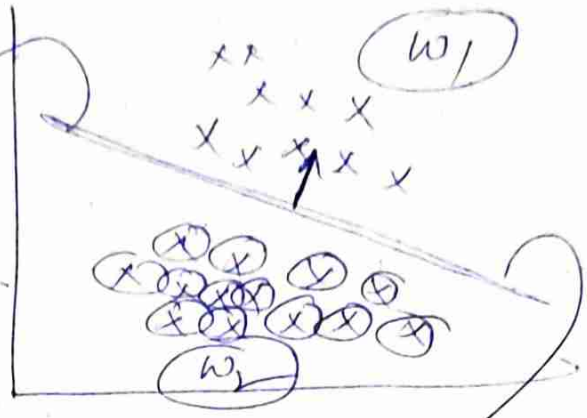
Linear classifier



$ax_1 + bx_2 + c = 0$

in 2D space

$a_1x_1 + a_2x_2 + a_3x_3 + \dots + k = 0$

$a^t y$

$w^T x + w_0 > 0$ $\quad w^T x + w_0 = 0$

$w^T x + w_0 < 0$ $\rightarrow x \in w_1$

$\rightarrow x \in w_2$

$a^t = \{ w_1, w_2, w_3, \dots, w_n, w_0 \}$

$y = \begin{Bmatrix} x_1 \\ x_2 \\ \vdots \\ x_n \\ 1 \end{Bmatrix}$

$a^t y > 0 \rightarrow y \in w_1$

$a^t y < 0 \rightarrow y \in w_2$

lets take for $w_2 \rightarrow$ replace y by $-y$

then $a^t y > 0$ even for w_2

so $a^t y > 0$.

if $a^t y < 0$

then a needs to be modified.

$\rightarrow \Sigma - a^t y$

error term.

$J = \Sigma - a^t y$

$\forall y$ (miss classified)

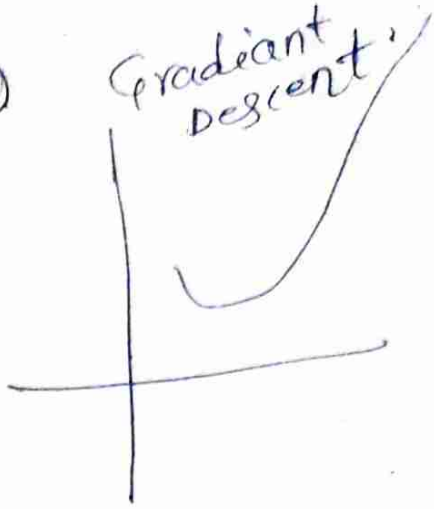
collect sum

$a(0) \leftarrow 0$

$a(k) \leftarrow a(k-1)$

↳ try to reduce $J(a)$

Gradient Descent:



$J(a) = \sum -a^t y$

↓ minimize

$\frac{\partial J}{\partial a} = \sum -y$

$+y$ misclassified

$a(0) \leftarrow$ arbitarily

$a(k+1) = a(k) - \eta \sum -y$

$a(k+1) = a(k) + \eta \sum y$

$\frac{\partial J}{\partial x} = 0$