

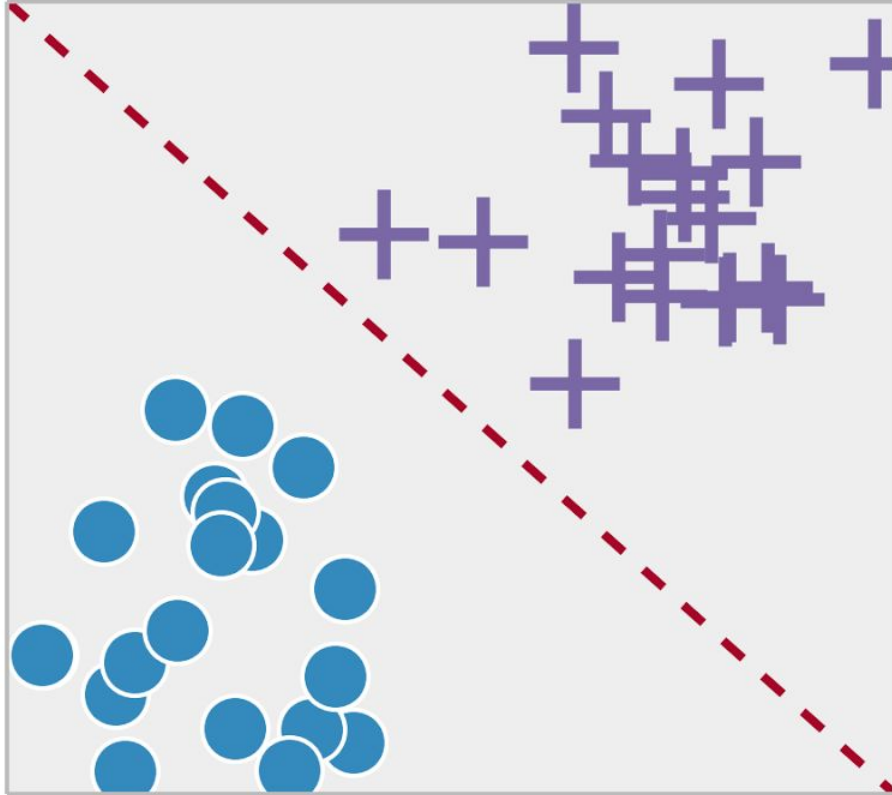
# Classification

A 10 minute crash-course

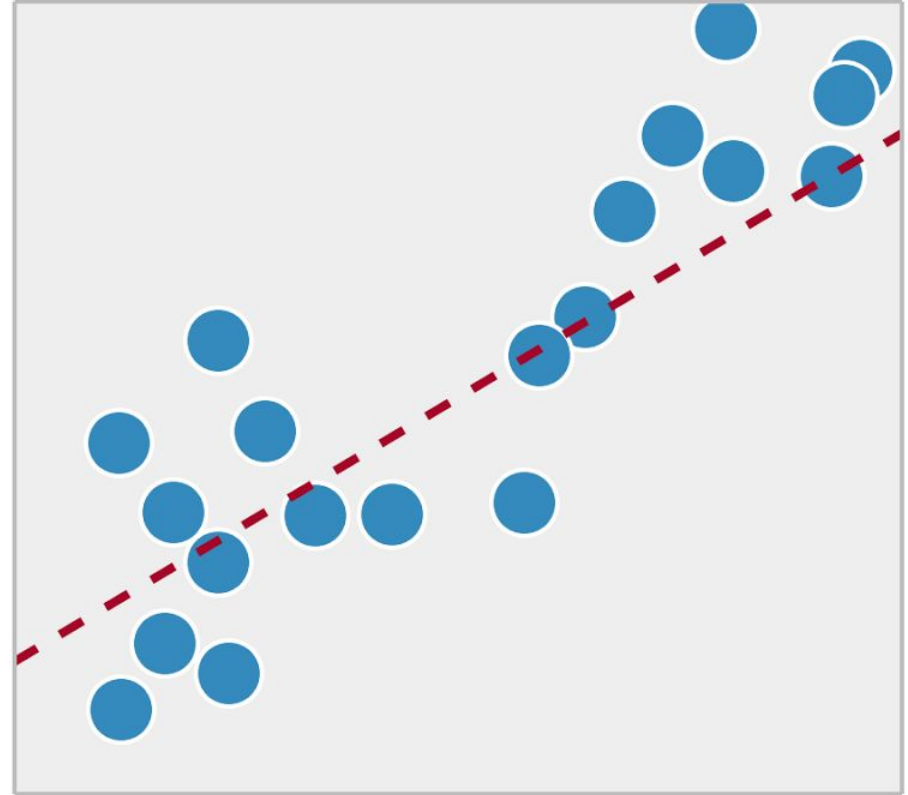
What is it?



## Classification



## Regression



# Methods:

## Perceptron:

Rosenblatt, F. (1958). The perceptron: a probabilistic model for information storage and organization in the brain. *Psychological review*, 65(6), 386.

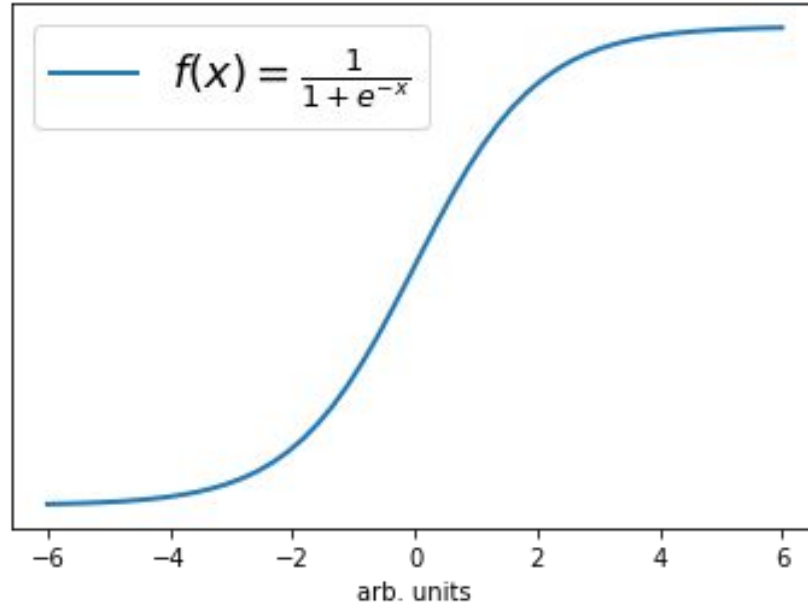
$$f(x) = \begin{cases} 1 & \text{if } \mathbf{x}^T \mathbf{w} > 0 \\ 0 & \text{otherwise} \end{cases}$$

## Logistic Regression:

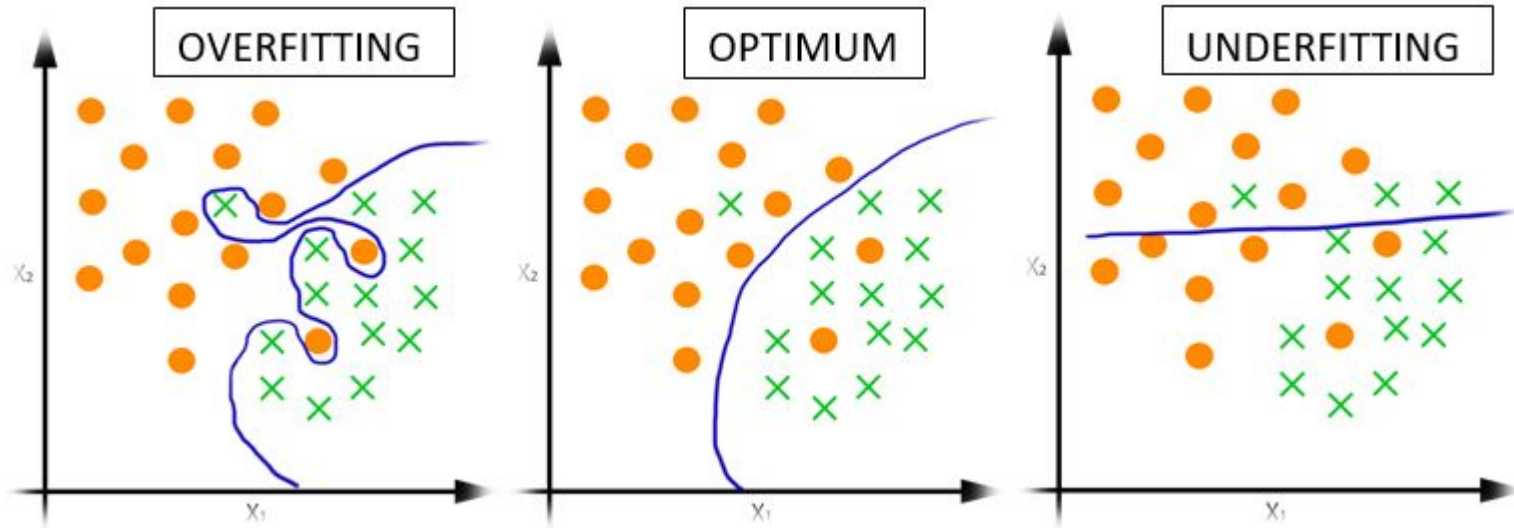
$$P(y_i = 1 | \mathbf{x}_i; \mathbf{w}, b) = \frac{1}{1 + e^{-(\mathbf{x}^T \mathbf{w} + b)}}$$

# The logistic sigmoid function

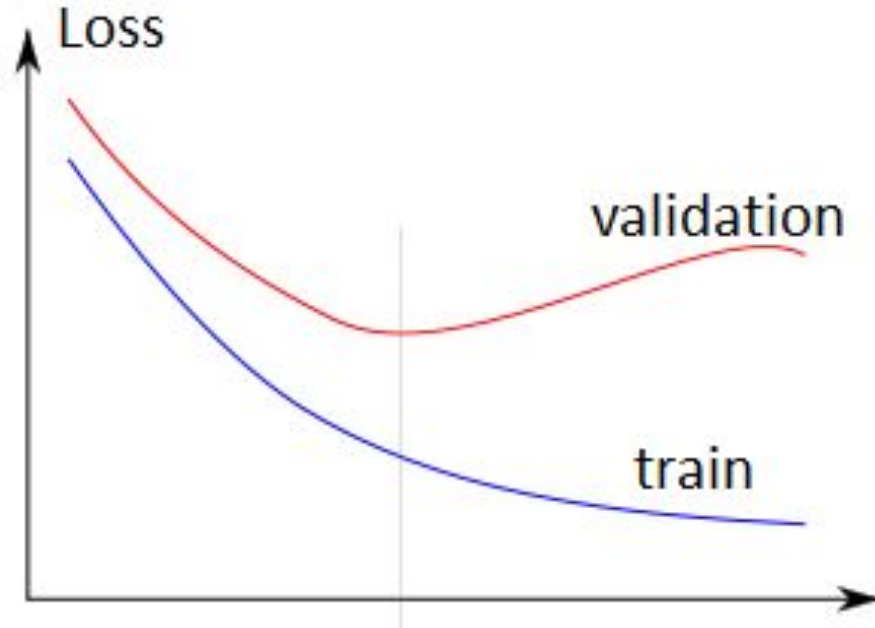
A figure showing a sigmoid function of one variable



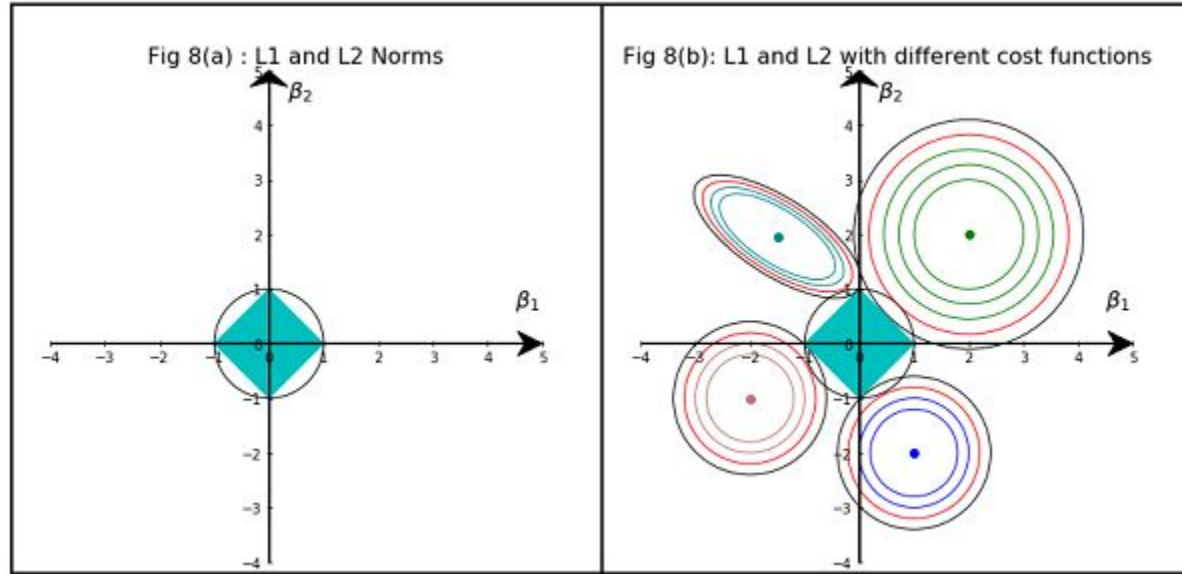
# Overfitting



# Overfitting 2



# Regularization





# Training, Validation and you

$$\mathbf{X}_{fit} \cap \mathbf{X}_{test} = \emptyset$$

Fitting and test set have zero intersection

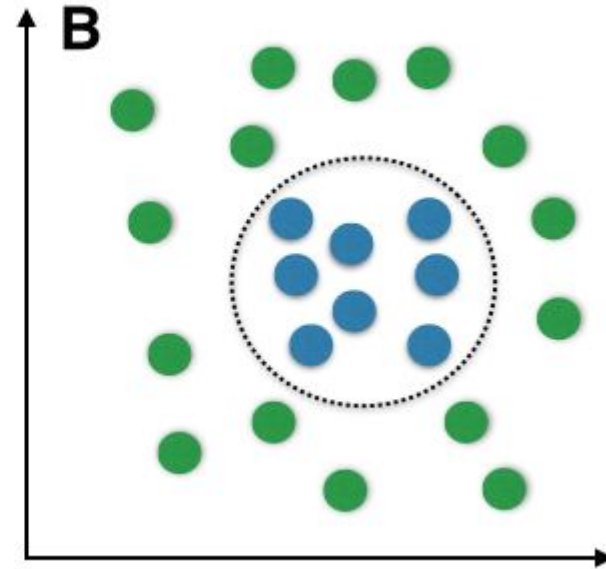
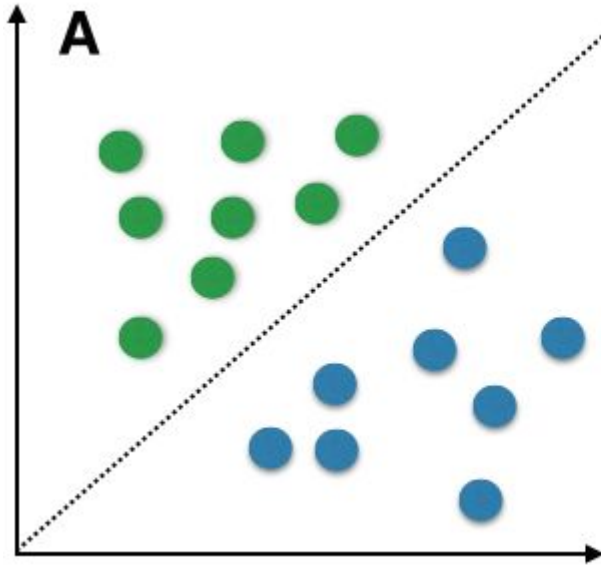
$$\mathbf{X}_{train} \subset \mathbf{X}_{fit}$$

$$\mathbf{X}_{val} \subset \mathbf{X}_{fit}$$

$$\mathbf{X}_{train} \cap \mathbf{X}_{val} = \emptyset$$

The fitting set is split in training and validation, these also have zero intersection

# Nonlinear classification



# Receiver Operator Characteristic curve

