vectors

```
A  1 1 0 0
B  0 0 0 1
C  1 0 0 0
D  0 0 1 1
```

Learning Rate α

$\alpha(0) = 0.6$

$\alpha(t+1) = 0.5 \times \alpha(t)$ (or)

$\alpha(t) = 0.5 \times \alpha(t-1)$

unit (aka neuron) weights: (randomly init)

```
unit1  0.2  0.6  0.5  0.9
unit2  0.8  0.4  0.7  0.3
```

Learning Rate α

at t = 0:

$\alpha(0) = 0.6$

at t = 1:

$\alpha(1) = 0.5 \times \alpha(t-1)$

$\alpha(1) = 0.5 \times \alpha(1-1)$

$\alpha(1) = 0.5 \times \alpha(0)$

$\alpha(1) = 0.5 \times 0.6$

$\alpha(1) = 0.3$

Calculating vector A BMU

Vector A	1	1	0	0
unit1	0.2	0.6	0.5	0.9
unit2	0.8	0.4	0.7	0.3

D(1) = euclidean distance to unit 1

$$D(1) = (0.2 - 1)^2 + (0.6 - 1)^2 + (0.5 - 0)^2 + (0.9 - 0)^2$$

$$D(1) = 1.86$$

D(2) = euclidean distance to unit 2

$$D(2) = (0.8 - 1)^2 + (0.4 - 1)^2 + (0.7 - 0)^2 + (0.3 - 0)^2$$

$$D(2) = 0.98$$

$D(2) < D(1)$: Unit 2 is winning unit (BMU = Best Matching Unit)

Updating weight of unit 2 (t=0)

Vector A	1	1	0	0
unit2	0.8	0.4	0.7	0.3

Learning Rate $\alpha(0)$ = 0.6

$$
\begin{aligned}
w_{i2}(new) &= w_{i2}(old) + \alpha[x_i - w_{i2}(old)] \\
&= w_{i2}(old) + 0.6[x_i - w_{i2}(old)] \\
&= w_{i2}(old) + 0.6[x_i] - 0.6[w_{i2}(old)] \\
&= [w_{i2}(old) - 0.6[w_{i2}(old)]] + 0.6[x_i] \\
&= [0.4w_{i2}(old)] + 0.6[x_i]
\end{aligned}
$$

Vector A 1 1 0 0

Updating weight of unit 2 (t=0)

unit2 0.8 0.4 0.7 0.3

Learning Rate $\alpha(0) = 0.6$

$$w_{i2}(new) = 0.4w_{i2}(old) + 0.6x_i$$

$$= 0.4(0.8) + 0.6(1)$$

$$0.4(0.4) + 0.6(1)$$

$$0.4(0.7) + 0.6(0)$$

$$0.4(0.3) + 0.6(0)$$

unit2(updated weights):

= 0.92 0.76 0.28 0.12