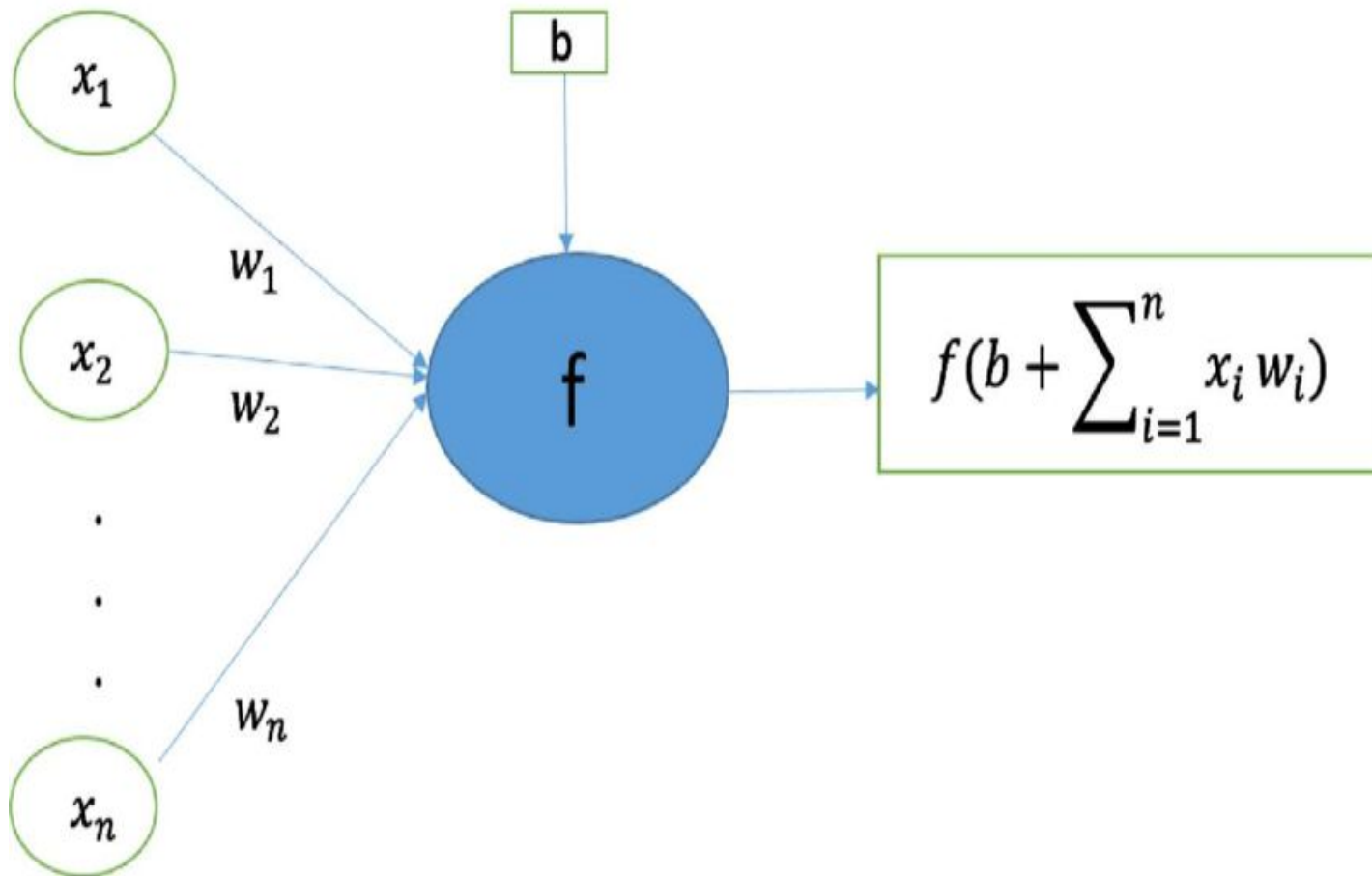
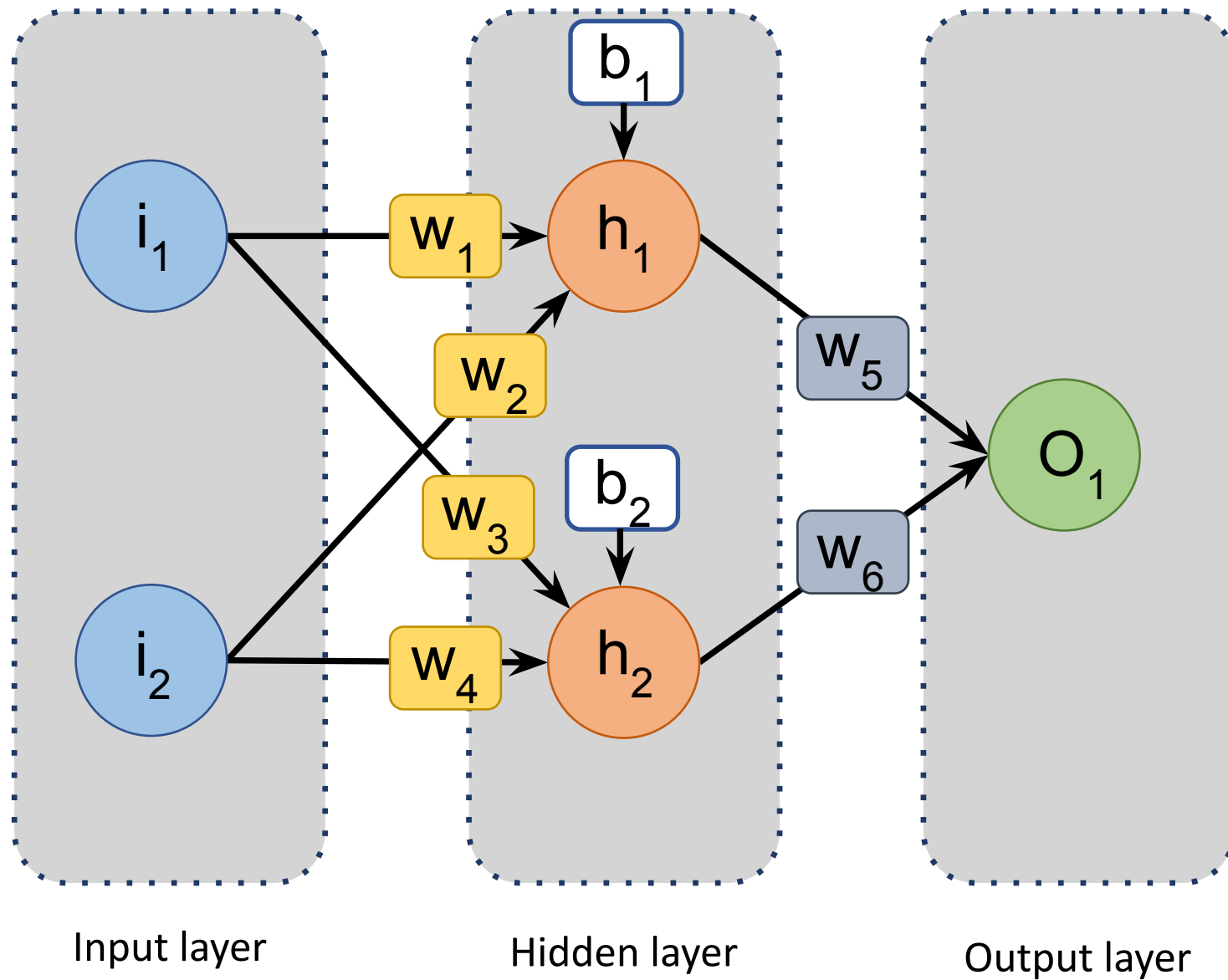


# Neural network

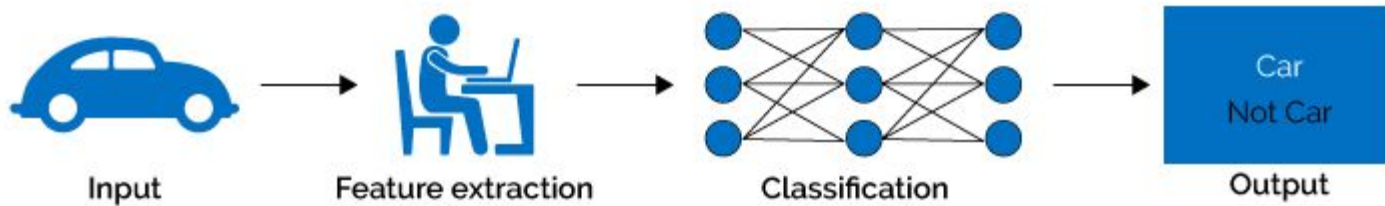
Python for AI

# Structure of a neuron

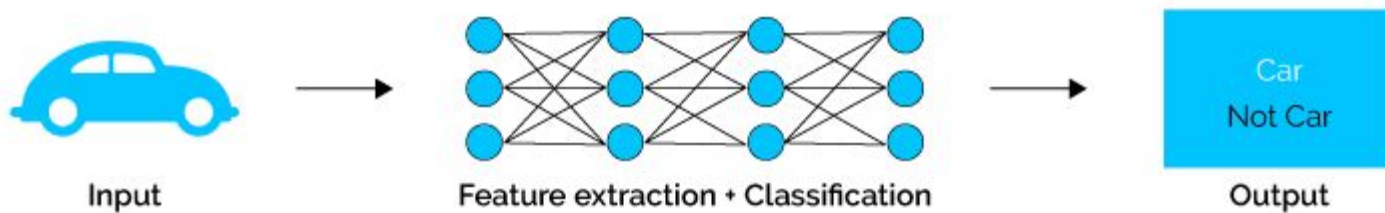




## Machine Learning



## Deep Learning



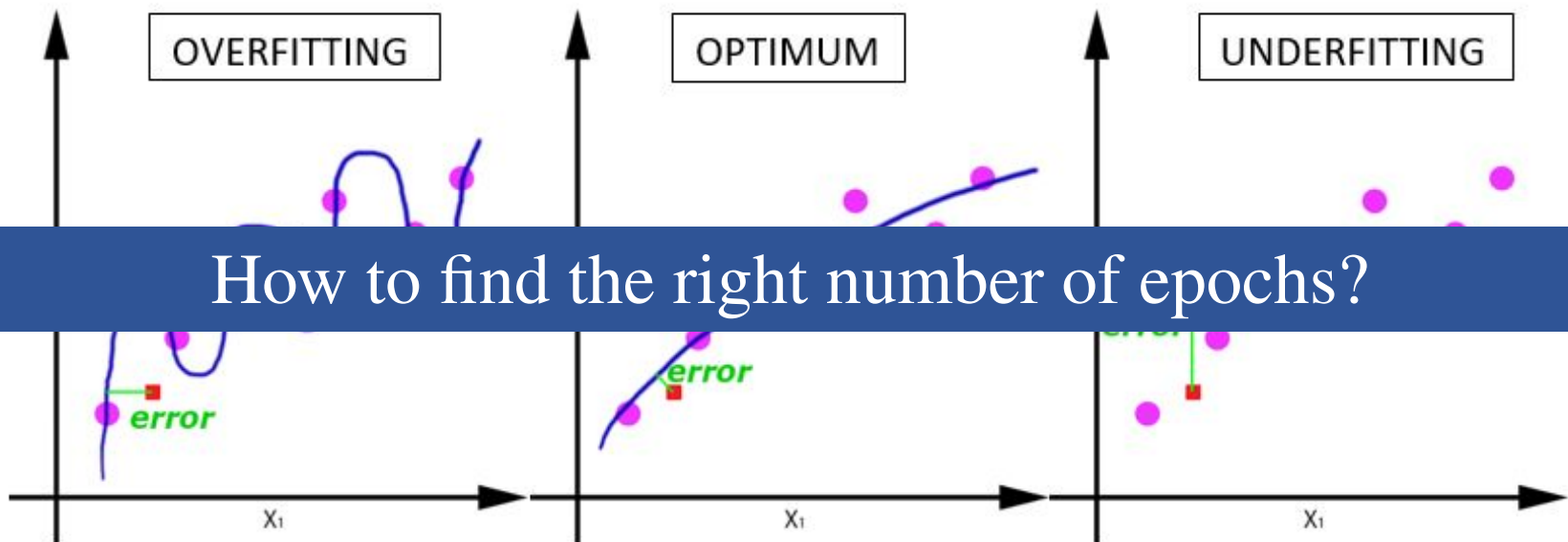
# Deep learning terminologies

## 5. Epoch, Batches, Batch size, Iteration

### a. Epoch:

-Entire dataset is passed (forward and backward) through the network.

-Why do we need multiple epochs?



How to find the right number of epochs?

## 5. Epoch, Batches, Batch size, Iteration

### a. Epoch:

- Entire dataset is passed (forward and backward) through the network.

### b. Batch/Batch size:

- Large data set is divided into smaller chunks or batches of specific size.

## 5. Epoch, Batches, Batch size, Iteration

### a. Epoch:

-Entire dataset is passed (forward and backward) through the network.

### b. Batch/Batch size:

-Large data set is divided into smaller chunks or batches of specific size.

### c. Iteration:

-Number of batches required to complete one epoch.

## 5. Epoch, Batches, Batch size, Iteration

### a. Epoch:

-Entire dataset is passed (forward and backward) through the network.

A dataset of 1000 training examples is divided into batches of 200 examples.

It will take 5 iterations to complete 1 epoch.

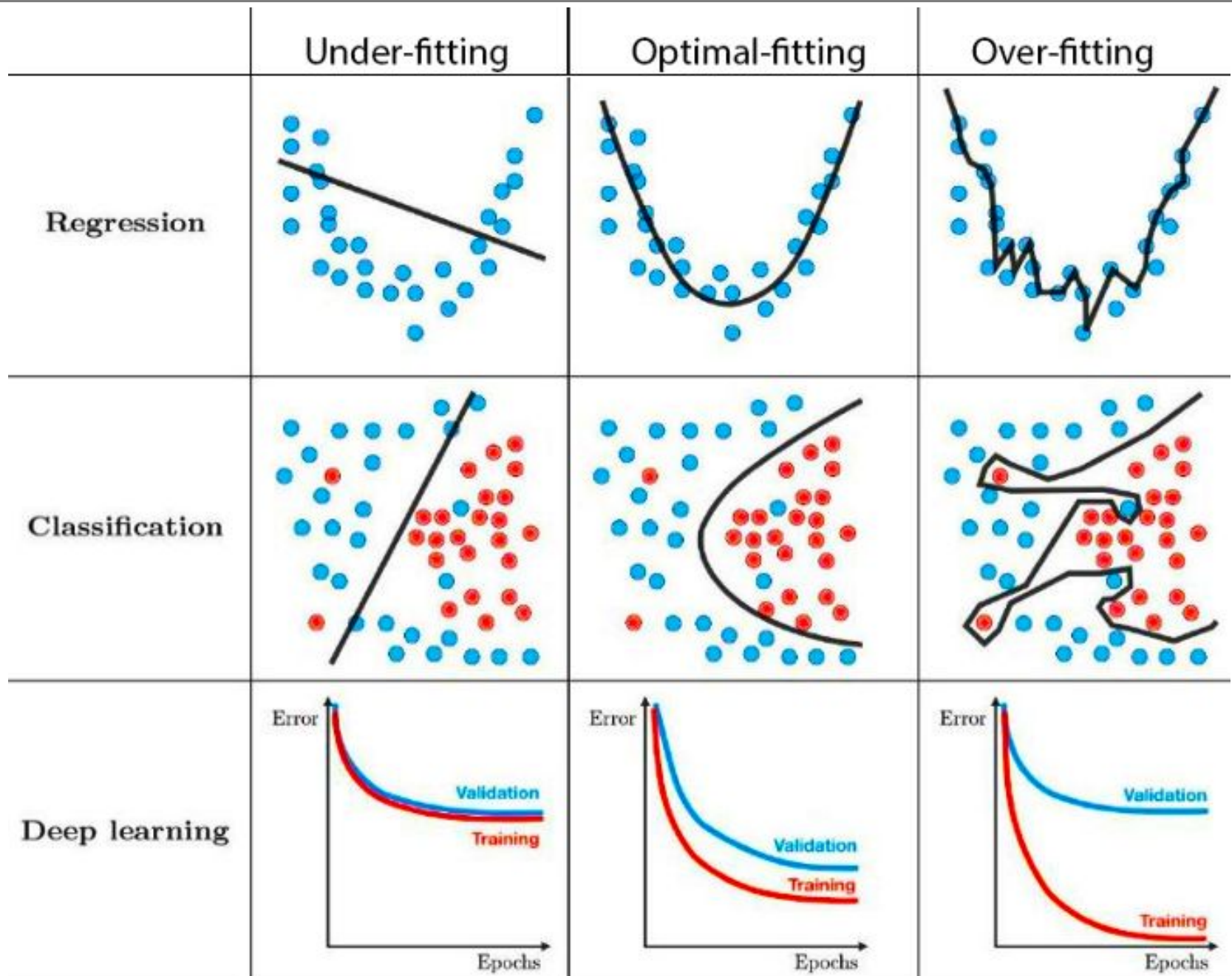
batches of specific size.

### c. Iteration:

-Number of batches required to complete one epoch.

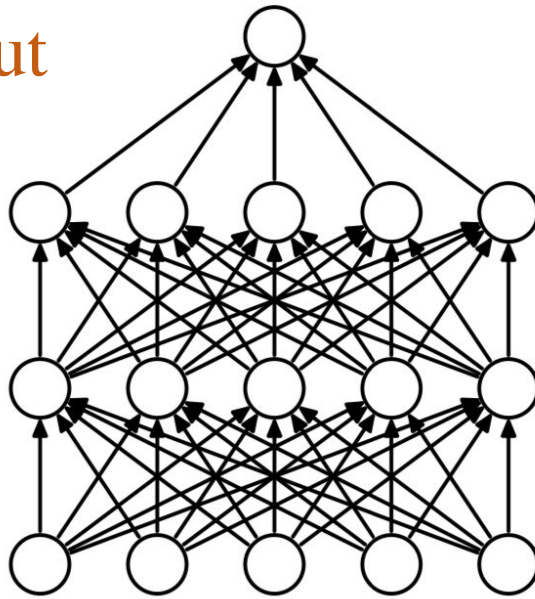


# Challenges: Underfitting & Overfitting

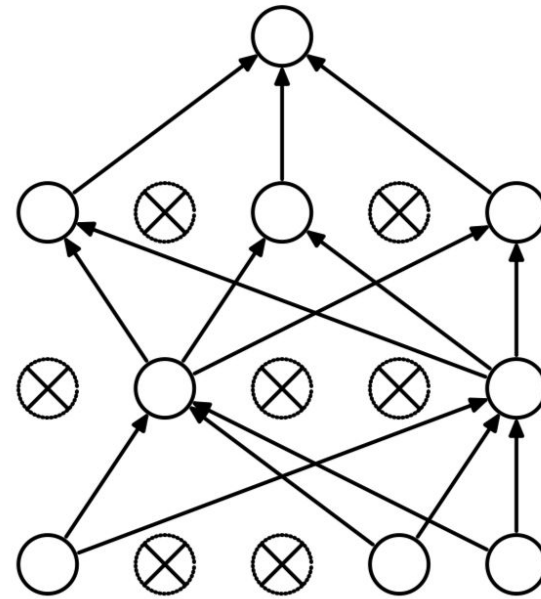


# Dealing with overfitting

## a. Dropout



(a) Standard Neural Net

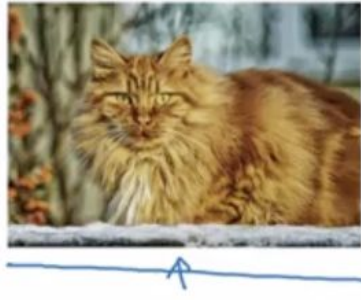
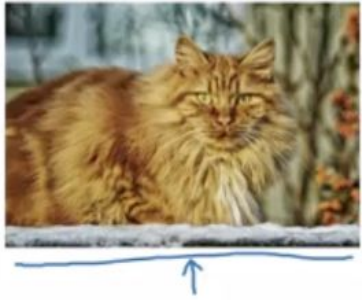


(b) After applying dropout.

Figure 1: Dropout Neural Net Model. **Left:** A standard neural net with 2 hidden layers. **Right:** An example of a thinned net produced by applying dropout to the network on the left. Crossed units have been dropped.

# Dealing with overfitting

## b. Augmentation



4



4



The digit '4' with a slight horizontal jitter. A blue horizontal line is drawn below the digit, with a blue arrow pointing upwards from the line to the digit.

4



The digit '4' with a slight vertical jitter. A blue horizontal line is drawn below the digit, with a blue arrow pointing upwards from the line to the digit.

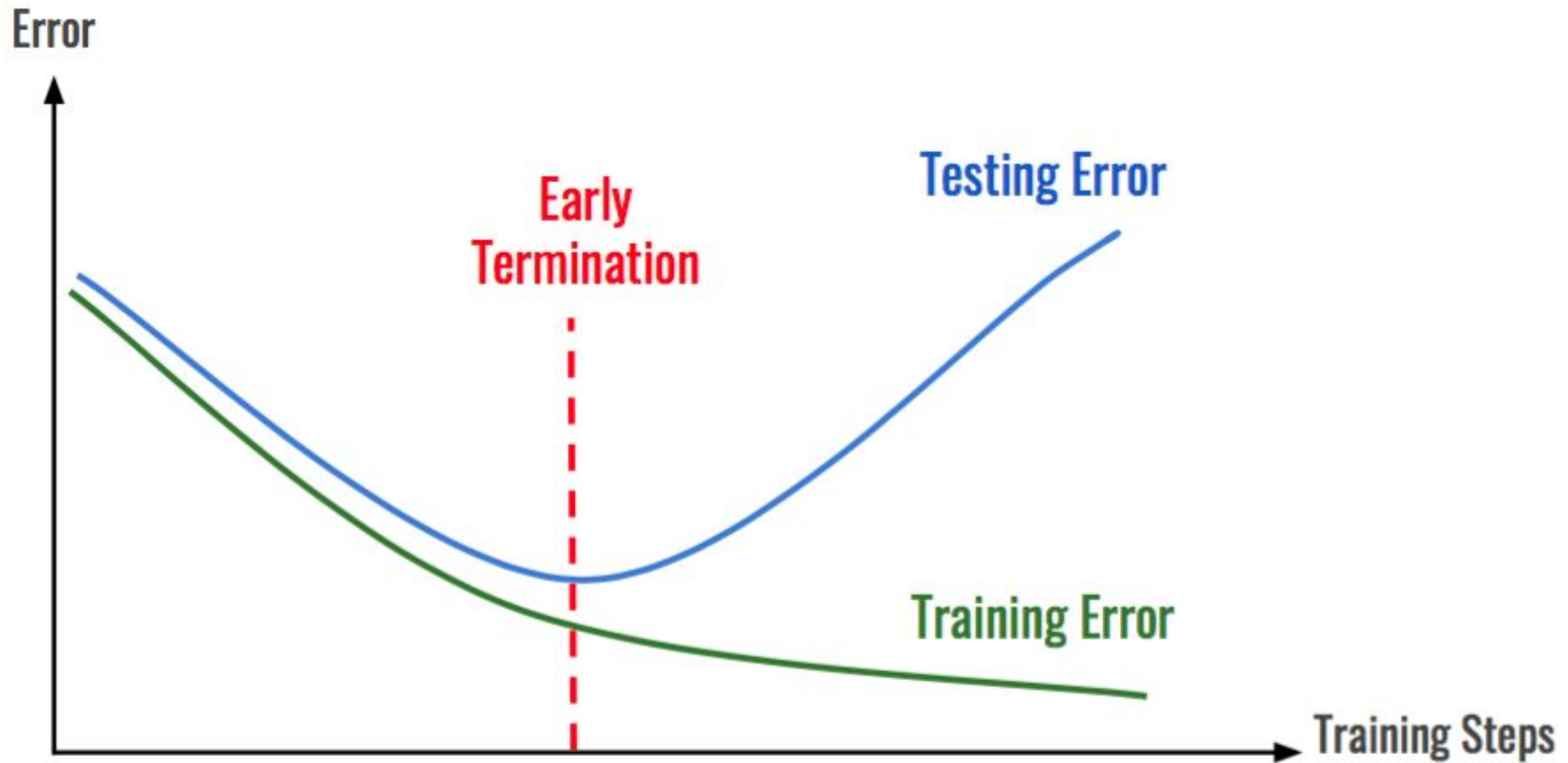
4



The digit '4' with a slight rotation. A blue horizontal line is drawn below the digit, with a blue arrow pointing upwards from the line to the digit.

# Dealing with overfitting

## c. Early stopping



# Example and code

- Download code in the classroom
- On class: follow a step by step tutorial