ONLINE COURSES

FROM YOUTUBE

FROMARUCIES

ROMMENES



Discussion

<u>C</u>ingin' in the Rain





Percy-eptron

$$x_1 \xrightarrow{w_1} y$$

$$x_2 \xrightarrow{w_2} y$$

$$x_3 \xrightarrow{bias}$$
Perceptron Model (Minsky-Papert in 1969)

Output = Activation
$$(W_1 \times_1 + W_2 \times_2 + W_3 \times_3 + b)$$



(BI)ac(k)-tivation Functions

Activation Functions

Sigmoid $\sigma(x) = \frac{1}{1+e^{-x}}$ tanh $\tanh(x)$ represents the second stank $\tan h(x)$ rep





Maxout

$$\max(w_1^T x + b_1, w_2^T x + b_2)$$



Let's work on an X-ample



Ex Decide Whether to eat outside. 1) Anything in the fridge? (1 = Yes) 2) Any restaurant nearby? (1=Yes) 3) Is it sunny now? (1= clear sky) 4) Using RTX3090? > W1 x1 +W2 x2 + W3 x3 + W9 x4 + 6 = (-3)(1) + 2(1) + 3(0) + (0.01)(1) + 0Fridge - -3 +2 toto.01 =-0.99 - ReLU (-0.99) = 0 Restaurant ReLU > Output Sunny) _ 0.01 1 (RTX309P Let bias = Q in this case, and activation function is ReLU

> Output = 0, so eat leftover fond!

(A) New (Hope) Ral Network



Long Definition (optional):

Artificial neural networks, usually simply called neural networks (NNs), are based on a collection of connected units or nodes called artificial neurons, which loosely model the neurons in a biological brain. Each connection, like the synapses in a biological brain, can transmit a signal to other neurons. An artificial neuron that receives a signal then processes it and can signal neurons connected to it.

Short Definition:
Neural Network is a bunch of perceptron connected together

Motivation:

The perceptron is not complex enough to classify non-linear data. We then introduced neural network which consists of many perceptron to handle nonlinear classification problem.

→ Tanh

4 HIDDEN LAYERS

- 0

OUTPUT

Classification ~

Show test data Discretize output

Test loss 0.020 do you want to Training loss 0.002 feed in? 5 neurons 4 neurons 4 neurons 4 neurons **a** Ratio of training to test data: 80% The outputs are Batch size: 10 mixed with varying weights, shown -6 -6 -4 -3 -2 -1 0 1 2 3 4 5 REGENERATE from one neuron Hover to see it

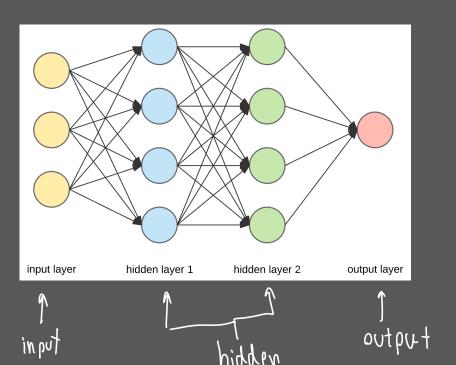
> radius angleA

000.498

FEATURES

https://playground.tensorflow.org/

Definition & Terminology



(Demon S)Layers

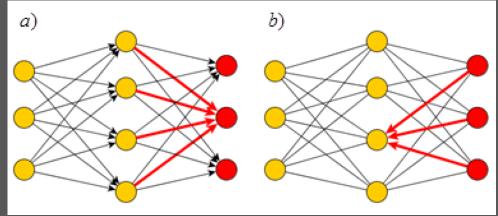




Back Propagation (backpropagation)

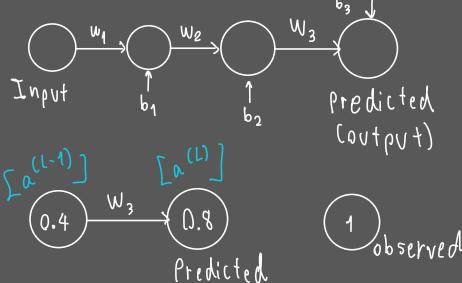
1/given the cost function, we use chain rule

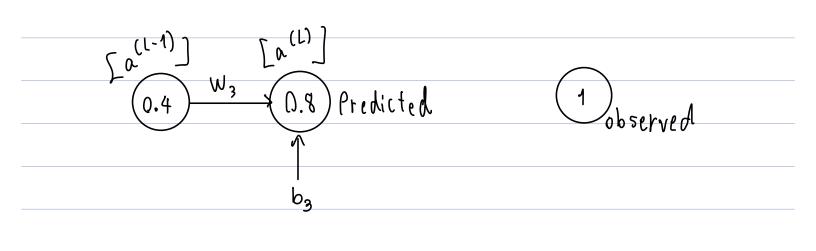
to update each weight & bias from output layer to input layer





(Django Un)chain(ed) rule is backpropagation backbone





Gradient Descent: W_{3 new} = W_{3 old} -
$$\lambda \frac{\partial (cost)}{\partial w_3}$$

That's The End (of Evangelion) for today

