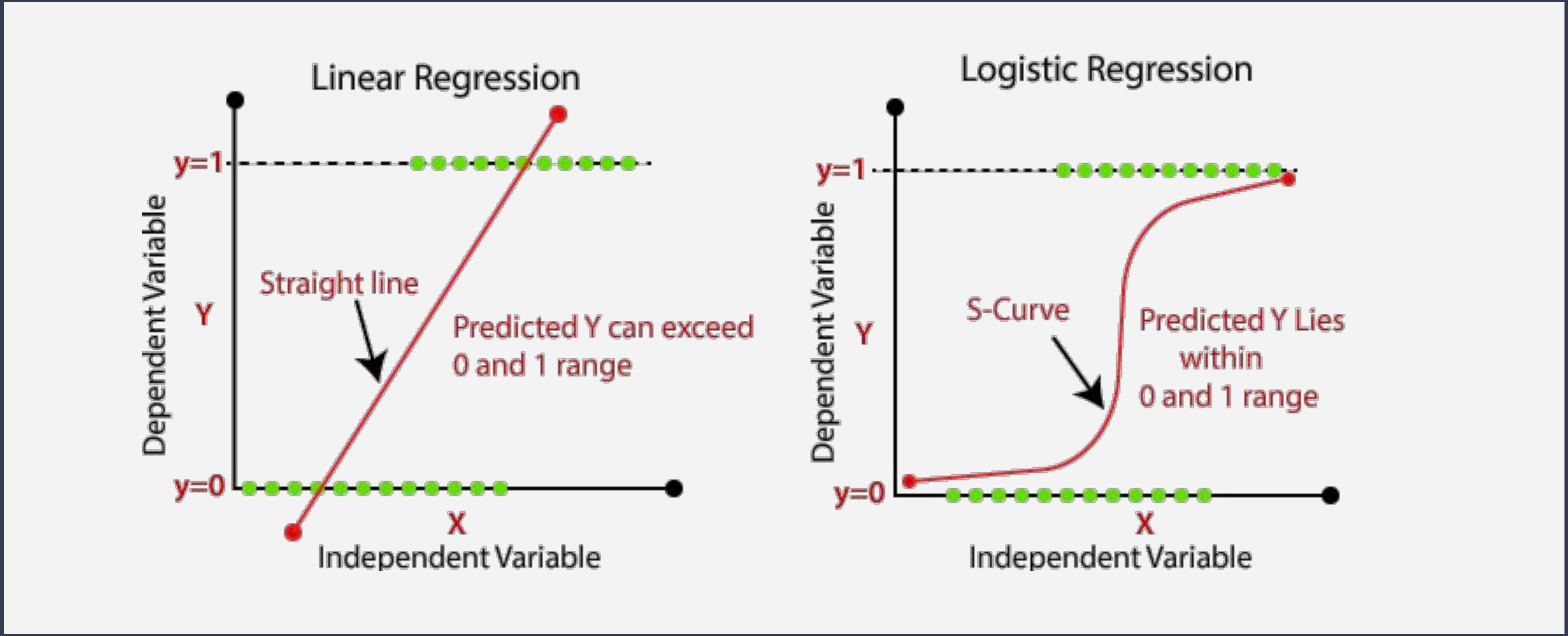
Logístic Regresion



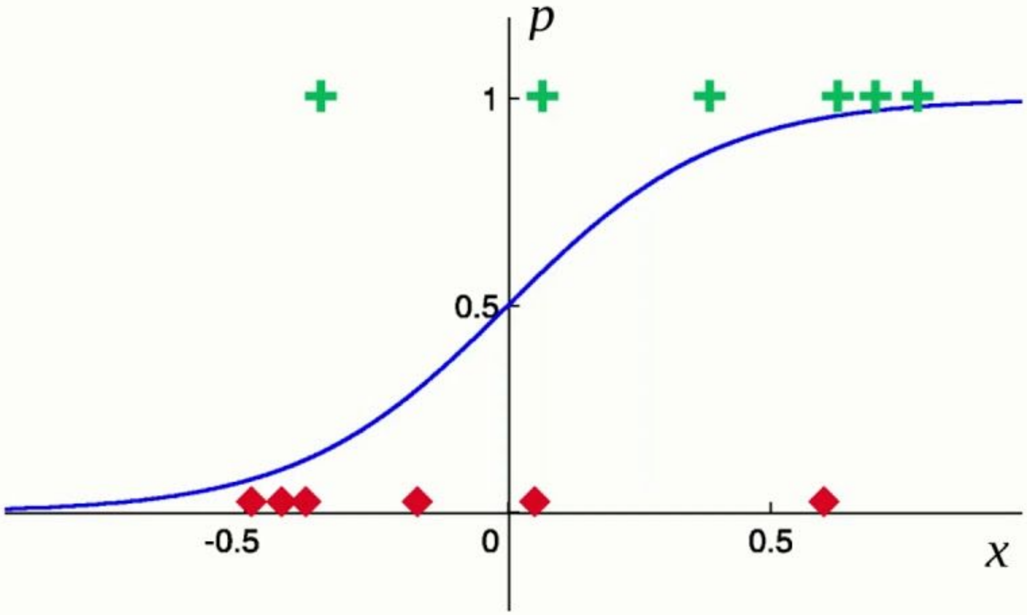
REGRESIÓN LOGÍSTICA

INTERPRETACIÓN

$$\log \frac{p}{1-p} = \beta_0 + \beta_1 x$$

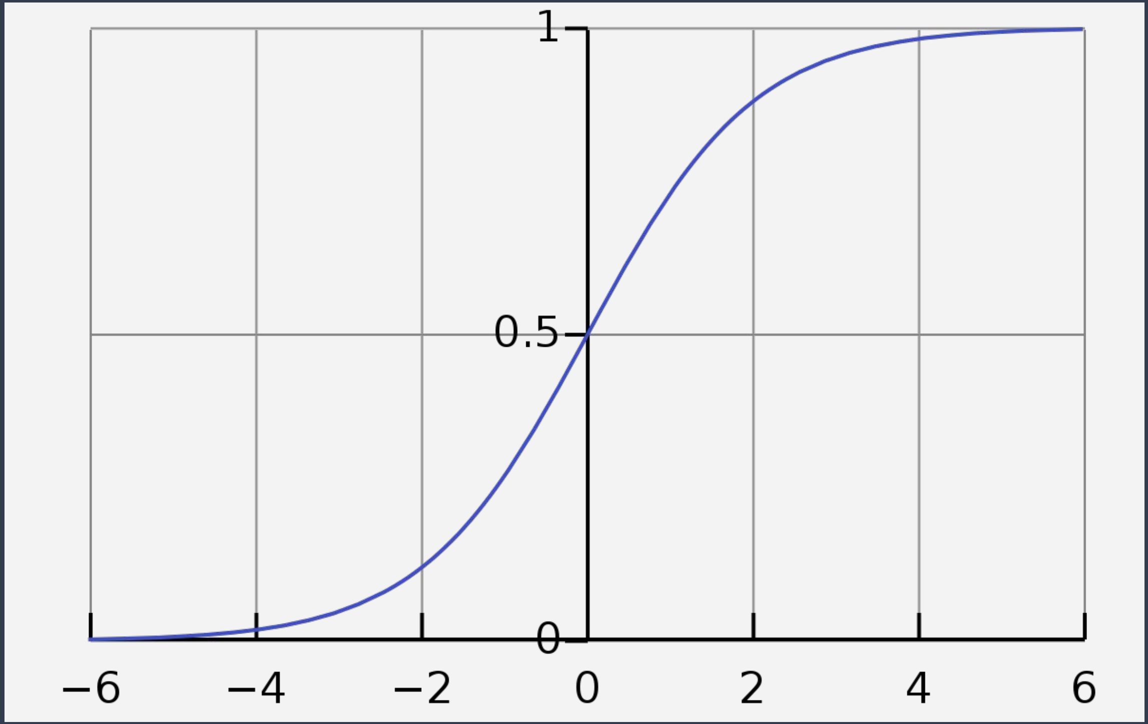
$$\downarrow$$

$$p = \frac{1}{1+e^{-(\beta_0+\beta_1 x)}}$$



Logístic Regresion

Enlace artículo Logística



$$Q(t) = \frac{1}{1+e^{-t}}$$

$$h(x) = \frac{1}{1+e^{-\theta^T x}}$$

Logístic Regresion

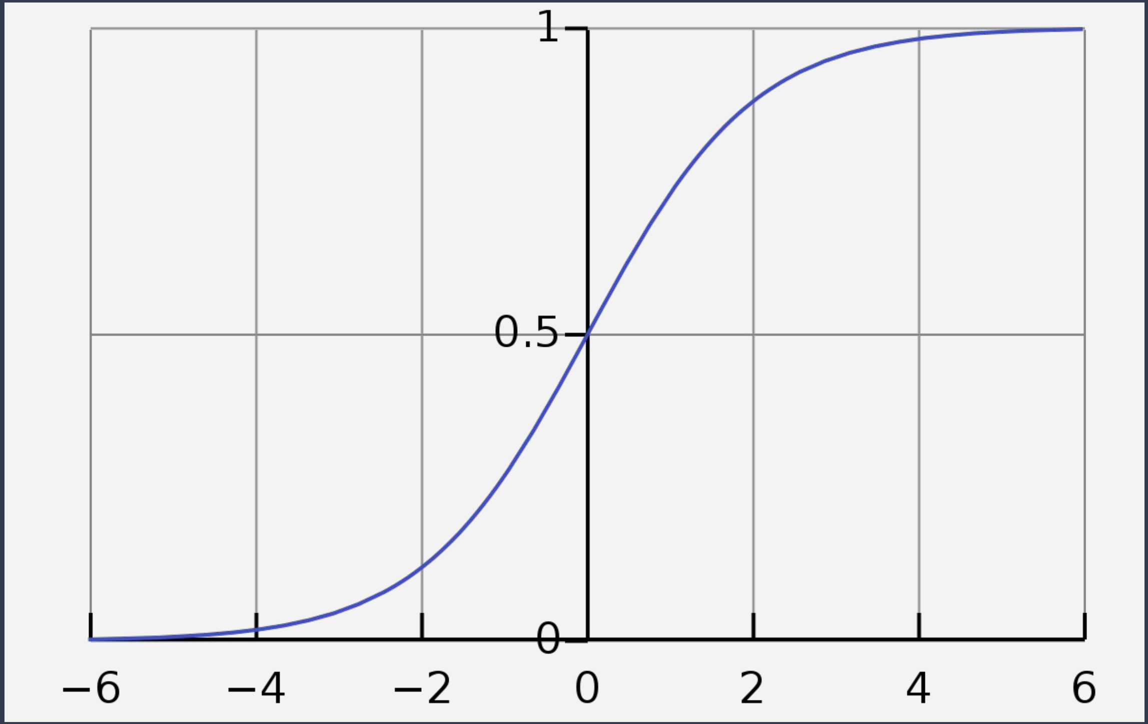
Enlace artículo Logística

$$\frac{1}{1+e^{-(\beta_0+\beta_1 X)}}$$

$$P = \frac{1}{1+e^{-(-.5596+1.2528X)}}$$

Logístic Regresion

Enlace artículo Logística



$$Q(t) = \frac{1}{1 + e^{-t}}$$

$$h(x) = \frac{1}{1 + e^{-\theta^T x}}$$

Logistic Regression- Cost function

$$h(x) = \frac{1}{1 + e^{-\theta^T x}}$$

$$h(x) = \begin{cases} > 0.5, & \text{if } \theta^T x > 0 \\ < 0.5, & \text{if } \theta^T x < 0 \end{cases}$$

$$cost = \begin{cases} -log(h(x), & \text{if } y = 1 \\ -log(1 - h(x)), & \text{if } y = 0 \end{cases}$$

$$cost(h(x), y) = -ylog(h(x)) - (1 - y)log(1 - h(x))$$

Cost Function

$$J(\theta) = -\frac{1}{m}\sum_{i=1}^{m}[y^i log(h(x^i)) + (1 - y^i)log(1 - h(x^i))]$$

Gradient

$$\frac{\partial J(\theta)}{\partial \theta_j} = \frac{1}{m}\sum_{i=1}^{m}(h(x^i) - y^i)\ x_j^i$$

Multi classification problem

- First each class is separated in columns as a binary columns
- 1 if the row belongs to this class
- 0 otherwise

$$\hat{p}^*_\ell = \frac{e^{\hat{y}_\ell}}{\sum_{l=1}^{C} e^{\hat{y}_l}}$$