Ex: Boosting Round 1:

x	0.1	0.4	0.5	0.6	0.6	0.7	0.7	0.7	0.8	1
y	1	-1	-1	-1	-1	-1	-1	-1	1	1

Boosting Round 2:

x	0.1	0.1	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3
y	1	1	1	1	1	1	1	1	1	1

Boosting Round 3:

x	0.2	0.2	0.4	0.4	0.4	0.4	0.5	0.6	0.6	0.7
y	1	1	-1	-1	-1	-1	-1	-1	-1	-1

Weights of the training records.

Round	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2	0.311	0.311	0.311	0.01	0.01	0.01	0.01	0.01	0.01	0.01
3	0.029	0.029	0.029	0.228	0.228	0.228	0.228	0.009	0.009	0.009

Decision stump is the base classifier.

Round	Split point	Left class	Right class	α
1	0.75	-1	1	1.738
2	0.05	1	1	2.7784
3	0.3	1	-1	4.1195

Details of Round 1:-

Original training set:-

x	y	wt	P(x)	
0.1	1	0.1	-1	x
0.2	1	0.1	-1	x
0.3	1	0.1	-1	x
0.4	-1	0.1	-1	
0.5	-1	0.1	-1	
0.6	-1	0.1	-1	
0.7	-1	0.1	-1	
0.8	+1	0.1	1	
0.9	1	0.1	1	
1	1	0.1	1	

$\therefore$ 3 wrong predictions

$\therefore$

$$\varepsilon_i = \frac{1}{10}\left[3 \times 0.1\right]$$

$$= 0.03$$

$$\alpha_i = \frac{1}{2}\ln\left(\frac{1-0.03}{0.03}\right)$$

$$= \frac{1}{2}\ln(32.33)$$

$$= \frac{1}{2} \times 3.48$$

$$= \boxed{1.738}$$

wt updation:

$\alpha = 1.738$

$\exp(1.738) = 5.69$

x	WP/CP	old wt	New wt =	Normal wt
0.1	X	0.1	0.1 × 5.69	0.311
0.2	X	0.1	0.1 × 5.69	
0.3	X	0.1	0.1 × 5.69	
0.4	✓	0.1	0.1 × 0.176	0.01
0.5	✓	0.1	0.1 × 0.176	
0.6	✓	0.1	0.1 × 0.176	
0.7	✓	0.1	"	
0.8	✓	0.1	"	
0.9	✓	0.1	"	
1	✓	0.1	"	

0.569

0.0176 = 0.02

α	Exp(α)	Exp($-\alpha$)
1.738	5.69	0.17587

Normalizing the wts:

Sum of the wts. $3 \times 0.569 + 7 \times 0.0176$

$= 1.707 + 0.1232$

$= 1.8302$

Divide each wt by the sum of wts.

Combining classifiers

Round	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
1	-1	-1	-1	-1	-1	-1	-1	1	1	1
2	1	1	1	1	1	1	1	1	1	1
3	1	1	1	-1	-1	-1	-1	-1	-1	-1
Sum	5.16	5.16	5.16	-3.08	-3.08	-3.08 →		0.397 →		
Sign	1	1	1	-1	-1	-1	-1	1	1	1