

$$f^2 \alpha_1(\text{model}_1) + \alpha_2(\text{model}_2) + \alpha_3(\text{model}_3) + \dots + \alpha_n(\text{model}_n)$$

Step 1: ^{Creating Decision Tree splits} entropy or Gini calculate

Step 2: Initial sample weight.

Step 3: Calculating total error & performance.

TE \rightarrow sum of weights

$$\text{Performance} = \frac{1}{2} \log(1 - \text{total error}) / \text{total error}$$

$$\alpha_1 = \frac{1}{2} \ln \left(\frac{1 - \text{total error}}{\text{total error}} \right)$$

Step 4: Updating weights for the Next model.

Classification correct

$$\text{New weight} = \text{weight} \times e^{-\alpha}$$

Incorrect classification

$$\text{New weight} = \text{weight} \times e^{\alpha}$$

Step 5: Normalization and Data Selection

$$\text{normalize correct} = \frac{\text{update weight (correct)}}{\text{sum.}}$$

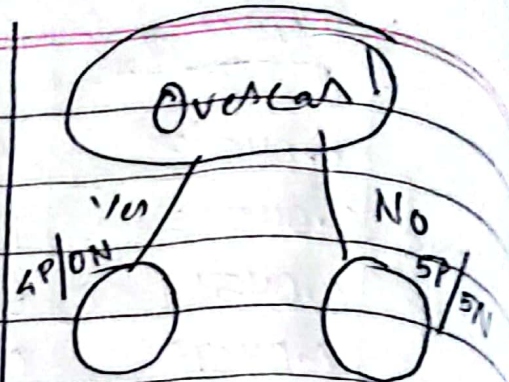
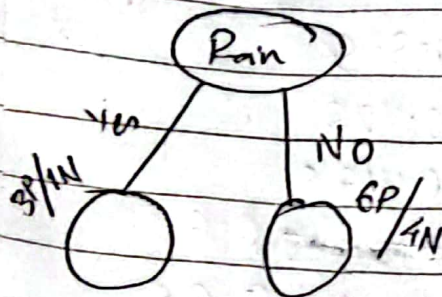
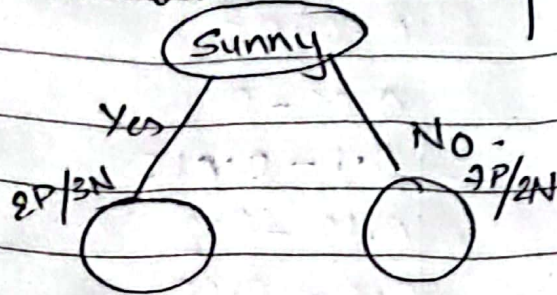
$$\text{normalize incorrect} = \frac{\text{update weight (incorrect)}}{\text{sum.}}$$

bin = ?

Final step.

randomly bin choose and send to model.

Step 1: Decision tree Strung



Step 2: Initial sample weight $\Rightarrow 1/14$.

Step 3: Calculate total error & performance.

TE \rightarrow sum of weights: $1/14 + 1/14 + 1/14 + 1/14 = 2/7$

Performance =

$$\epsilon_1 = \frac{1}{2} \ln \left(\frac{1 - 2/7}{2/7} \right) \Rightarrow 0.4581$$

Step 4: Updating weight for next model.

Classification correct

$$\begin{aligned} \text{New weight} &= \text{weight} \times e^{-\epsilon} \\ &= \frac{1}{14} \times e^{-0.4581} \\ &= 0.04517 \end{aligned}$$

$$\begin{aligned} \text{New weight} &= \text{weight} \times e^{\epsilon} \\ &= \frac{1}{14} \times e^{0.4581} \\ &= 0.1129 \end{aligned}$$

$$\text{sum} = 10 \times 0.04517 + 4 \times 0.1129 \\ = 0.9033$$

$$\text{correct} \rightarrow 10 \\ \text{incorrect} = 4$$

$$\text{Normalize correct} = \frac{0.04517}{0.9033} = 0.050$$

$$\text{Incorrect} = \frac{0.1129}{0.9033} = 0.1249$$

Step 1: Creating Decision Tree "Stumps".

Entropy, Gini Impurity or Information Gain

Outlook	Temperature	Humidity	Windy	Class	prob.
1 Sunny	Hot	high	false	N	1/14
2 Sunny	hot	high	true	N	1/14
3 Overcast	hot	high	false	P.	1/14
4 rain	mild	high	false	P.	1/14
5 rain.	cool	normal	false	P.	1/14
6 rain	cool	normal	true	N.	1/14
7 Overcast	cool	normal	false true	P.	1/14
8 sunny	mild	high	false	N	1/14
9 X sunny	cool	normal	false	P	1/14
10 rain.	mild	normal	false	P	1/14
11 X sunny	mild	normal	true	P	1/14
12 Overcast	mild	high	true	P	1/14
13 Overcast	hot	normal	false	P	1/14
14 X rain	mild	high	true	N	1/14

$$\text{Normalize correct} = \frac{0.04517}{0.9033} = 0.05$$

$$\text{Incorrect} = \frac{0.1129}{0.9033} = 0.1249$$

sw.	Opated. weight normalize	Normalize.	Bin.
✓ 1/14	0.04517	0.05	0 - 0.05
✓ 1/14	0.04517	0.05	0.05 - 0.1
✓ 1/14	0.04517	0.05	0.1 - 0.15
✓ 1/14	0.04517	0.05	0.15 - 0.2
✓ 1/14	0.04517	0.05	0.2 - 0.25
✗ 1/14	0.1129	0.125	0.25 - 0.375
✓ 1/14	0.04517	0.05	0.375 - 0.425
✓ 1/14	0.04517	0.05	0.425 - 0.475
✗ 1/14	0.1129	0.12495	0.475 - 0.5999 0.6
✓ 1/14	0.04517	0.05	0.6999 - 0.6 - 0.65
✗ 1/14	0.1129	0.12495	0.65 - 0.775
✓ 1/14	0.04517	0.05	0.775 - 0.825
✓ 1/14	0.04517	0.05	0.825 - 0.875
✗ 1/14	0.1129	0.12495	0.875 - 1

1/11