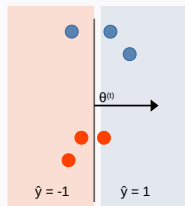
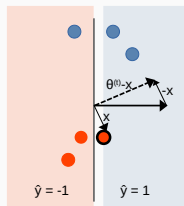


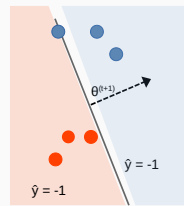
## Binary classification



Parameter vector  $\theta$  at time  $t$   
Orthogonal to decision  
boundary



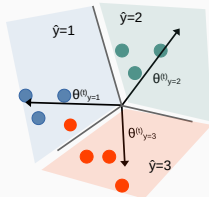
Update  $\theta \leftarrow \theta - x$  for  
Misclassified data point  
(bold)



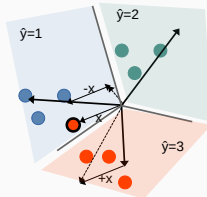
New parameter vector  $\theta$   
and decision boundary  
at time  $t+1$

# Geometrical interpretation

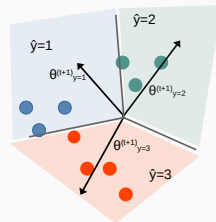
## Multi-class classification ( $K=3$ )



3 class problem, with three  
Class-specific parameter  
vectors



**Add  $x$  to weights of true class  $y$  (red)**  
**Subtract  $x$  from weights of  
predicted  $\hat{y}$  (blue)**



New parameter vectors  
and decision boundaries  
At time  $t+1$