Perceptron

For input $x = (x_1, x_2, x_3, .., x_n)$ 'attributes of a house'

$$\textit{House is costly if } \sum_{i=1}^{n} w_i x_i \geq \textit{threshold},$$

$$\textit{House is costly if } \sum_{i=1}^{n} w_i x_i < \textit{threshold}$$

This function can be re-written as:

$$h(x) = \textit{sign}\left(\left(\sum_{i=1}^{n} w_i x_i\right) - \textit{threshold}\right)$$

$$h(x) = sign\left(\left(\sum_{i=1}^{n} w_i x_i\right) + w_0\right)$$

Introduce an artificial coordinate $x_0 = 1$:

$$h(x) = sign\left(\sum_{i=0}^{n} w_i x_i\right)$$

Vector form

$$h(x) = sign(w^T x)$$

Perceptron Learning Algorithm

Given the training set:

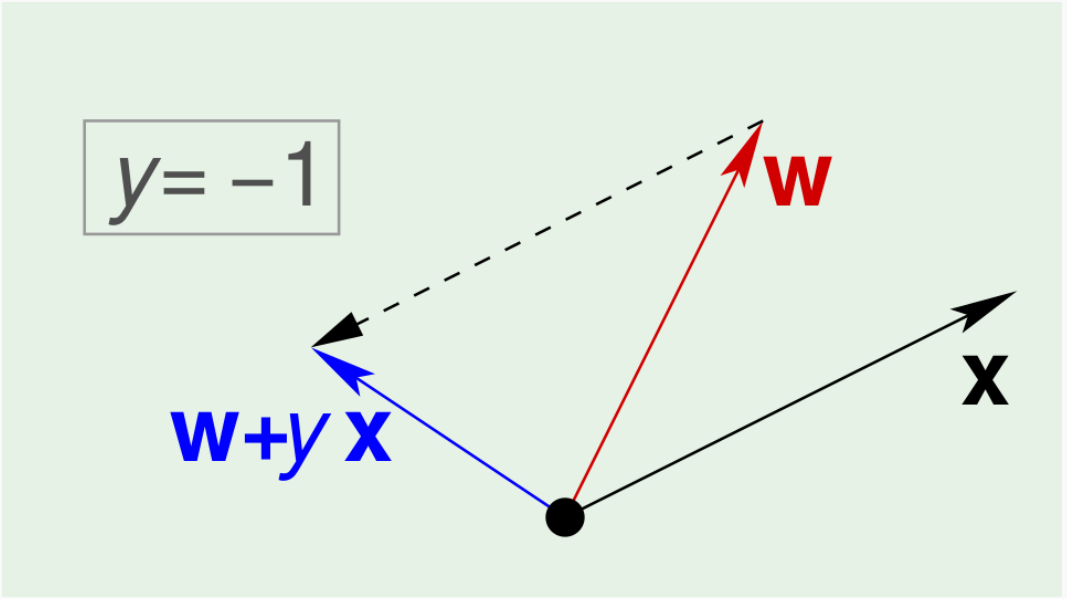
$$(x_1, y_1), (x_2, y_2), (x_3, y_3), ..., (x_n, y_n)$$

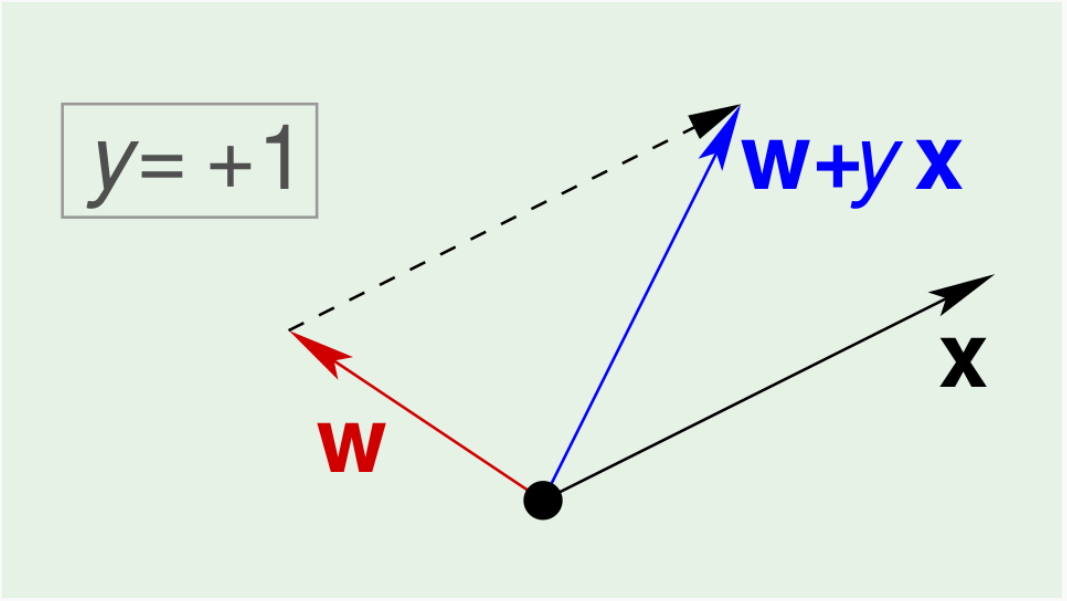
Pick a misclassified point:

$$sign(w^T x_k) \neq y_k$$

and update weight vector as

$$w \leftarrow w + y_k x_k$$


y= −1
w
x
w+y x


y= +1
w+y x
x
w