Machine Learning
without **code**

CS Society

WICS WOMEN IN COMPUTING SOCIETY

1950

Artificial Intelligence

Computers doing thing that requires ‘human intelligence’

1980

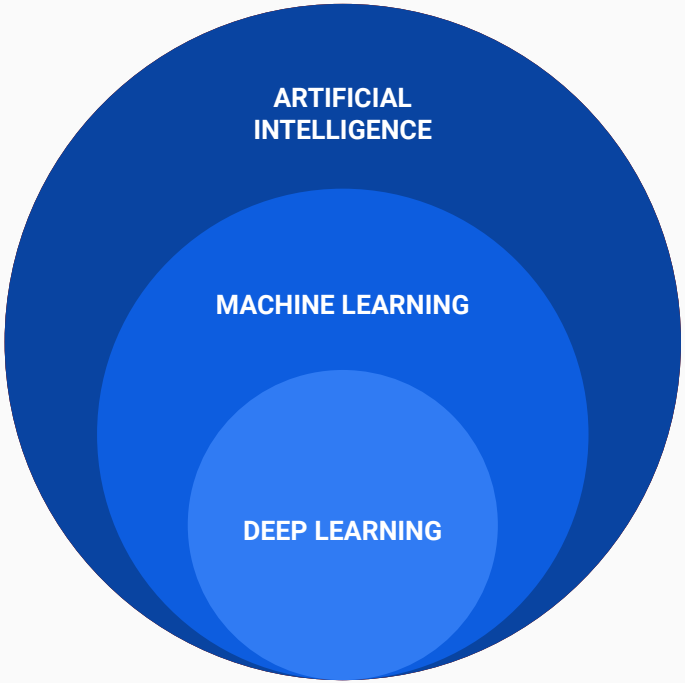
Machine Learning

Learning from experience

2010

Deep Learning

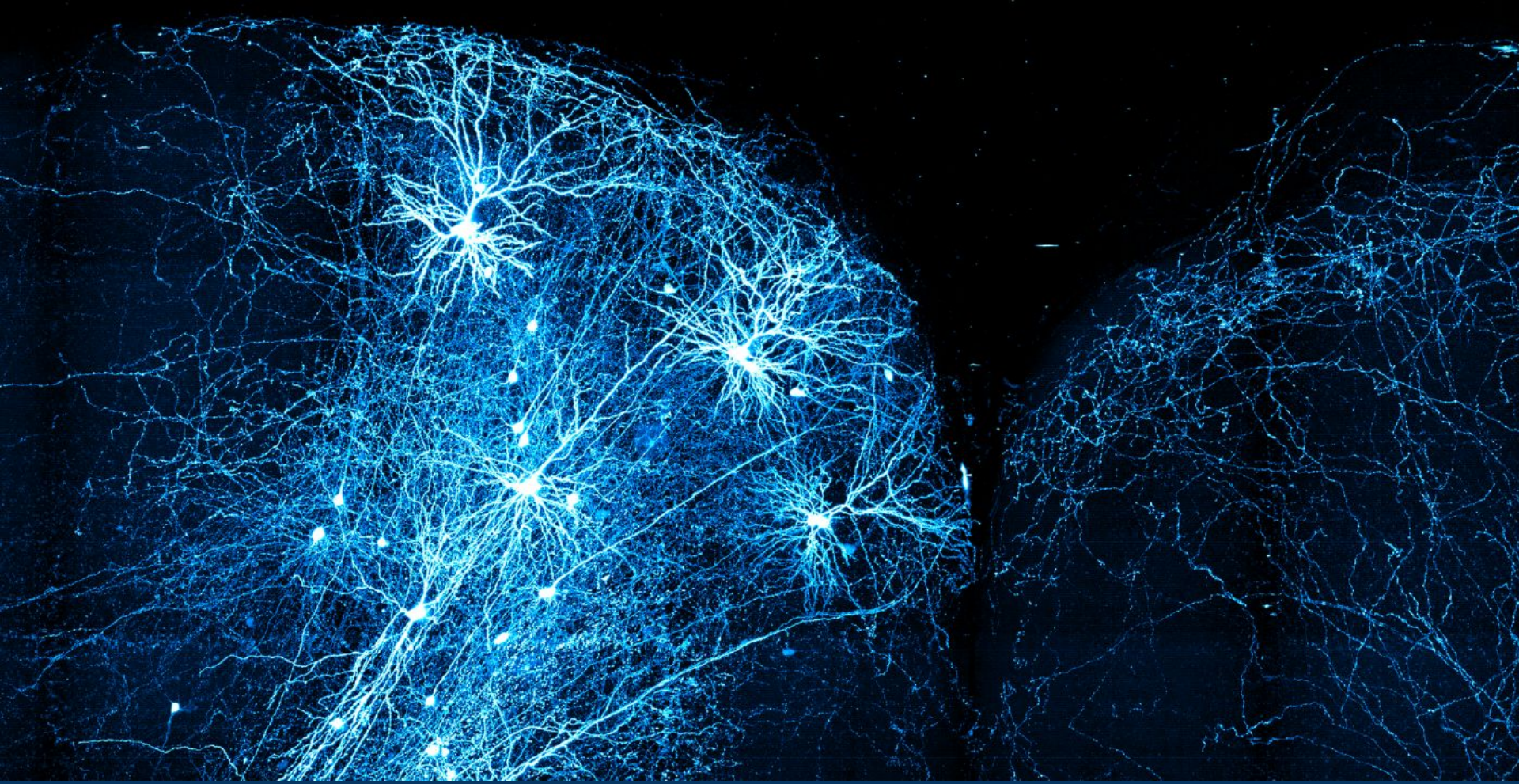
Deep Neural Networks



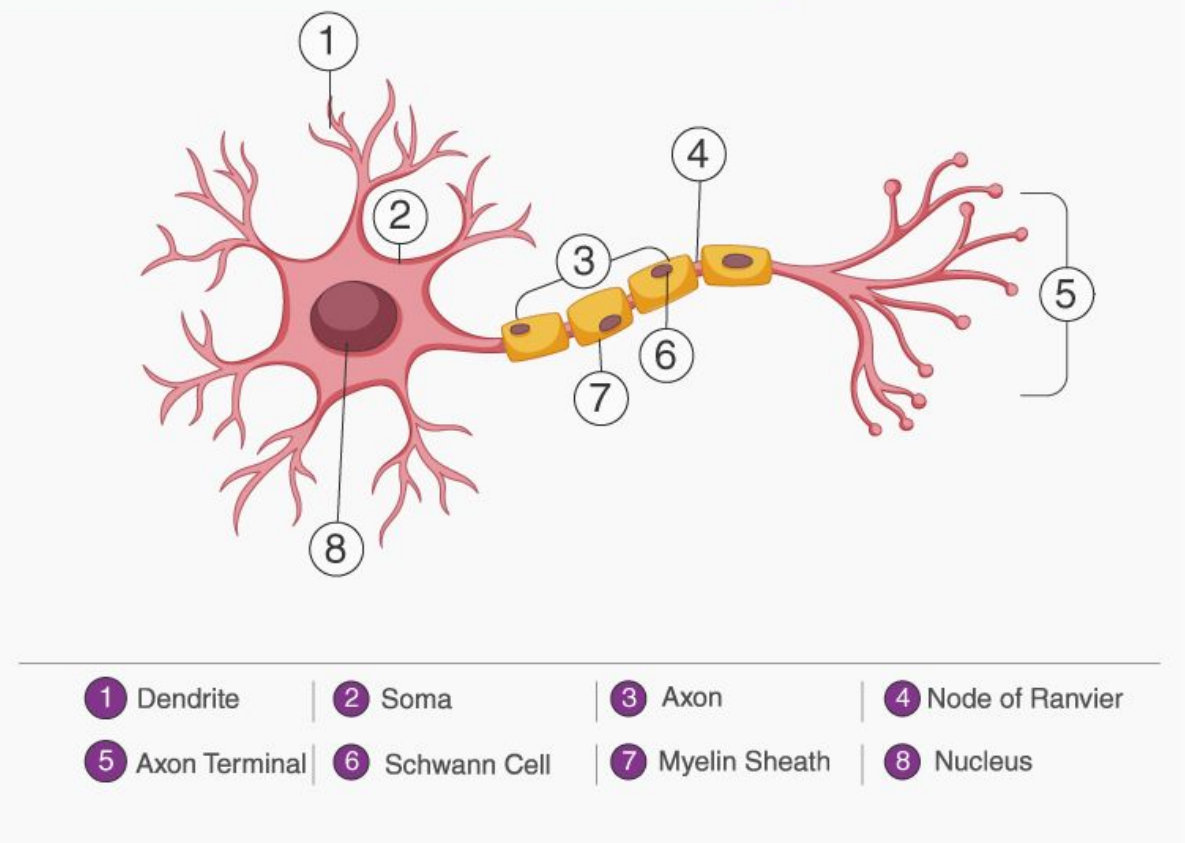
I’m smart.
You dumb.
101001110

CAT

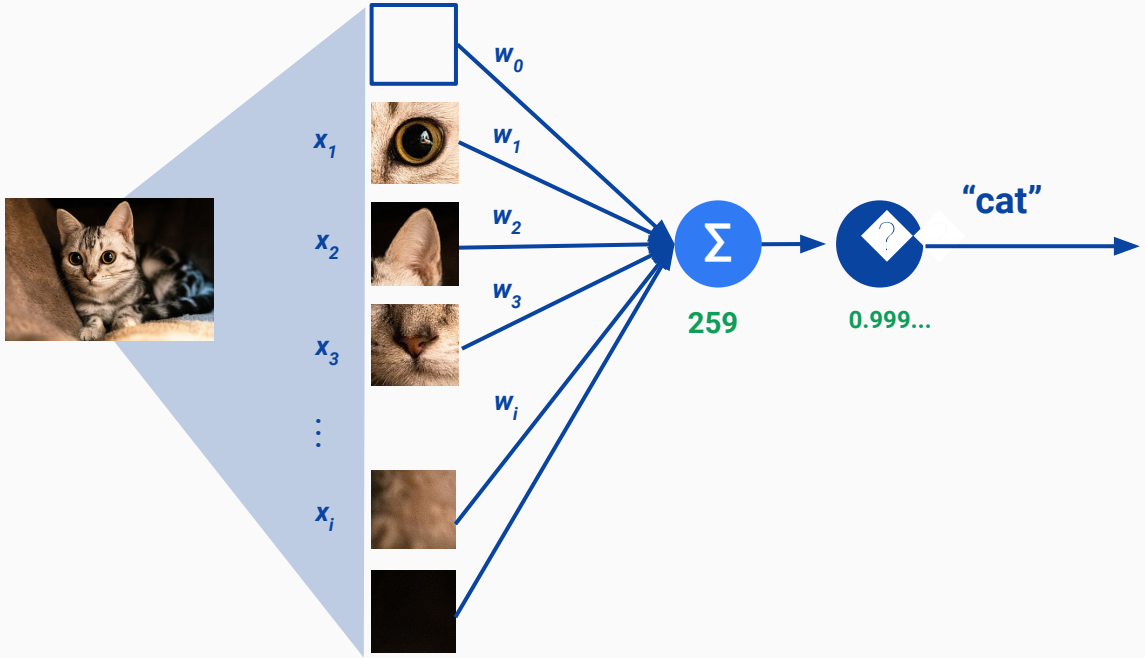
The Perceptron

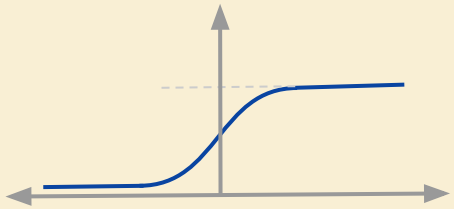


Brain Map (Source: [The Scientist)]



A single neuron



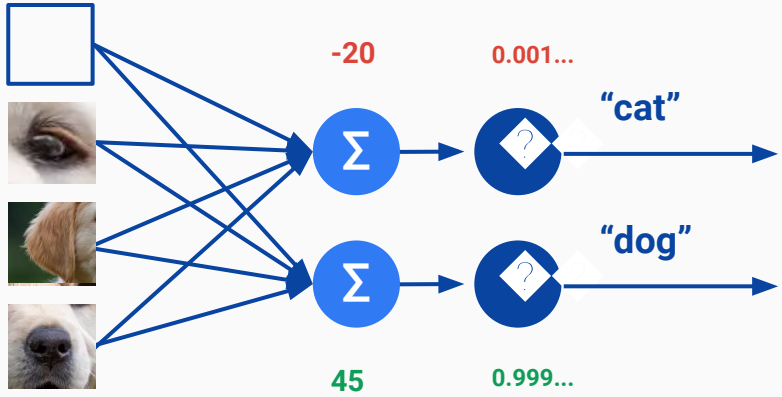


$$\hat{y} = \sigma(w_0 + \sum x_i w_i)$$

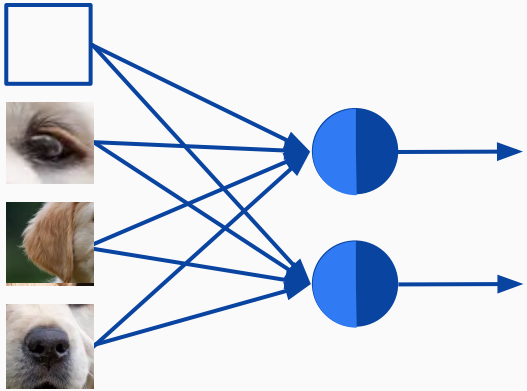
$$\hat{y} = \sigma(w_0 + \mathbb{X}^T \mathbb{W})$$

A single perceptron

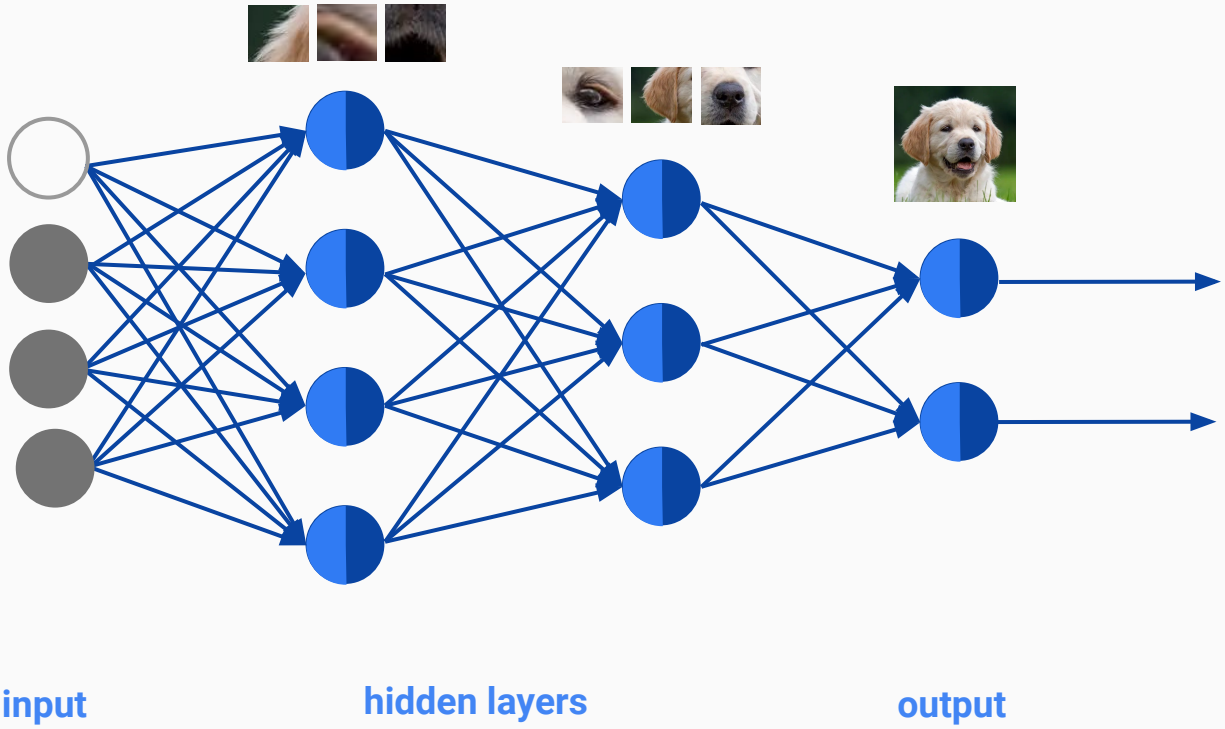
The Neural Network



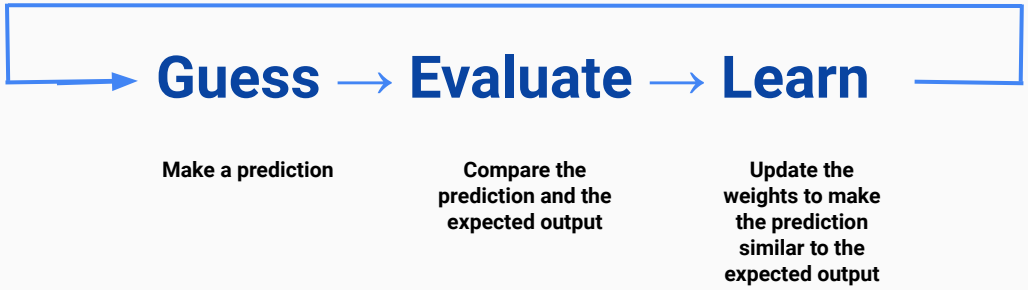
2-Class Classification



2-Class Classification



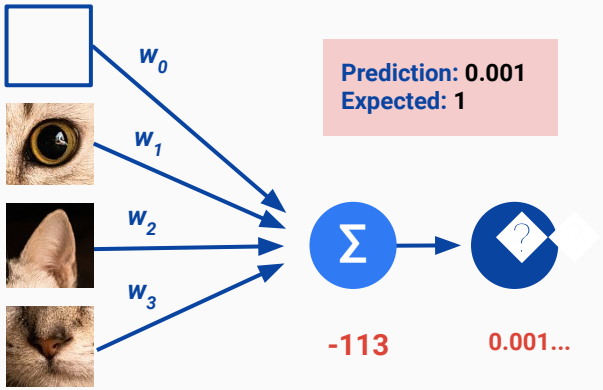
A Neural Network



The Training Process

Evaluate

Compare the prediction and the expected output



Prediction: 0.001
Expected: 1

Quantify the 'Loss'

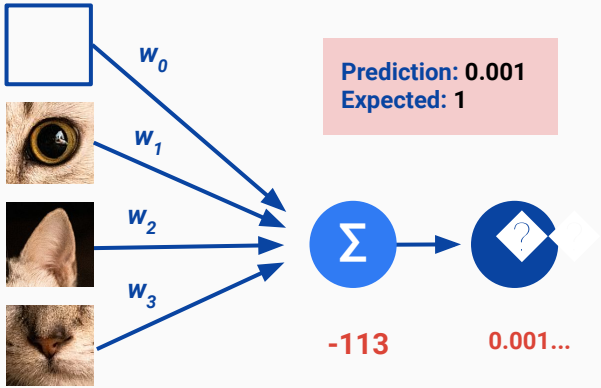
$$L_i = \text{Prediction}_i - \text{Expected}_i$$
$$J = \text{Sum}(L_i)$$

We want to optimize this 'Loss' by updating the weights

$$\mathbb{L}(f(x^{(i)}, \mathbb{W}), y^{(i)})$$
$$\mathbb{J}(\mathbb{W}) = \frac{1}{n}\sum_{i=1}^{n}\mathbb{L}(f(x^{(i)}, \mathbb{W}), y^{(i)})$$

Learn

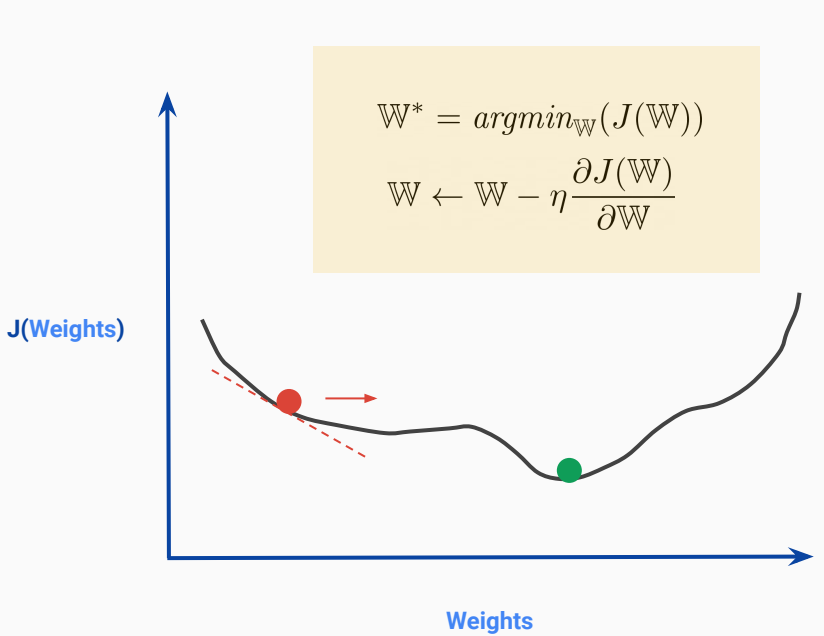
Update the weights to make the prediction similar to the expected output



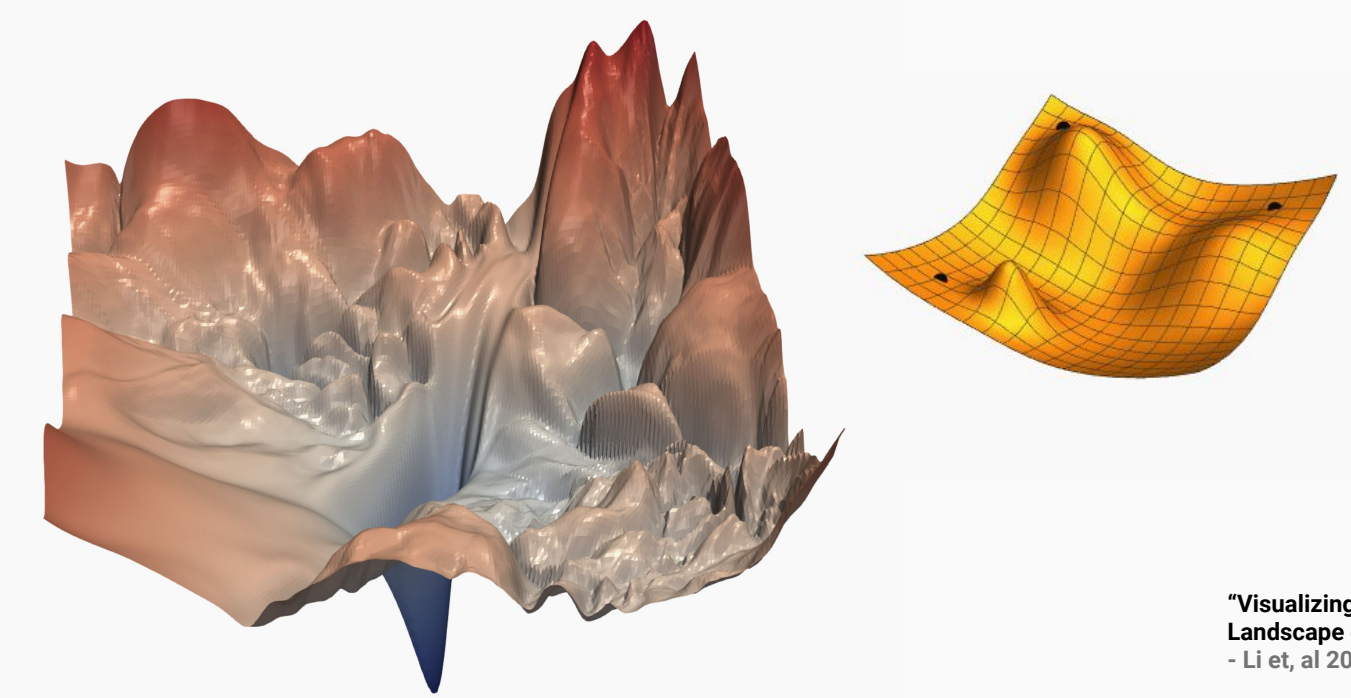
Prediction: 0.001
Expected: 1

Gradient Descent

$$\mathbb{W}^* = argmin_{\mathbb{W}}(J(\mathbb{W}))$$
$$\mathbb{W} \leftarrow \mathbb{W} - \eta \frac{\partial J(\mathbb{W})}{\partial \mathbb{W}}$$



Ofcourse, it isn't that easy



"Visualizing the Loss Landscape of Neural Nets"
- Li et, al 2017

Further Optimisations

- Adaptive Learning Rates
- Mini-Batches
- Regularization

Teachable Machines

listening

- **Make sure your background isn’t very distracting**
- **Make sure you don’t change your position**

https://teachablemachine.withgoogle.com/
https://editor.p5js.org/soham.de2001/sketches/5Ga5OIuUx

https://res.cloudinary.com/ashokacs/image/upload/v1605337128/listening_tkftie.png
https://res.cloudinary.com/ashokacs/image/upload/v1605337469/question_qn8spc.png
https://res.cloudinary.com/ashokacs/image/upload/v1605337761/ok_vsuayo.png

Other Cool Stuff

https://quickdraw.withgoogle.com/

https://thispersondoesnotexist.com/

https://monalisaeffect.com/