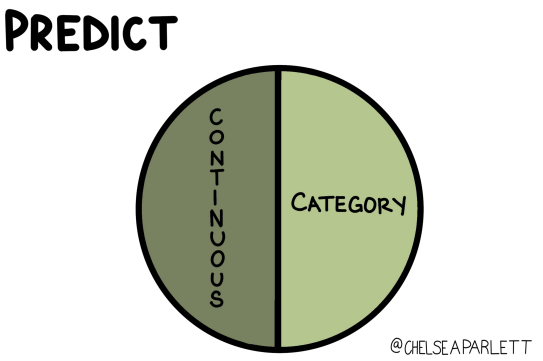
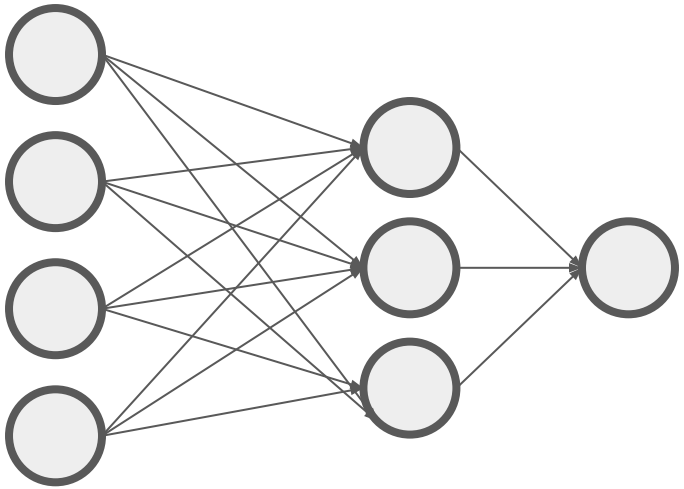


Intro to Neural Networks

Dr. Chelsea Parlett-Pelleriti

Neural Networks

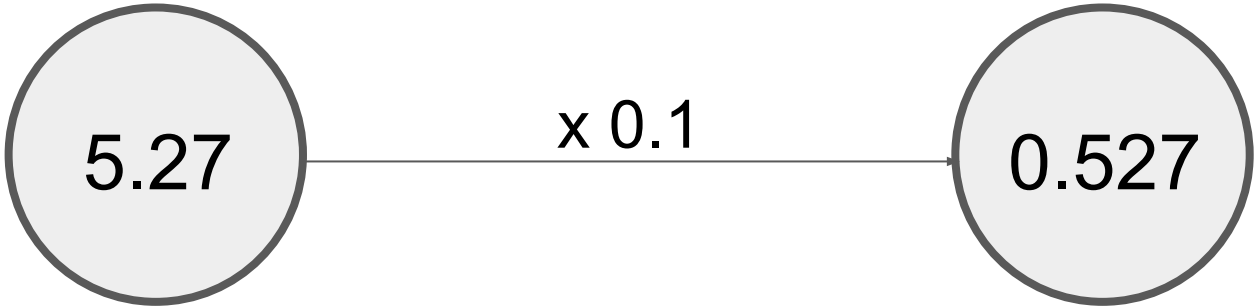


Nodes

Nodes Hold Values

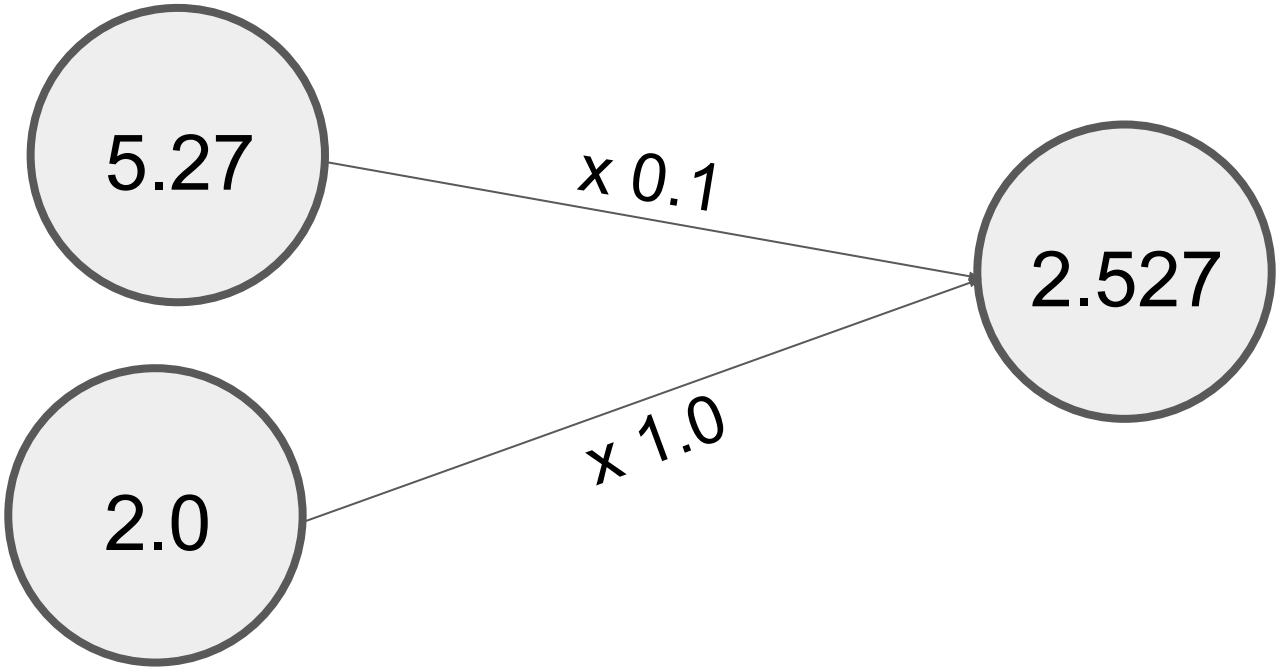
Weights

Weights multiply the number in a previous node and add it to the next node



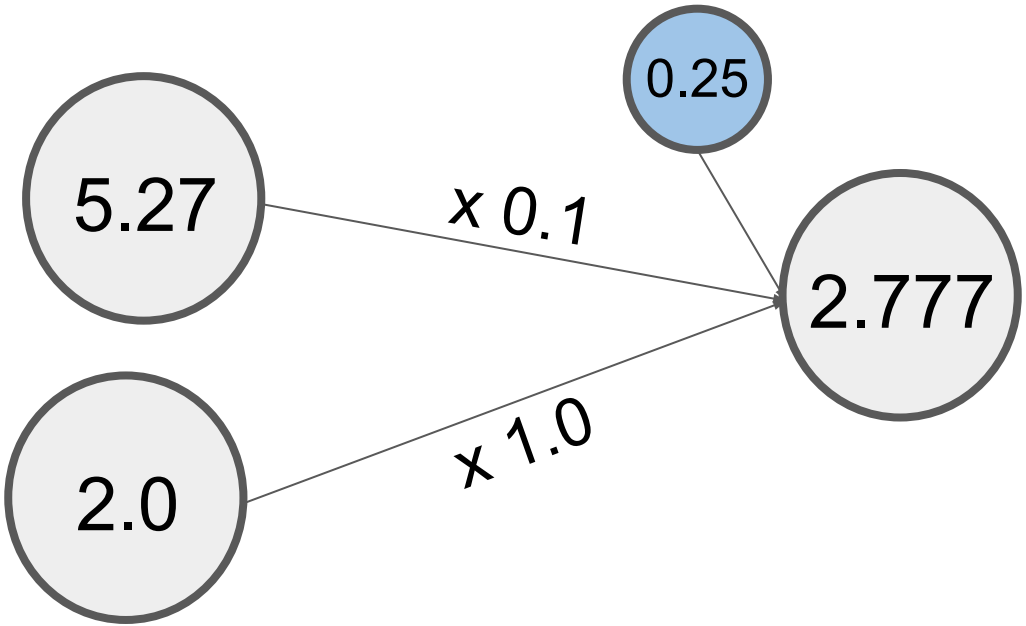
Weights

We can have multiple weights feeding into one node



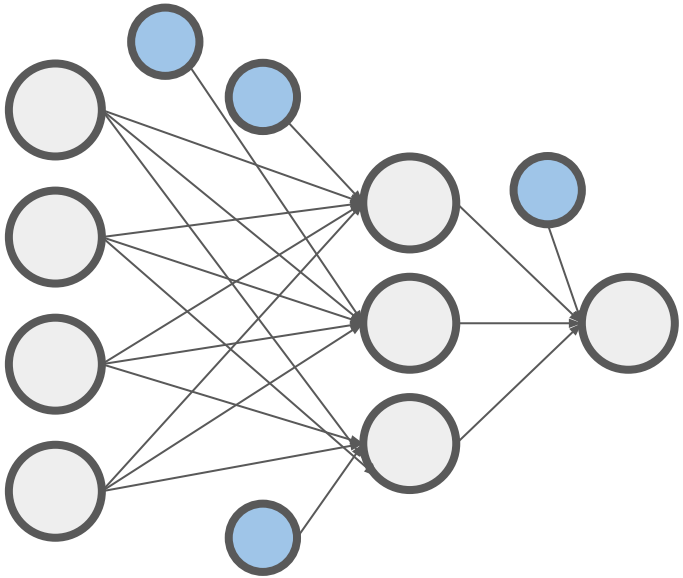
Biases

Biases move the value of a node up (for positive values) or down (for negative values) no matter what the weights and previous nodes' values were

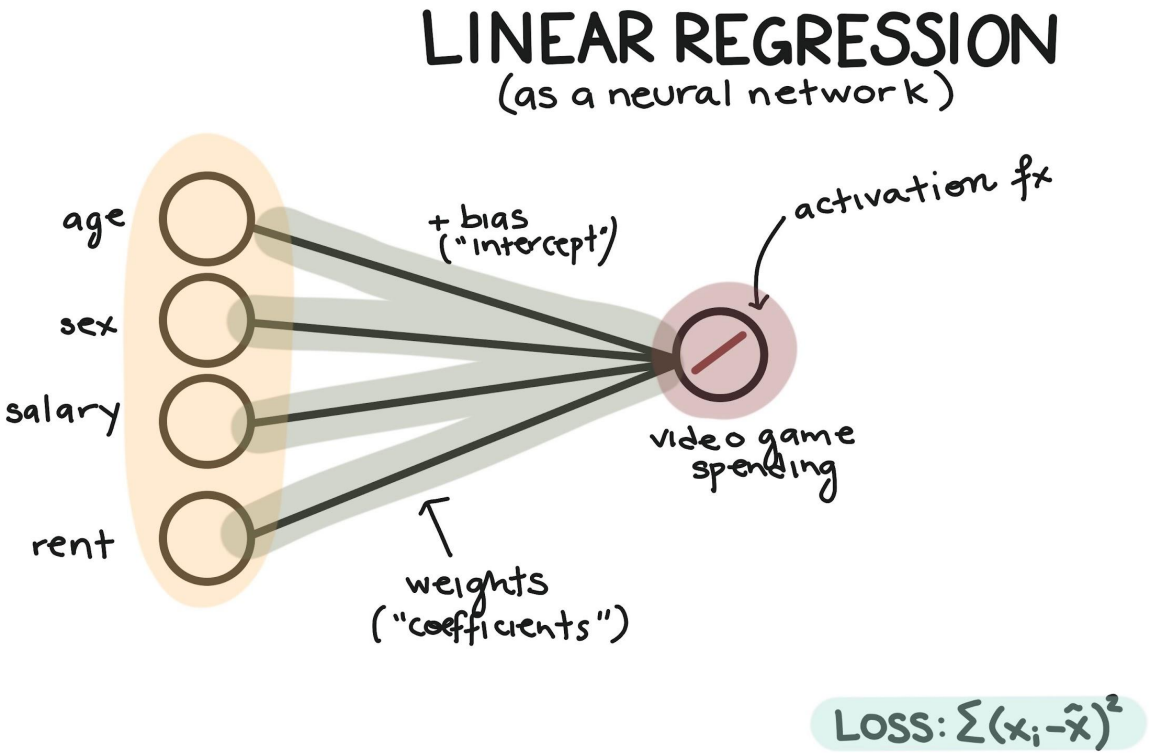


Biases

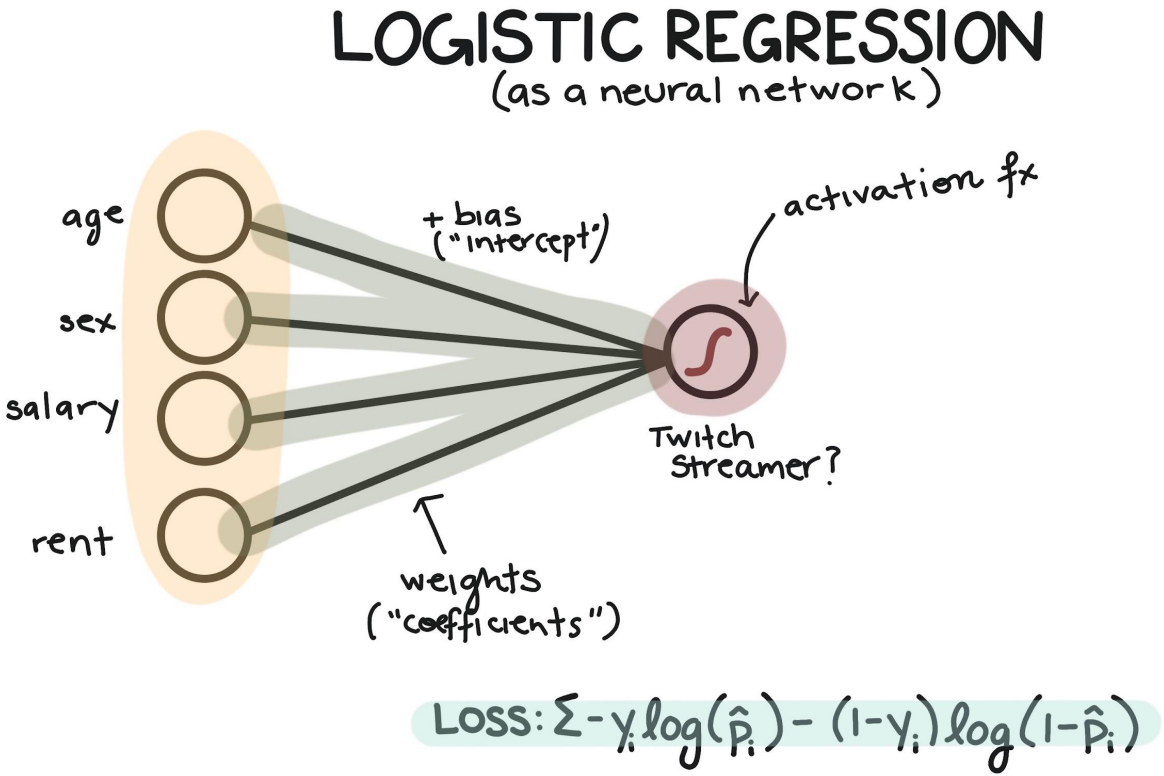
Together, nodes, weights, and biases make up the core structure of a neural network



Linear Regression as a NN

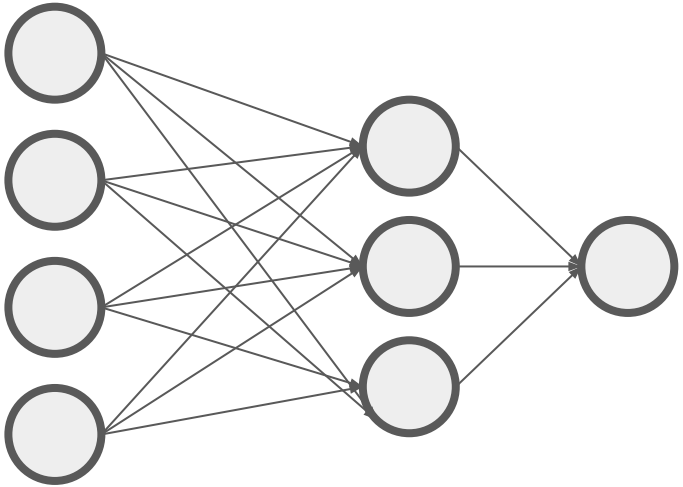


Logistic Regression as a NN



Building a FF NN Structure

1. Structure
2. Connections
3. Activations



Common Loss Functions (continuous)

MSE

$$\frac{1}{N}\sum_{i=1}^{N}(\text{actual} - \text{predicted})^2$$

MAE

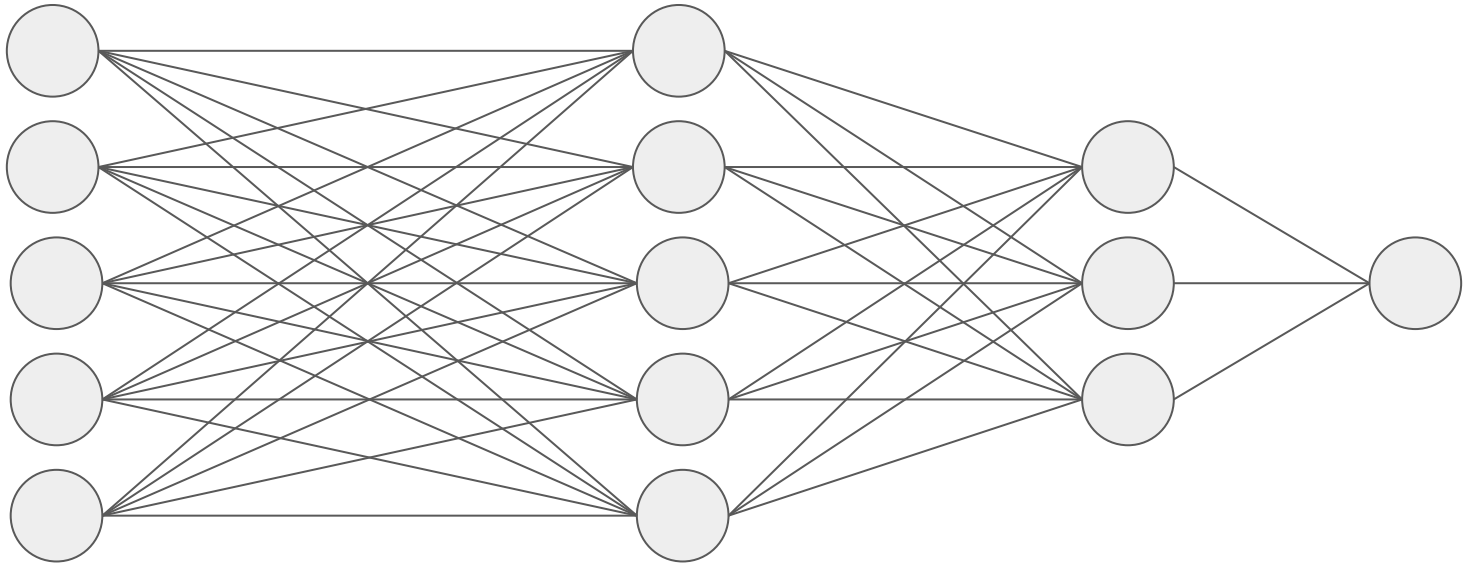
$$\frac{1}{N}\sum_{i=1}^{N}|\text{actual} - \text{predicted}|$$

Common Loss Functions (categorical)

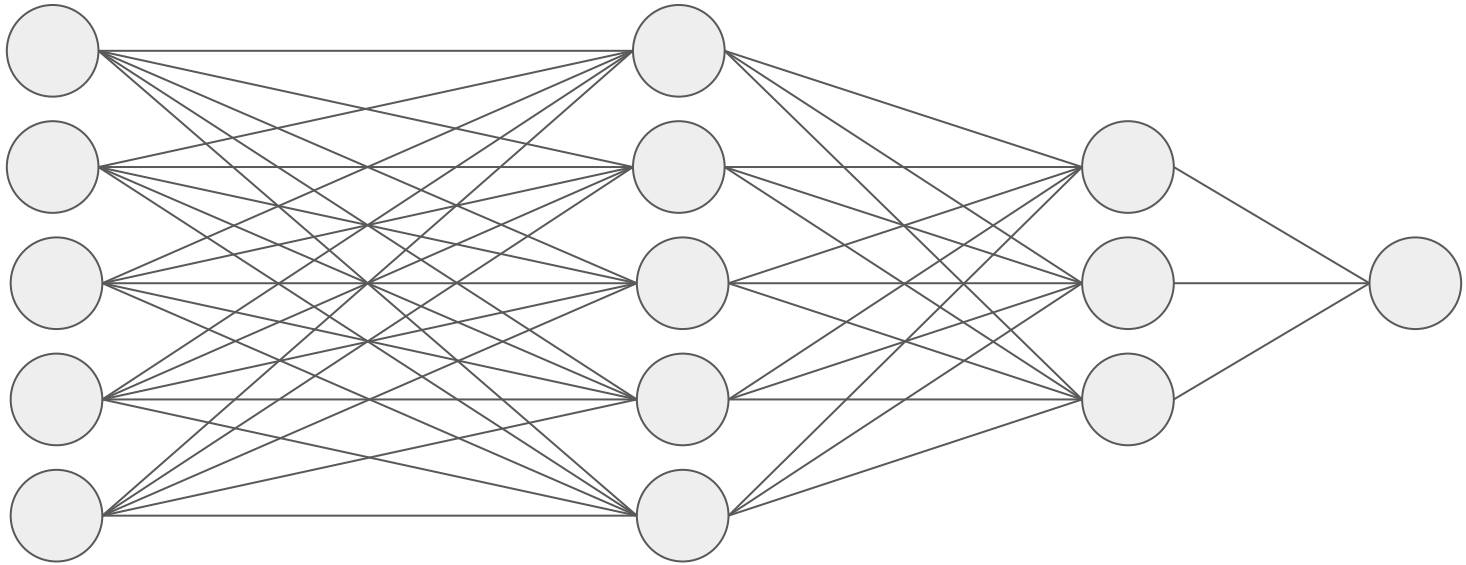
Log Loss/ Binary Cross Entropy

$$-\frac{1}{N}\sum_{i=1}^{N} y_i \cdot log(p_i) + (1 - y_i) \cdot log(1 - p_i)$$

Universal Function Approximation



Feature Engineering



Backpropagation/Gradient Descent

1. Which direction goes down the most?
2. Take a step in that direction.
3. Repeat until you get somewhere flat.