1000) = 14600
14000	14500	-500	-500	14500 - (0.1 x 500) = 14450

2nd Iteration:

Price	Prediction, $F_1(x)$	Residuals = observed - $F_1(x)$
12000	14250	12000 - 14250 = -2250
16500	14700	16500 - 14700 = 1800
15500	14600	15500 - 14600 = 900
14000	14450	14000 - 14450 = -450



Price	Prediction $F_1(x)$	Residuals from Tree	Prediction, $F_2(x) = F_1(x) + (0.1 \times \text{Residual})$
12000	14250	-2250	14250 - (0.1 x 2250) = 14025
16500	14700	1800	14700 + (0.1 x 1800) = 14880
15500	14600	900	14600 + (0.1 x 900) = 14690
14000	14450	-450	14450 - (0.1 x 450) = 14405

THE END