MultiLayer Perceptron (MLP)

Deep Learning
EE 298/CoE 197/EE 197/ECE 197
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Multilayer Perceptron (MLP)

- Also called **“vanilla”** neural model, or a **fully-connected** model

- Consists of multiple layers of perceptron units
  - Input Layer, *n* Hidden Layers and an Output Layer

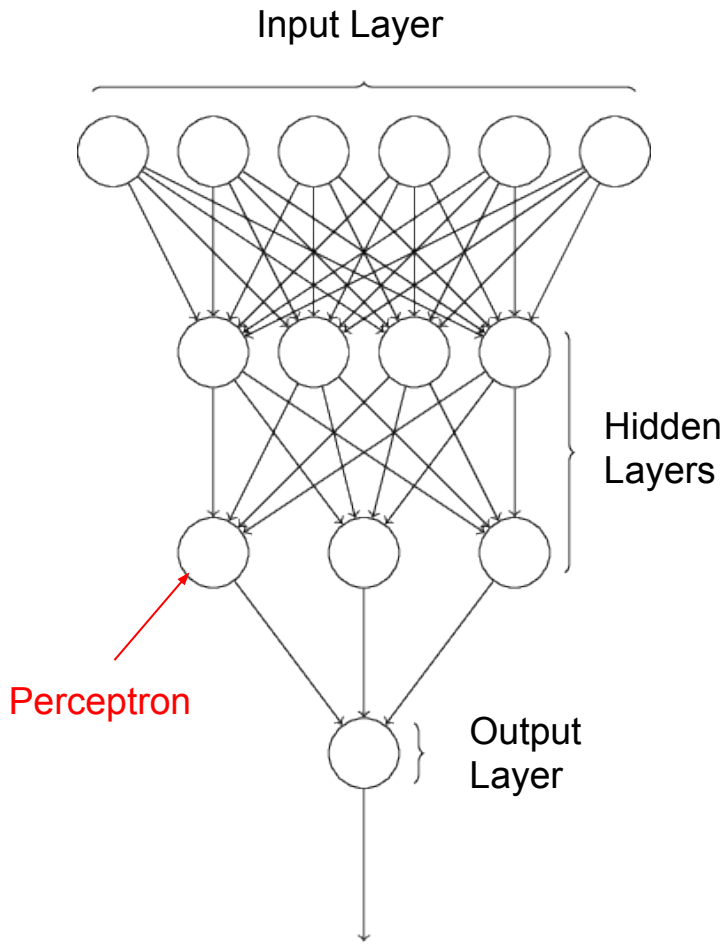
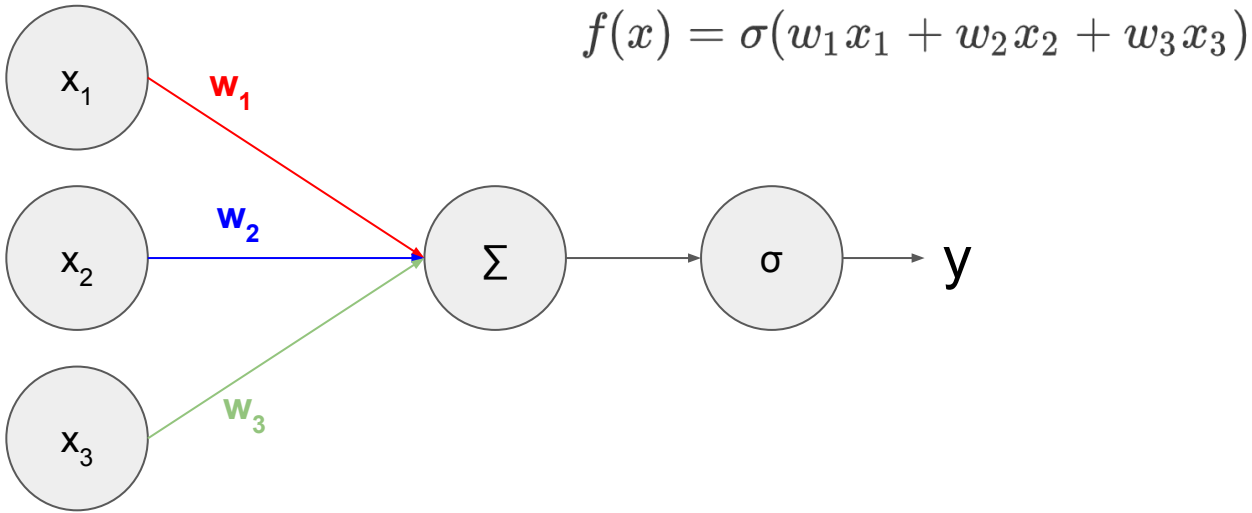


Image taken from Google Images

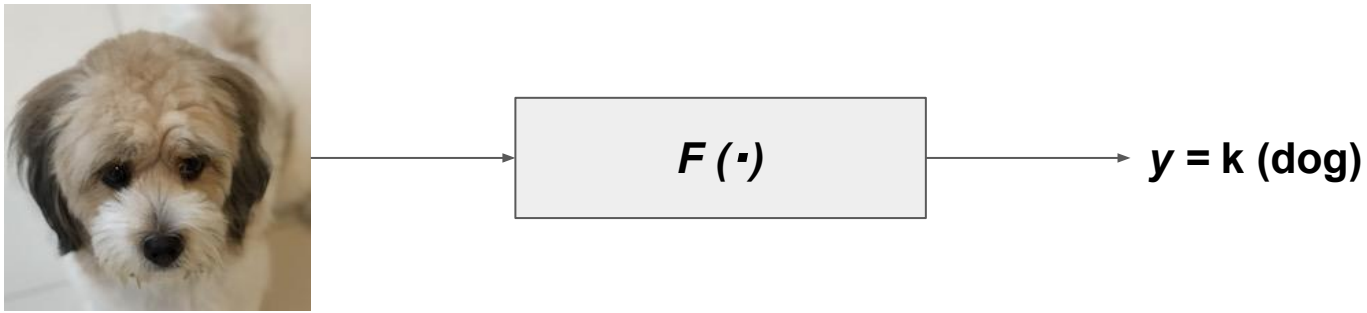
What are Perceptrons?

- It is a neural network unit that classifies (maps) input data into labels via the linear combination of its features



Problem Statement (Supervised Learning)

- Given paired data (**x**, **y**), where **x** is input and **y** is the label, the task is to find a mapping function $\boldsymbol{F} : \mathbf{x} \rightarrow \mathbf{y}$



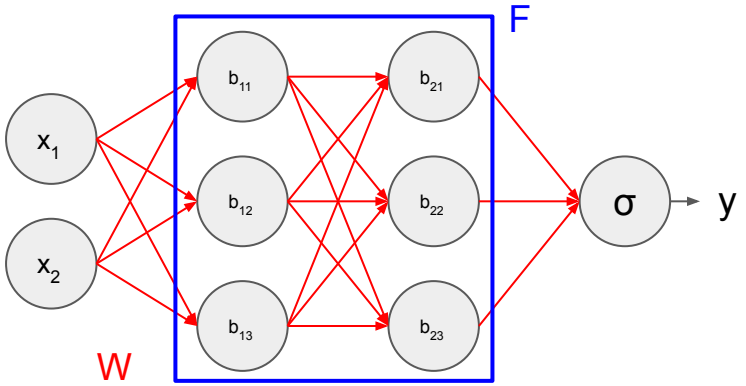
Multilayer Perceptron (MLP)

- We can approximate ***F*** as a composition of smaller functions f_i

$$F(x) = f_n \circ f_{n-1} \circ \cdots \circ f_1(x)$$

- In MLP, we can represent each smaller function f_i as one that computes the linear combination of our input features (perceptron)

$$f_1(x, \theta) = \sigma(Wx + b)$$



Multilayer Perceptron in Code

- We use **nn.Linear** from PyTorch
  - Applies a linear transformation to the input: $\mathbf{y} = \mathbf{x}A^T + b$, A is the weights and b the bias