# PERCEPTRON
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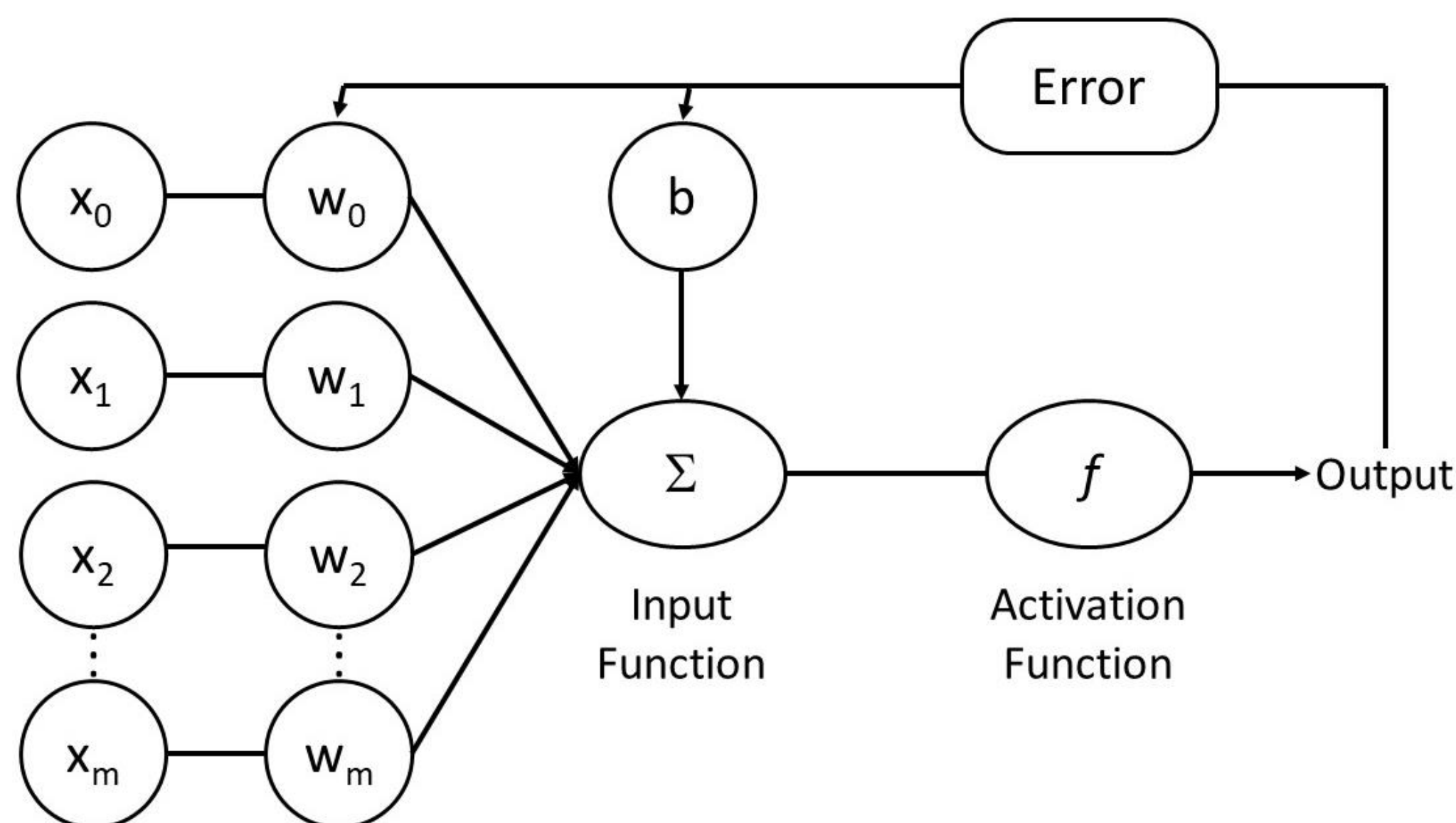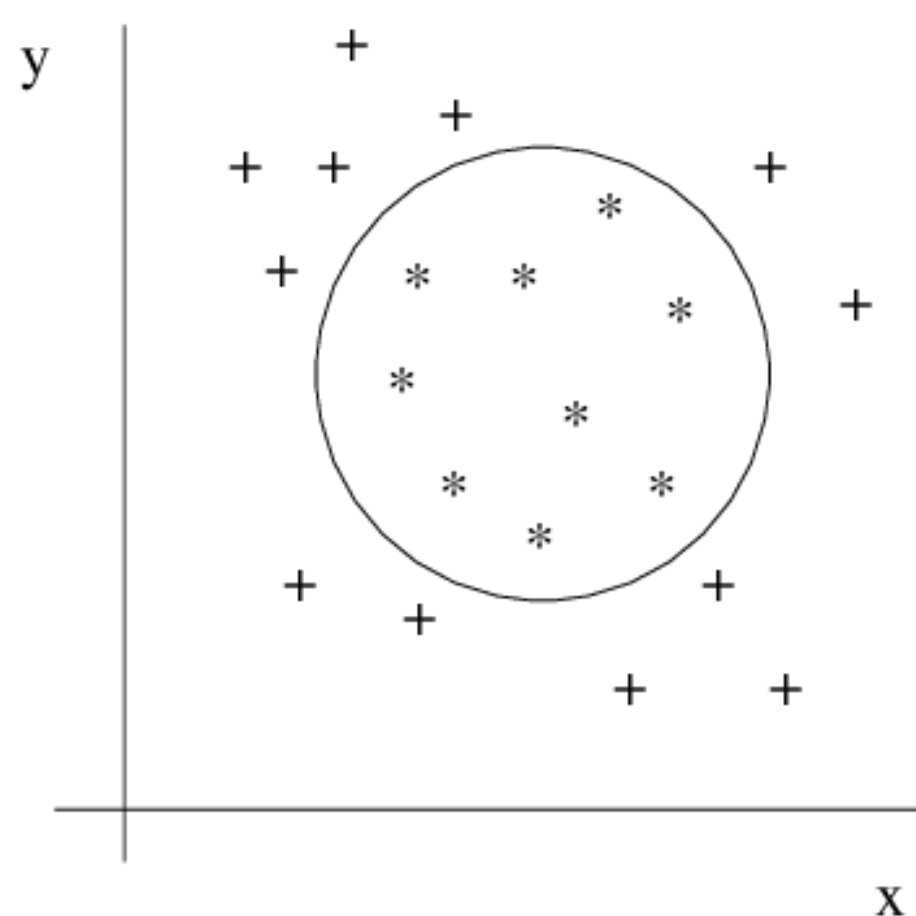## CS460: Machine Learning

- Inspired from Biological Neurons
- First proposed by Warren McCulloch and Walter Pitts in 1943
- First developed by Frank Rosenblatt in 1957

- Supervised Learning of Binary Classifier for Linearly Separable Data
- Types: Single Layer and Multilayer
- Simplest Form of Artificial Neural Network
- 4 Parameters

Linearly separable:
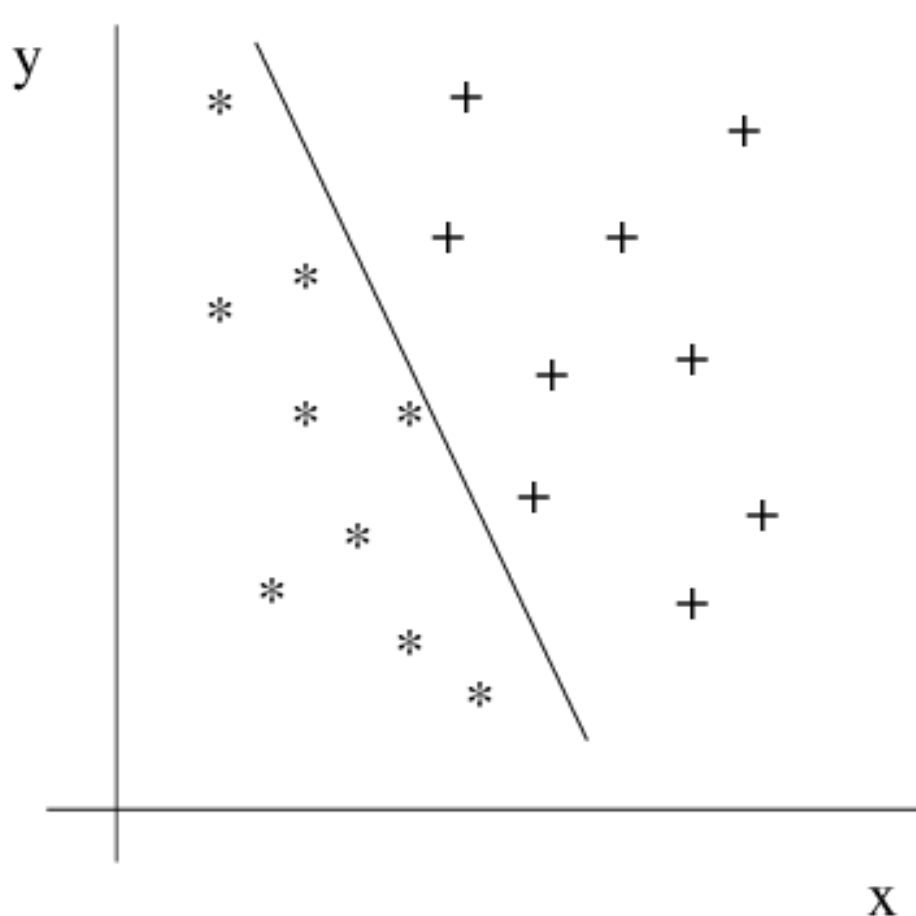
Linearly inseparable:

Training
- Step0: Initialize weights, W and bias, b
Take input X

- Step1: Calculate input function
$i_p = \Sigma(w_i . x_i) + b)$ for w_i, $x_i \in$ W, X

- Step2: Calculate output
$o_p = f(i_p)$, f: Activation function

- Step3: Reducing Error
If $t \neq o_p$:
   $w_i = w_i + \alpha.(t - o_p).x_i$
   $b = b + \alpha.(t - o_p)$
   Next input => X
α: Learning Rate, t: Target, o_p: Output

- Step4: Iterate through all inputs
Only stops when there is no input

Testing
- Step0: Learned weights, W and bias, b
Take input X

- Step1: Calculate input function
$i_p = \Sigma(w_i . x_i) + b)$ for w_i, $x_i \in$ W, X

- Step2: Calculate output
$o_p = f(i_p)$, f: Activation function

References
- https://www.simplilearn.com/tutorials/deep-learning-tutorial/perceptron#:~:text=A%20Perceptron%20is%20a%20neural,value%20%E2%80%9Df(x).
- https://www.youtube.com/watch?v=53XdNBOyMJU
- https://en.wikipedia.org/wiki/Perceptron

f - e.g.: f(X) = {1, if W•X + b > 0
        0, else
        }