

Week 7

Lecture

- MLP
 - Perceptron (limitation?)
 - Activation function
(purpose, different types, advantages and disadvantages of different types)
 - Forward and backpropagation.
 - Optimization.
- Regularization and prevent overfitting
 - Data augmentation
 - Dropout
 - Weight decay
 - BN

Tutorial

Task 1: Building MLP image classifier

Step 1: Load MNIST data and create validation set.

Step 2: Define the model by using Keras.

Step 3: Optimization and evaluation.

Step 4: Parameter search [optional]

Task 2: Using MLP for regression task

Step 1: load the Boston housing data.

Step 2: Standardize the data.

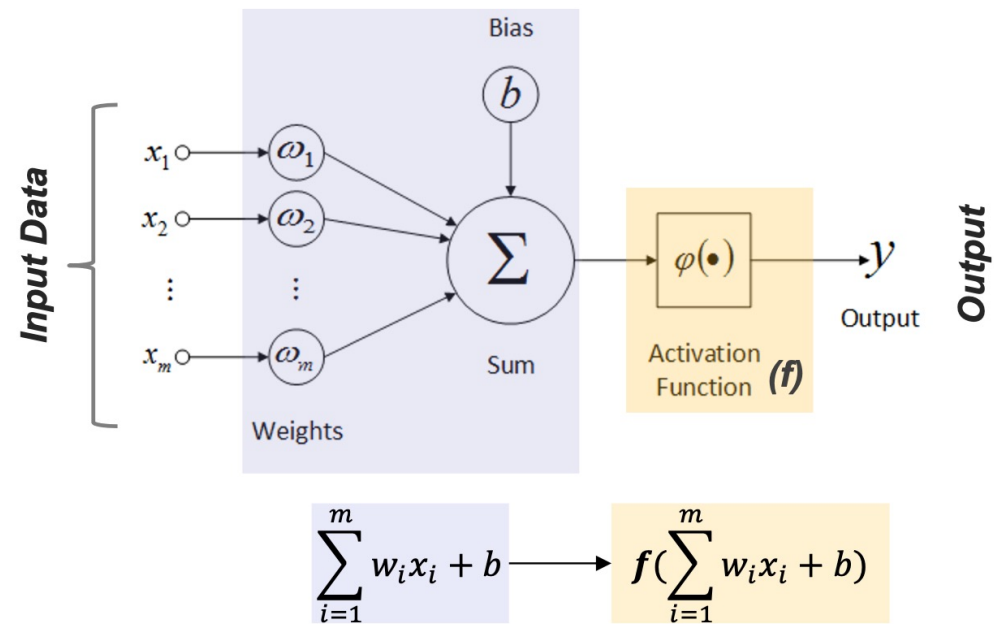
Step 3: Create MLP for regression.

TODO:

1. What would happen if we set the weights initialization all = 0?
2. Implement MLP for regression.

Deep Learning

MLP – feedforward and backpropagation



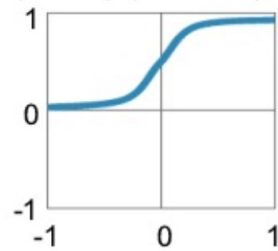
Deep Learning

Activation function

Activation Function – different types

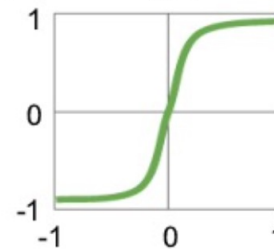
Sigmoid

$$y = 1/(1 + e^{-x})$$



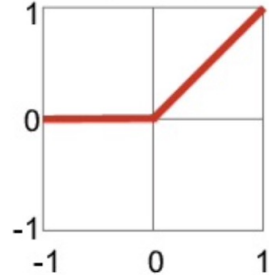
Tanh

$$y = (e^x - e^{-x})/(e^x + e^{-x})$$



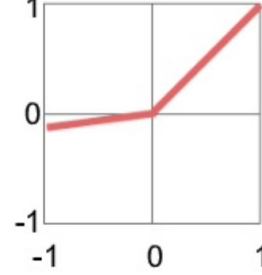
ReLU

$$y = \max(0, x)$$



Leaky ReLU

$$y = \max(ax, x)$$



Exponential LU

$$y = \begin{cases} x, & x \geq 0 \\ a(e^x - 1), & x < 0 \end{cases}$$

