

Adaboost → Sequential Learning

Adaptive

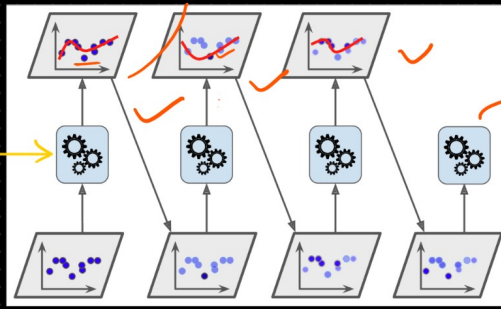
Boosting
Algorithm

Final model

Strong learners

(Combination of various
Weak learners)

DT_1



Training Set

$$\frac{1}{\text{num_records}} = \frac{1}{5} = 0.2$$

→ $m_1(DT_1)$

	f_1	f_2	y	wt	\hat{y}	updated-wt	normalized
①	1	2	1	0.2	1	0.16	0.166
②	2	3	0	0.2*	1	0.24	0.25
③	3	7	1	0.2*	0	0.24	0.25
④	2	9	0	0.2	0	0.16	0.166
⑤	9	8	0	0.2	0	0.16	0.166
						0.96	1.00

$$\text{Error} = 0.2 + 0.2 = 0.4$$

Misclassification data points

Higher weightage
as compared to the
correctly classified
data points.

Decision Stumps

→ max_depth = 1

$$\alpha_1 = \frac{1}{2} \ln \left(\frac{1 - 0.4}{0.4} \right) = \underline{\underline{0.20}}$$

$\alpha \rightarrow$

(Model's say)

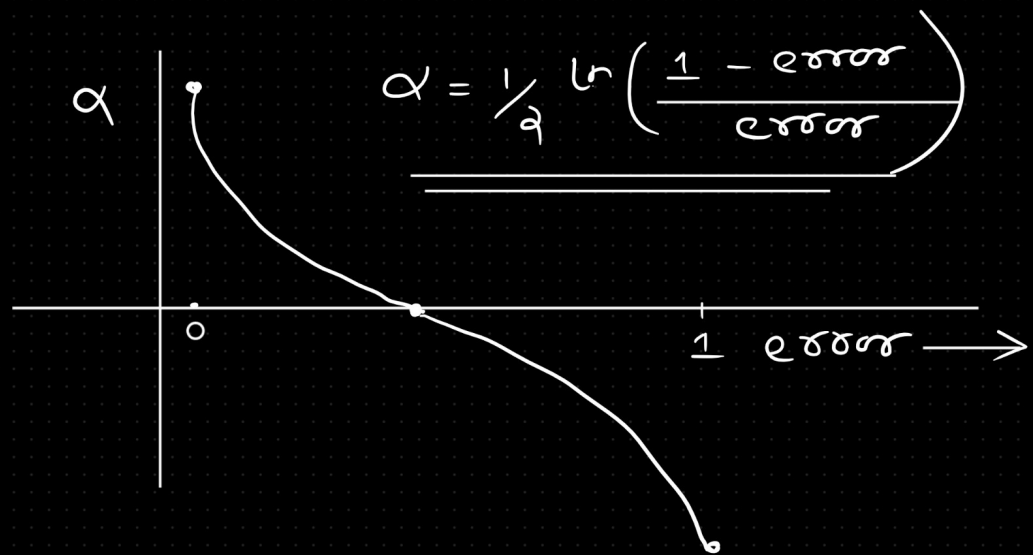
$\alpha \uparrow \uparrow$

error(M₁) → 0%

dangerous ← error(M₂) → 50%

situation → error(M₃) → 100%

$\alpha \downarrow \downarrow$



Misclassification → Higher
 $0.2 * e^{0.2} = 0.24$

$$\text{updated_wt} = \text{curr_wt} * e^{\alpha_1}$$

correctly classified

$$\begin{aligned} \text{updated_wt} &= \text{curr_wt} * e^{-\alpha_1} \\ &= 0.2 * e^{-0.2} = 0.16 \end{aligned}$$

Cum. range	
①	0 - 0.166
②	0.166 - 0.416
③	0.416 - 0.666
④	0.666 - 0.832
⑤	0.832 - 1.0

Random (0 & 1)

misclassified

points

0.13	1 ✓
0.43	3 ✓
0.47	3
0.74	4 ✓
0.80	4

Range

is higher

weight * e^{α}

misclassified

correctly

wt * $e^{-\alpha}$

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

update weight

misclassified points

Addition of

Weights \rightarrow Error

initialization = $\frac{1}{\text{num_records}}$

num_records

High sample (2, 3)

DT₂

Train set

misclassified point

Probability of

having misclassified range will be higher

\hat{y}

y

DT₁

weight

Train set

