Lecture 26 : Structure of Neural Nets for Deep Learning

Deep neural nets (CNNs)

feature vectors, $x = \begin{bmatrix} x_1 \\ \vdots \\ x_n \end{bmatrix}$

E.g. 2-class classification -1 or 1

There are M different training example $x = \begin{bmatrix} x_1 \\ \vdots \\ x_n \end{bmatrix}$

Create $F(x)$ gets class correct $F(x) < 0$ when -1

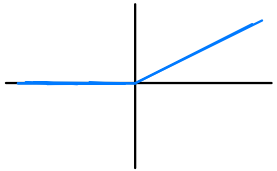
$F(x) > 0$ when +1

Visualization

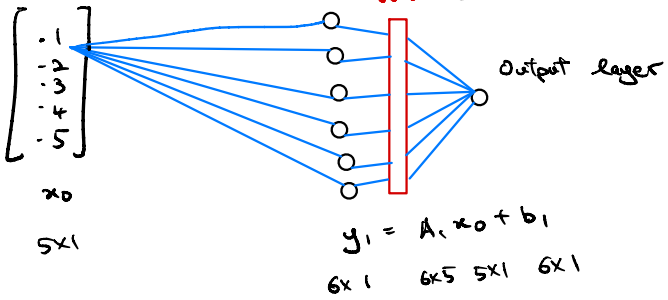
playground.tensorflow.org

New term: Epoch means number of passes of the entire training dataset the machine learning algorithm has completed.

Activation function (ReLU)



$\text{ReLU}(x) = \max(x, 0)$



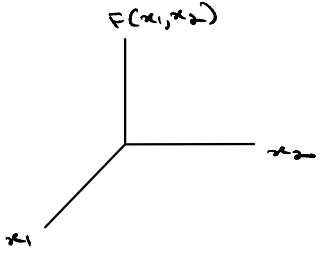
$F_1(x) = \text{ReLU}(A_1 x_0 + b_1)$

Learning function

$F(x) = F_3(F_2(F_1(x)))$

Continuous piecewise linear function of $x \in \mathbb{R}^m$

E.g. $m=2$ dimensions



$m=1$

r = # of flat pieces

m = dimension of $x=2$

N = # of folds

$$r(N, m) = \binom{N}{0} + \binom{N}{1} + \cdots + \binom{N}{m}$$