

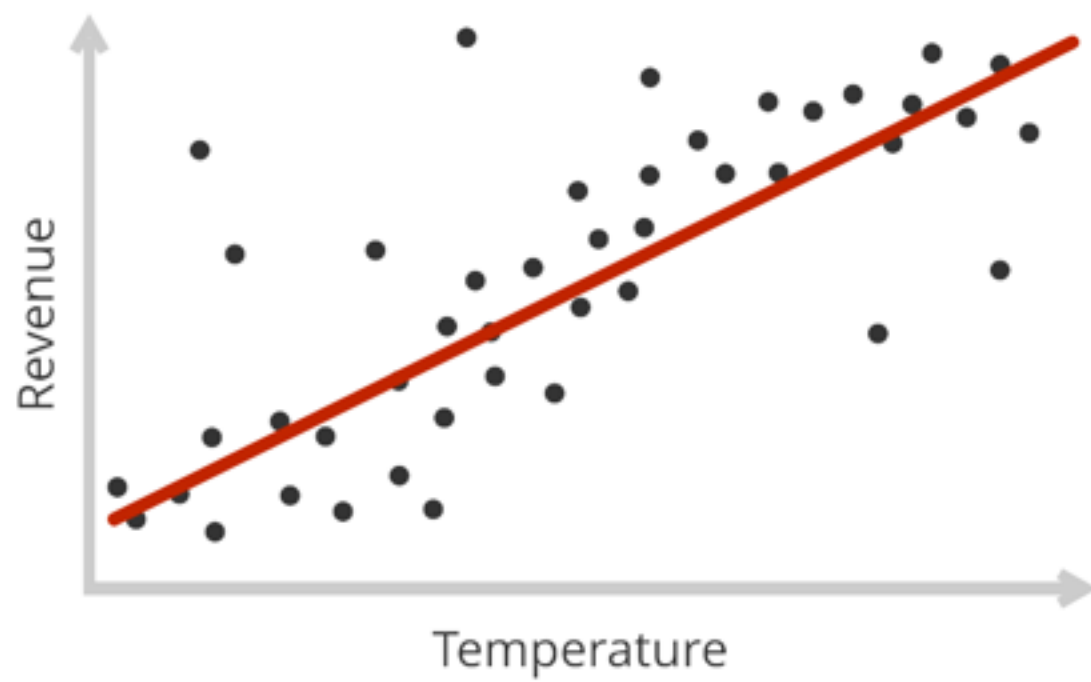
# Neural Nets

A Very Quick Introduction

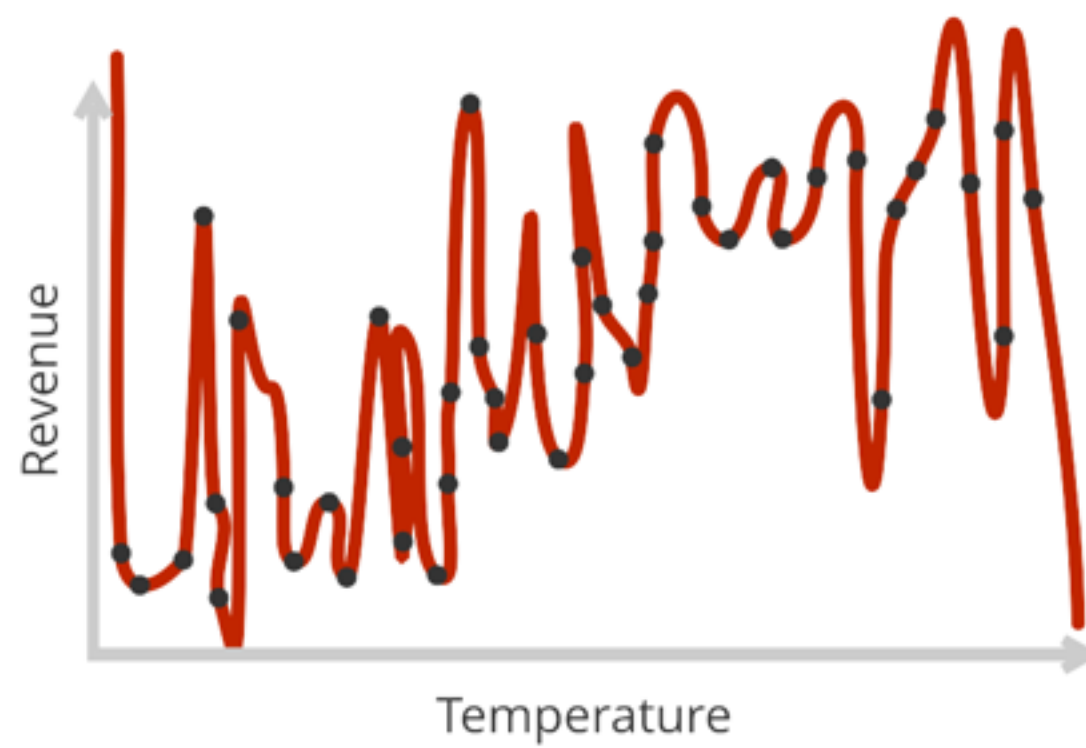
@benfreu

Ben Freundorfer

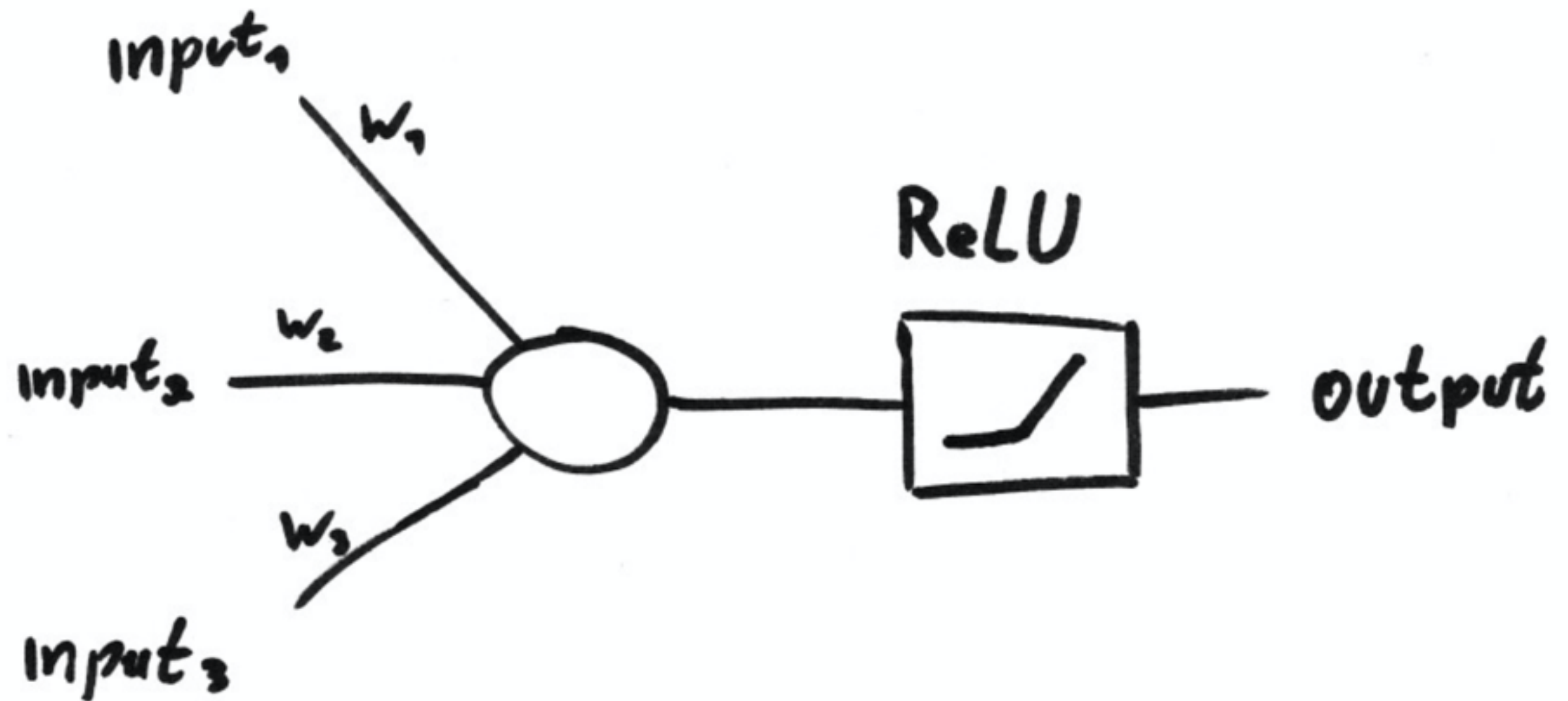
**Underfitting**



**Overfitting**

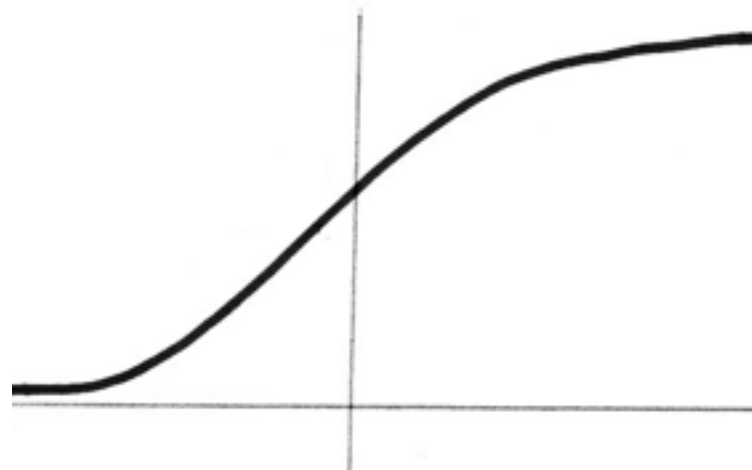


# Single Neuron

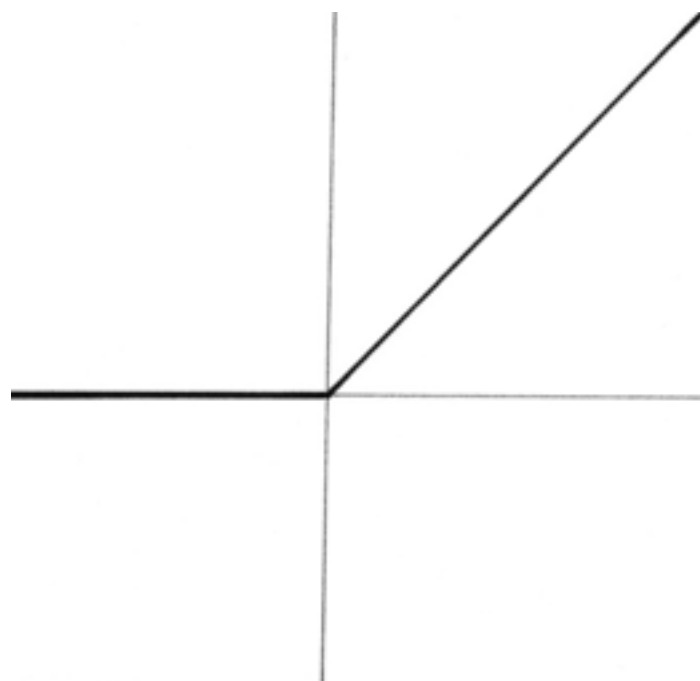


# Activation Functions

- Sigmoid



- ReLU





Iterations  
000,374

Learning rate  
0.01

Activation  
ReLU

Regularization  
L1

Regularization rate  
0.003

Problem type  
Classification

## DATA

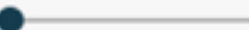
Which dataset do you want to use?



Ratio of training to test data: 50%



Noise: 0



Batch size: 10



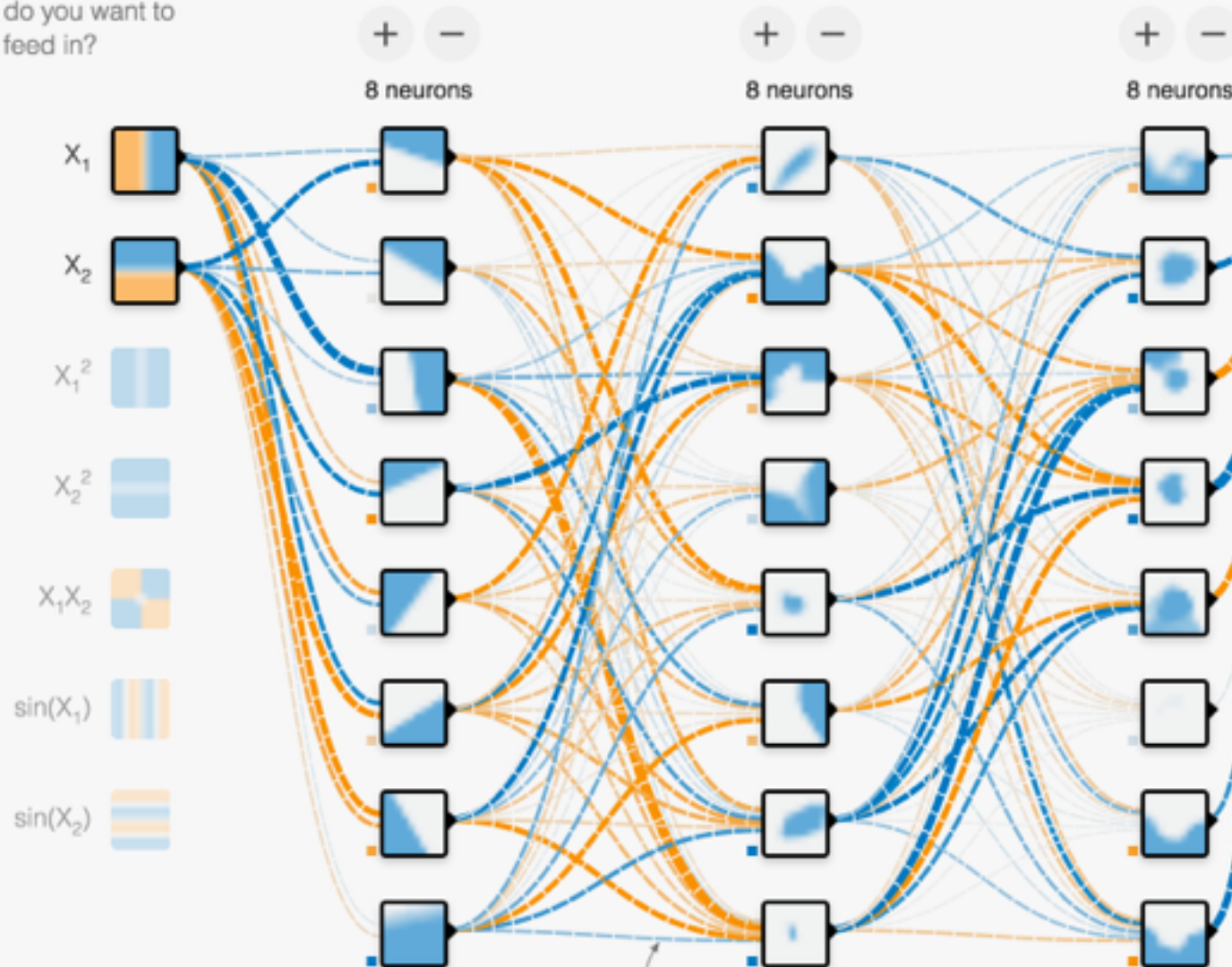
REGENERATE

## FEATURES

Which properties do you want to feed in?

- ☒  $X_1$
- ☒  $X_2$
- ☐  $X_1^2$
- ☐  $X_2^2$
- ☐  $X_1 X_2$
- ☐  $\sin(X_1)$
- ☐  $\sin(X_2)$

+ - 3 HIDDEN LAYERS

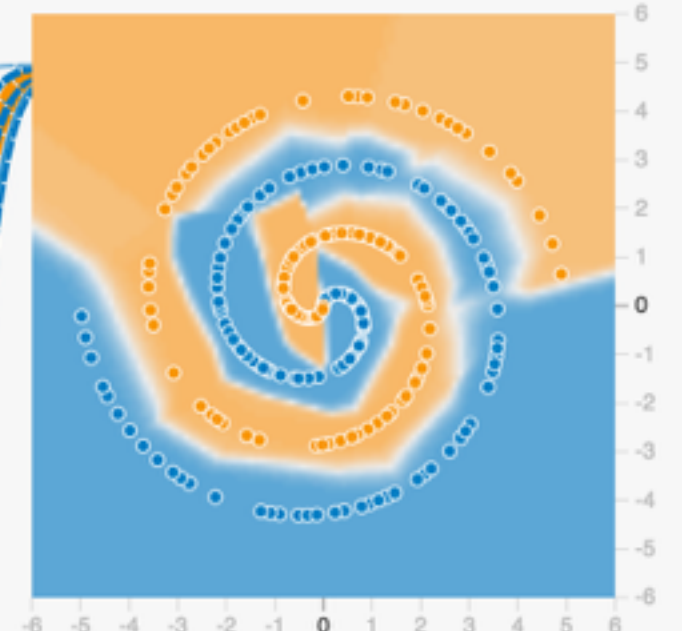


This is the output from one neuron. Hover to see it larger.

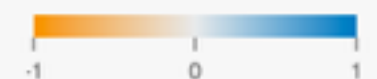
The outputs are mixed with varying weights, shown by the thickness of the lines.

## OUTPUT

Test loss 0.016  
Training loss 0.006



Colors shows data, neuron and weight values.

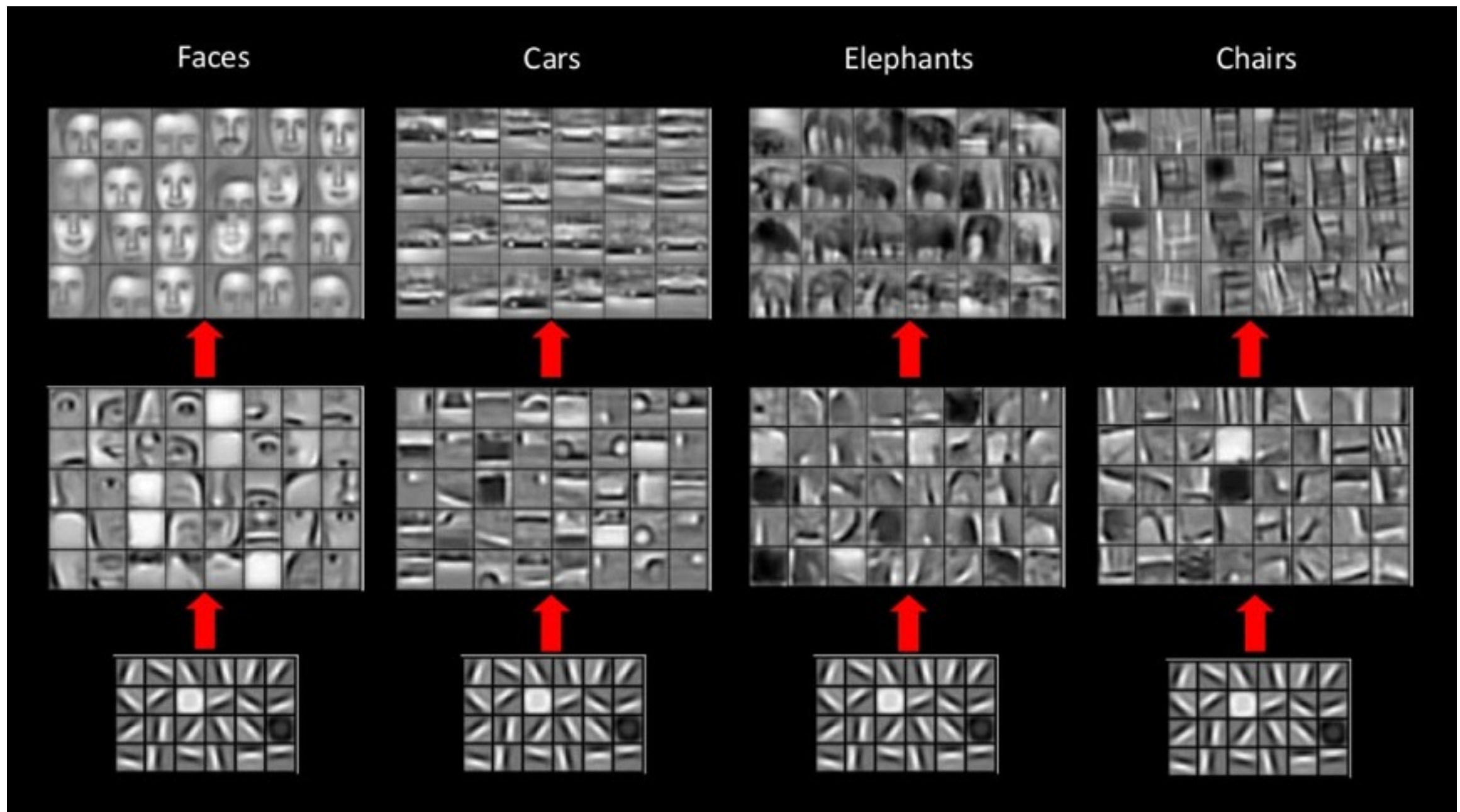


☐ Show test data

☐ Discretize output

<http://playground.tensorflow.org/>

# Layers of Abstraction





# Challenges

- Overfitting
- Understanding the net's internals



CC AT 4.0 Google Inc. <https://research.googleblog.com/2015/06/inceptionism-going-deeper-into-neural.html>

# Architectures

- Feedforward NN
- Convolutional NN
- Recurrent NN
- AutoEncoder



# Thank you

Ben Freundorfer  
@benfreu

# Ethics

- Your model might turn into a racially profiling sexist.
- Be aware of what your input features mean & what you actually base your predictions on
- Relatively harmless when predicting product categories - questionable for credit ratings