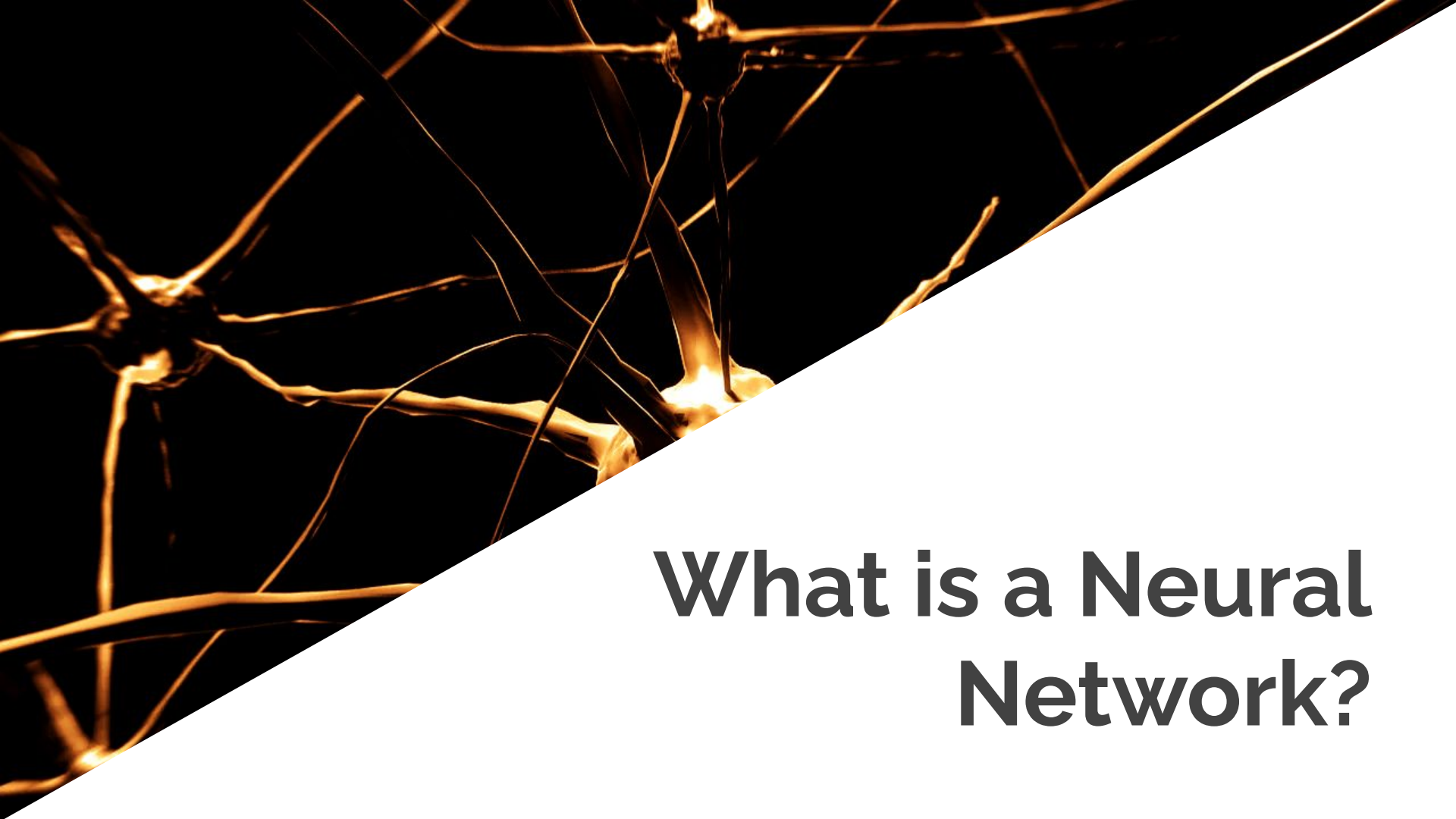
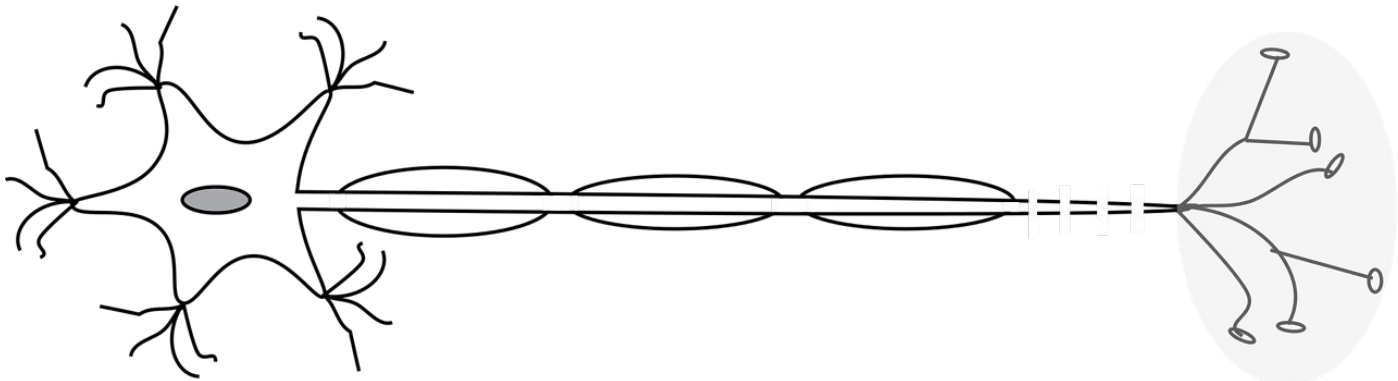


What is a Neural Network?

What is an *artificial* neural network?

- Machine learning framework
- Mimics the learning pattern of the brain's neural networks

What is a *natural* neural network?



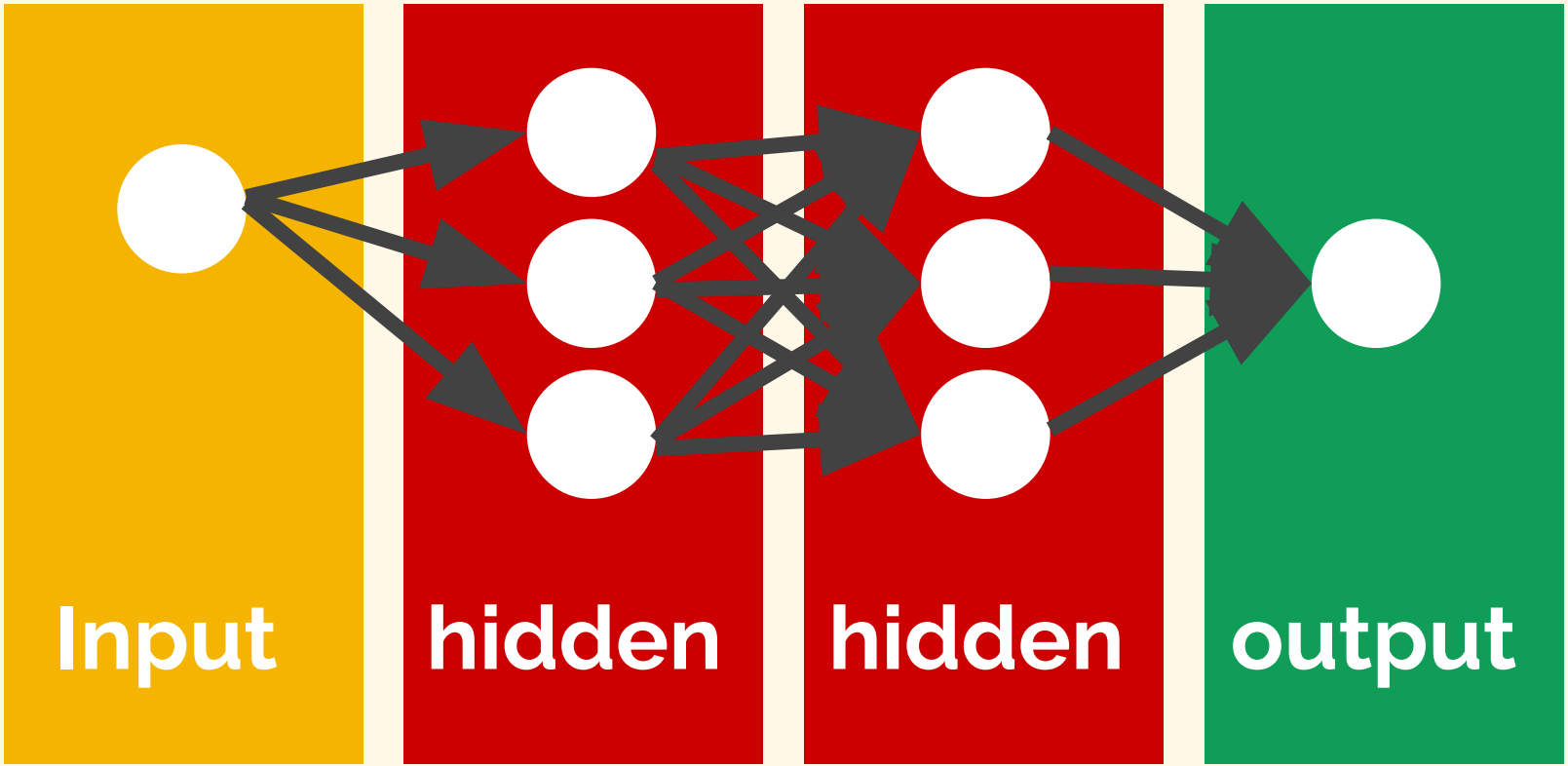
What is a *natural* neural network?

- Interconnected neurons that receive inputs
- Produce output signal through an axon to another neuron

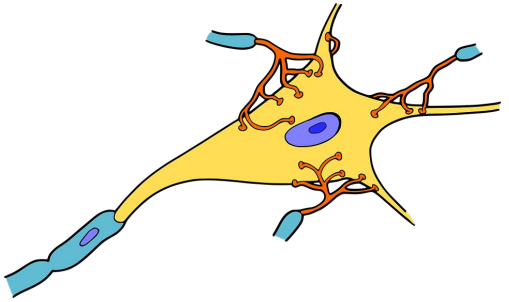
How do you *build* a neural network?

- Input layer takes in feature inputs
- Add hidden layers
- Output layer makes outputs

Layers



What is a neuron?



- Calculates weighted sum of inputs from predecessor neuron
- Applies an activation function to produce its output

How do you *build* the layers?

- Start with 1 *perceptron*
- Add layers of perceptrons together

What is a perceptron?

1. **Receives inputs**
2. **Multiplies inputs by a random weight**
3. **Adds a bias to account for inputs of 0**
4. **Passes inputs to an activation function to produce an output**

What do you do with the output?

1. **Compare the output to a known label**
2. **Adjust weight accordingly**
3. **Repeat until there are no more allowed iterations or the error rate is acceptable**

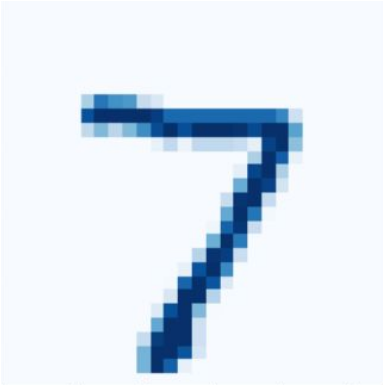
How do you build a perceptron?

- At least 1 input
- Bias
- Activation function
- 1 output

Types of neural networks

- **Feedforward (NN)**
  - Connections only in 1 direction

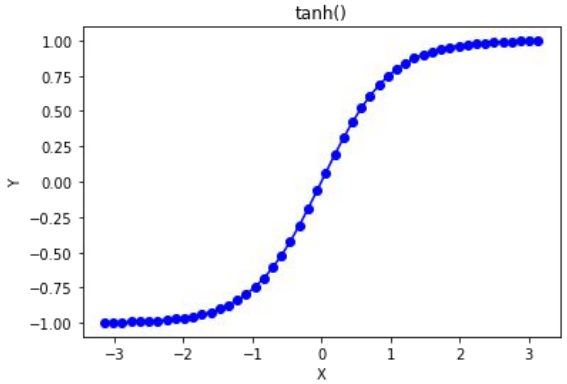
Types of neural networks

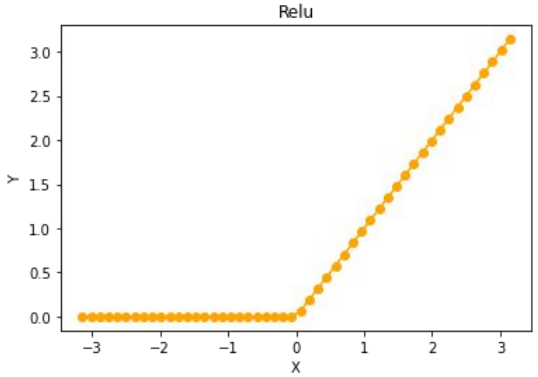


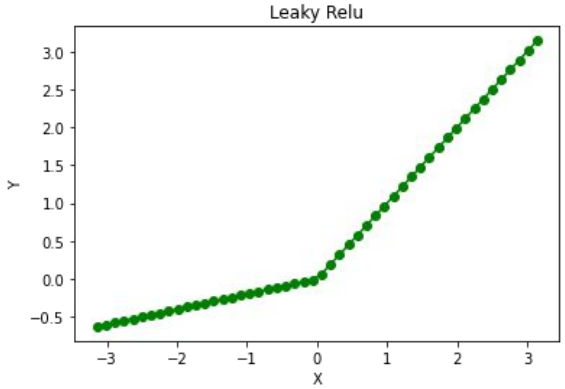
- **Convolutional (CNN)**
  - Takes adjacency into account
  - Grid topology data (images)

Types of neural networks

- **Recurrent (RNN)**
  - Feeds outputs back into its own inputs
  - Sequential data (language)

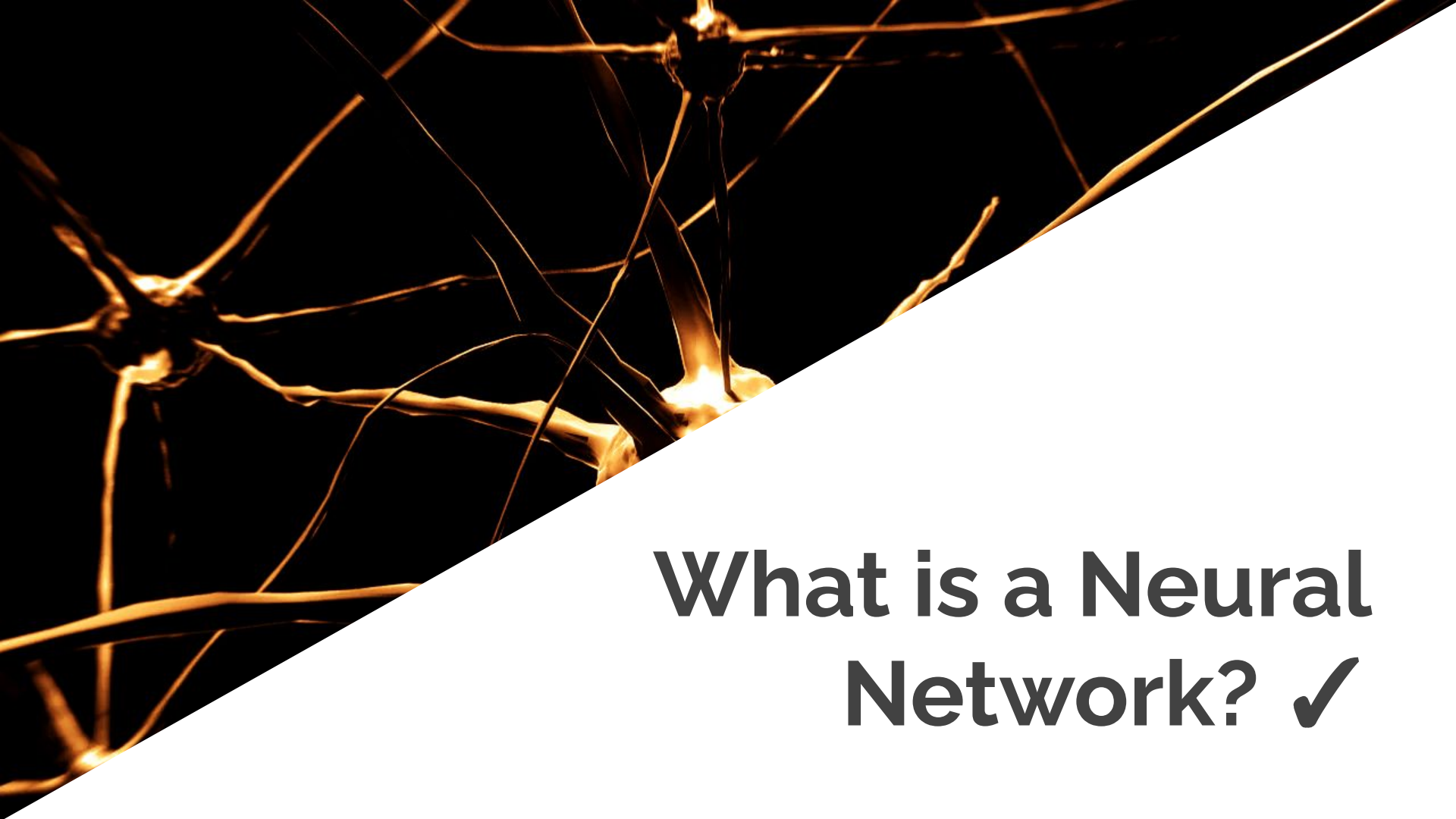






Activation Function

- **Nonlinear function**
  - Allows large networks of neurons to represent arbitrary functions



What is a Neural Network? ✓