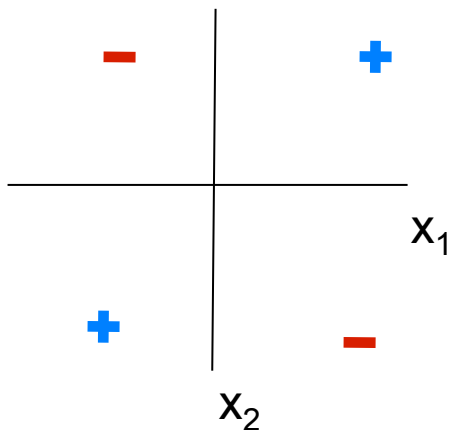


- set  $a^i=0$  for each example  $i$
- For  $t=1..T, i=1..n$ :
  - $y = \text{sign}(\sum_k a^k K(x^k, x^i))$
  - if  $y \neq y^i$ 
    - $a^i += y^i$

$x_1$	$x_2$	$y$
1	1	1
-1	1	-1
-1	-1	1
1	-1	-1



$K(u,v) = (u \bullet v)^2$   
 e.g.,  
 $K(x^1, x^2)$   
 $= K([1,1], [-1,1])$   
 $= (1 \times -1 + 1 \times 1)^2$   
 $= 0$

$K$	$x^1$	$x^2$	$x^3$	$x^4$
$x^1$	4	0	4	0
$x^2$	0	4	0	4
$x^3$	4	0	4	0
$x^4$	0	4	0	4

Initial:

- $a = [a^1, a^2, a^3, a^4] = [0,0,0,0]$

$t=1, i=1$

- $\sum_k a^k K(x^k, x^1) = 0 \times 4 + 0 \times 0 + 0 \times 4 + 0 \times 0 = 0$ ,  $\text{sign}(0) = -1$
- $a^1 += y^1 \rightarrow a^1 += 1$ , new  $a = [1,0,0,0]$

$t=1, i=2$

- $\sum_k a^k K(x^k, x^2) = 1 \times 0 + 0 \times 4 + 0 \times 0 + 0 \times 4 = 0$ ,  $\text{sign}(0) = -1$

$t=1, i=3$

- $\sum_k a^k K(x^k, x^3) = 1 \times 4 + 0 \times 0 + 0 \times 4 + 0 \times 0 = 4$ ,  $\text{sign}(4) = 1$

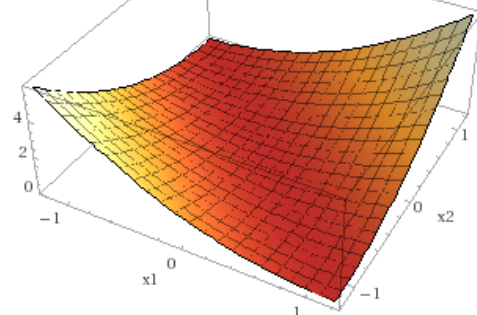
$t=1, i=4$

- $\sum_k a^k K(x^k, x^4) = 1 \times 0 + 0 \times 4 + 0 \times 0 + 0 \times 4 = 0$ ,  $\text{sign}(0) = -1$

$t=2, i=1$

- $\sum_k a^k K(x^k, x^1) = 1 \times 4 + 0 \times 0 + 0 \times 4 + 0 \times 0 = 4$ ,  $\text{sign}(4) = 1$

...



Converged!!!

- $y = \sum_k a^k K(x^k, x)$   
 $= 1 \times K(x^1, x) + 0 \times K(x^2, x) + 0 \times K(x^3, x) + 0 \times K(x^4, x)$   
 $= K(x^1, x)$   
 $= K([1,1], x)$  (because  $x^1 = [1,1]$ )  
 $= (x_1 + x_2)^2$  (because  $K(u,v) = (u \bullet v)^2$ )