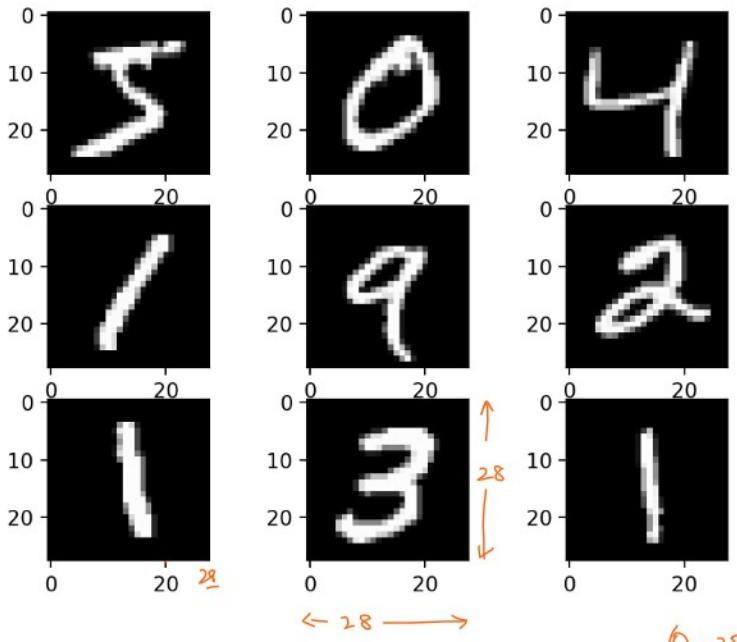
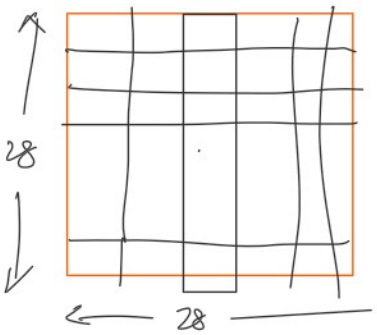
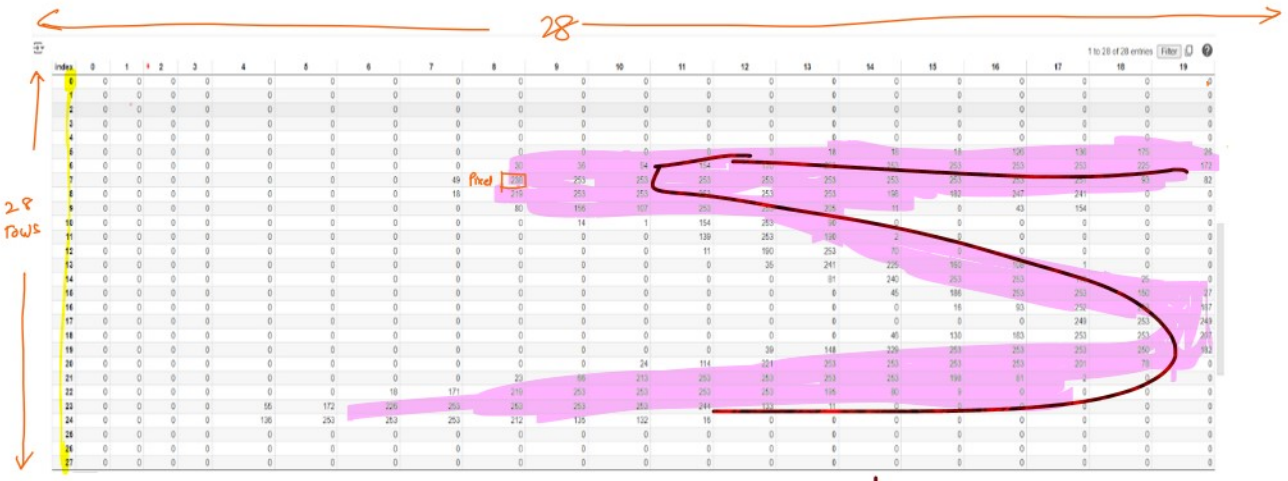
Weights & biases

27 July 2024 20:10





(0-255)

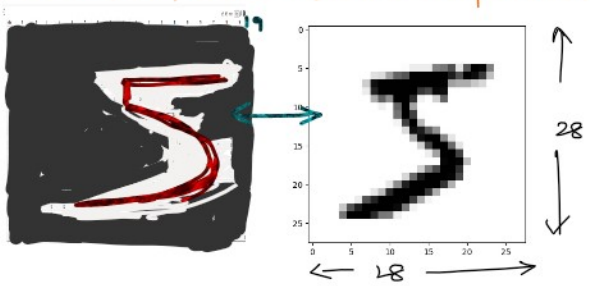


(5)

How do we identify any image ?

- depending on the edges, patterns texture, shape etc., images are unique in nature

9 9 →



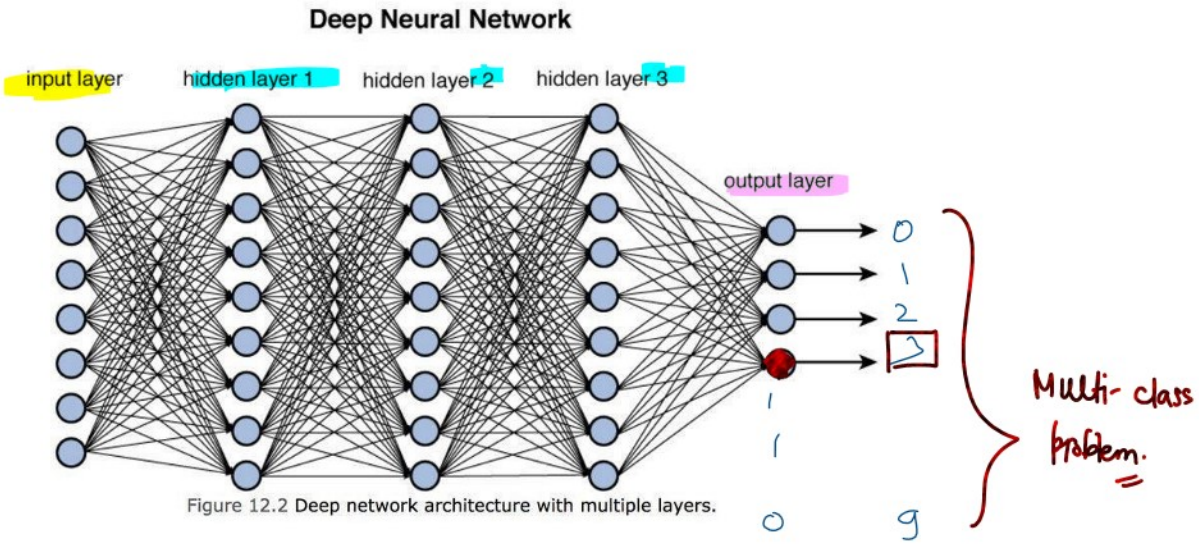
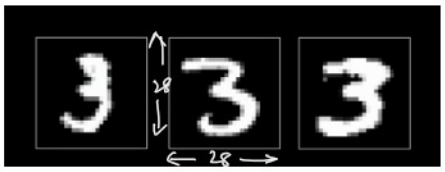


Figure 12.2 Deep network architecture with multiple layers.

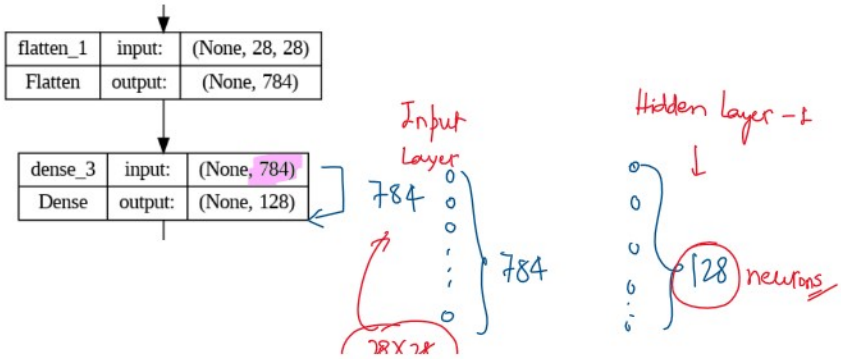
Input Layer: (Input variables)

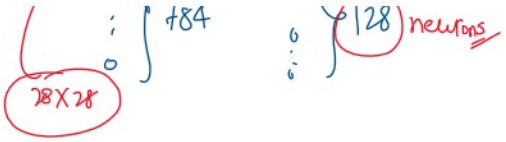
To input the data features; in our case, pixel values of an image

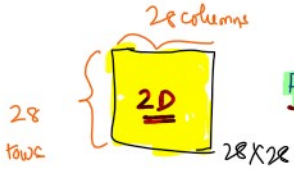


28*28=**784** → No. of input features (neurons) connecting to hidden layer.

MNSIT







np.flatten()

pixel

dpi
dot per inch
4 by 3

What do you mean by pixel?

- It means 'picture element' which is the smallest unit of a digital image or display.

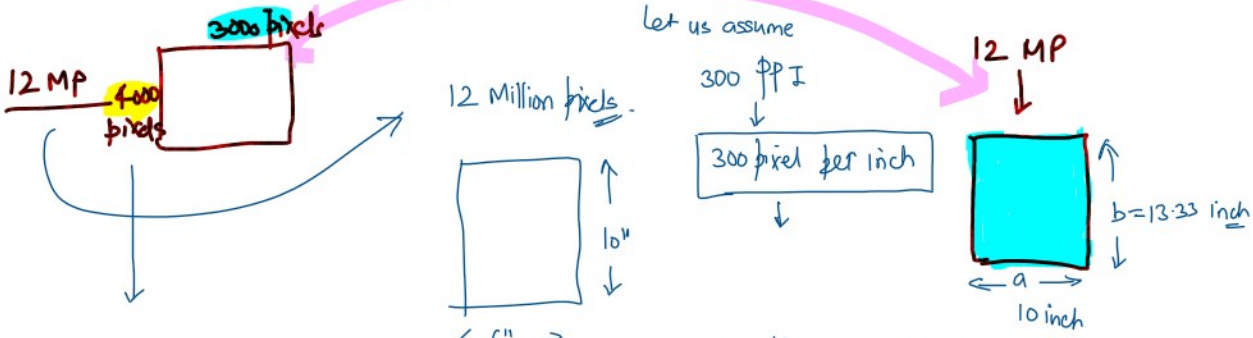
Pixels per inch → ppi → Higher the ppi ⟹ more details and sharpness in image

1920 rows by 1080 columns

= 1920*1080=2,073,600 ⇒ 2 MP.

12MP → 12×10^6

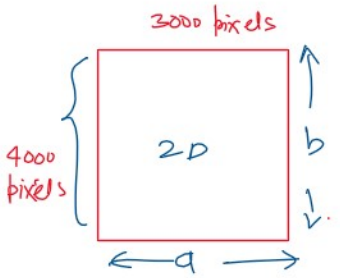
4×10^3 (4000) 3×10^3 (3000)



$\frac{4000}{300}$ inch = 4000/300=13.3333

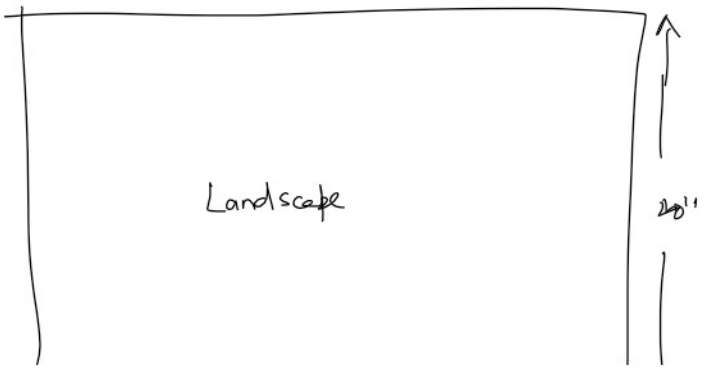
a) Kelan – 10x 13.33

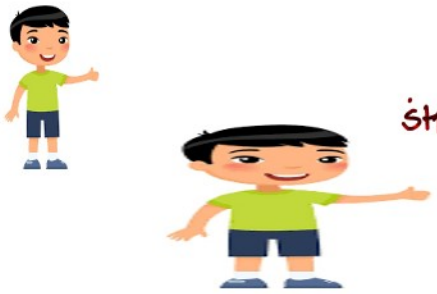
b)



300 PPI

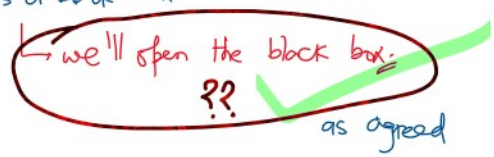
300





Hidden Layer(s)

- it is a black box



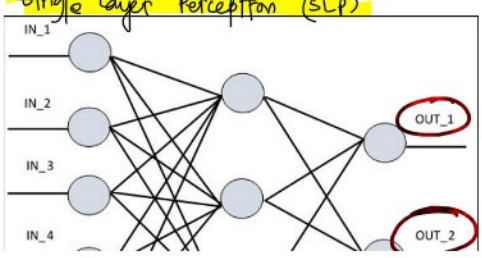
Caution: going to be overwhelming

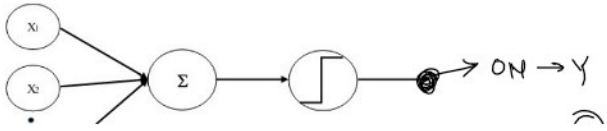
- intermediate layer between input and output layers.
- these layers (hidden) perform computations and extract the features from the input data
- 'deep' learning term refers to the network with multiple hidden layers.

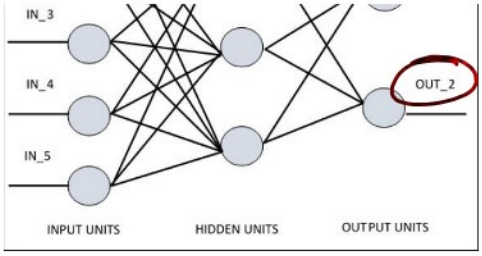
Output Layer

- It is the final layer that produces the o/p of the network.
  - one neuron in the output layer for binary classification → 'sigmoid'

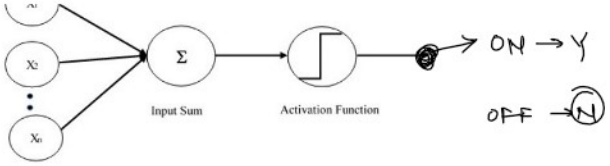
Single layer Perceptron (SLP)





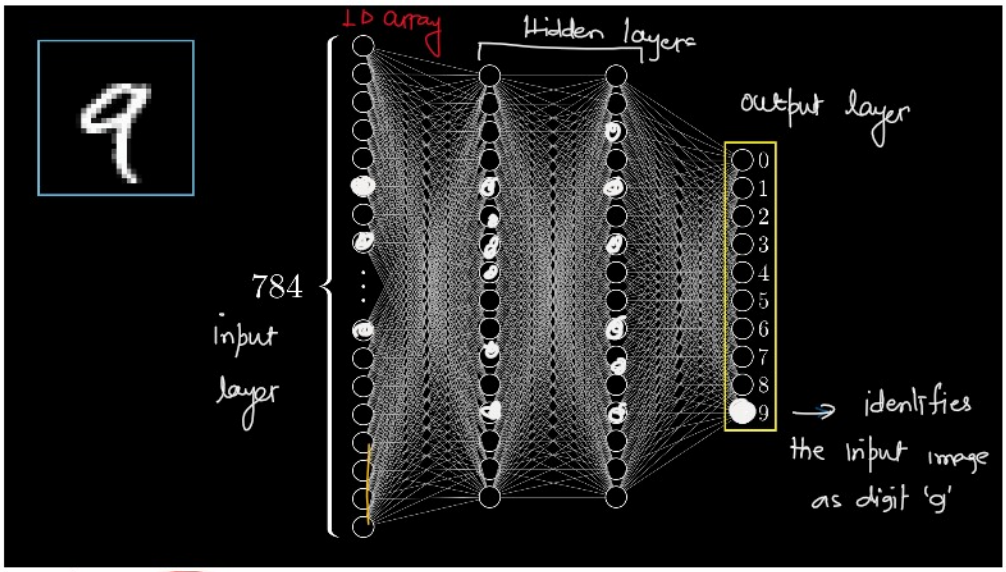


N



- multiple neurons for multi-class classification
  - Softmax

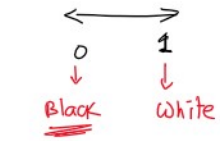
Warren Mc culloh and Walter Pitts (1943) — proposed the first mathematical model for neural network.

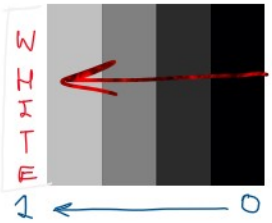


0 to 255

↓

Normalization

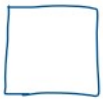




0-255 range in pixels

total 256 values

most digital images → JPEG, PNG



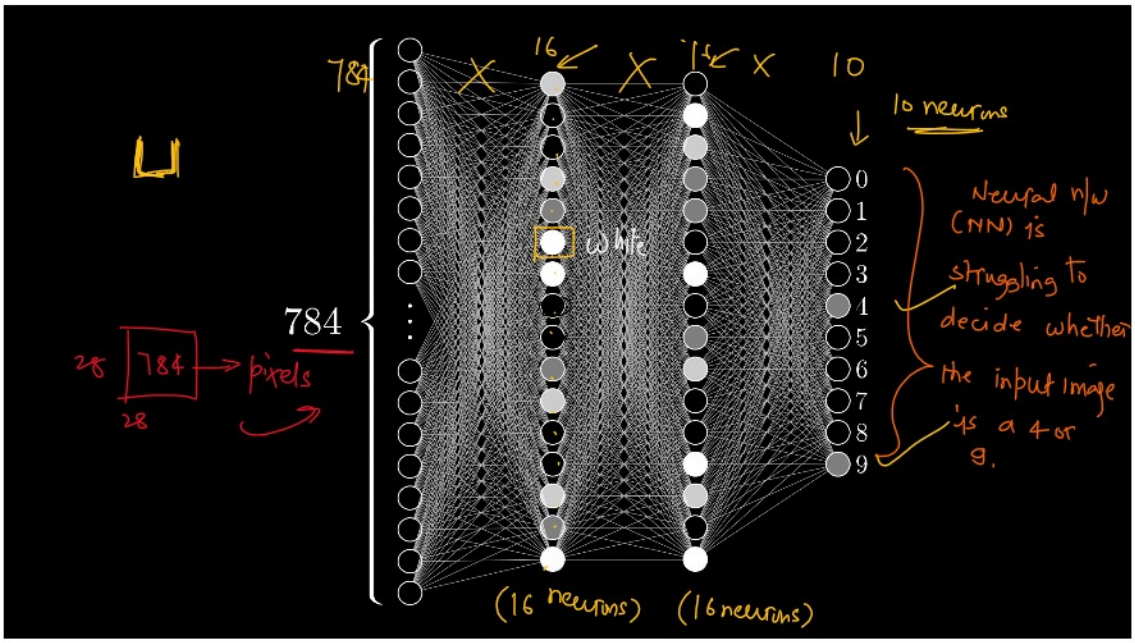
0: represents black

255: represents white

] 256 shades of black to white

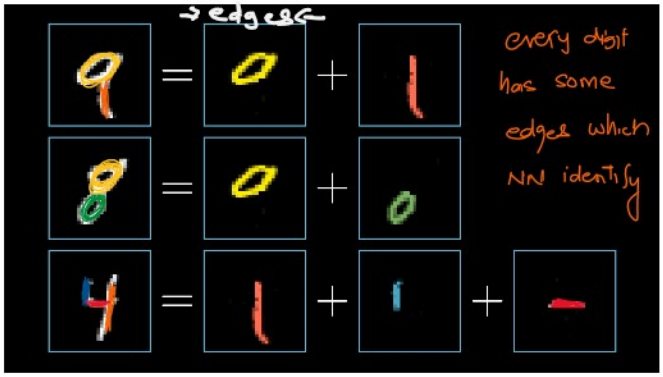
127 → represents medium grey

0–255 —normalization→ 0–1

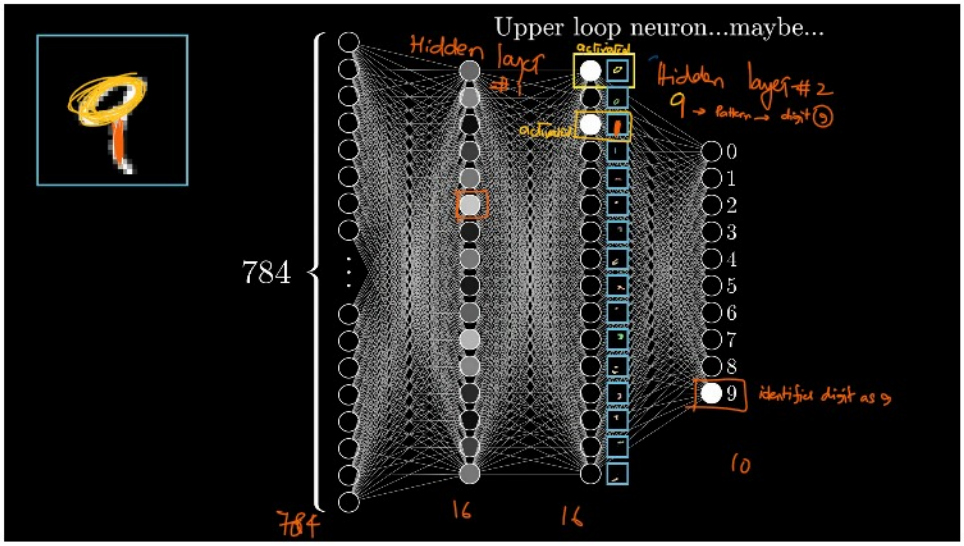


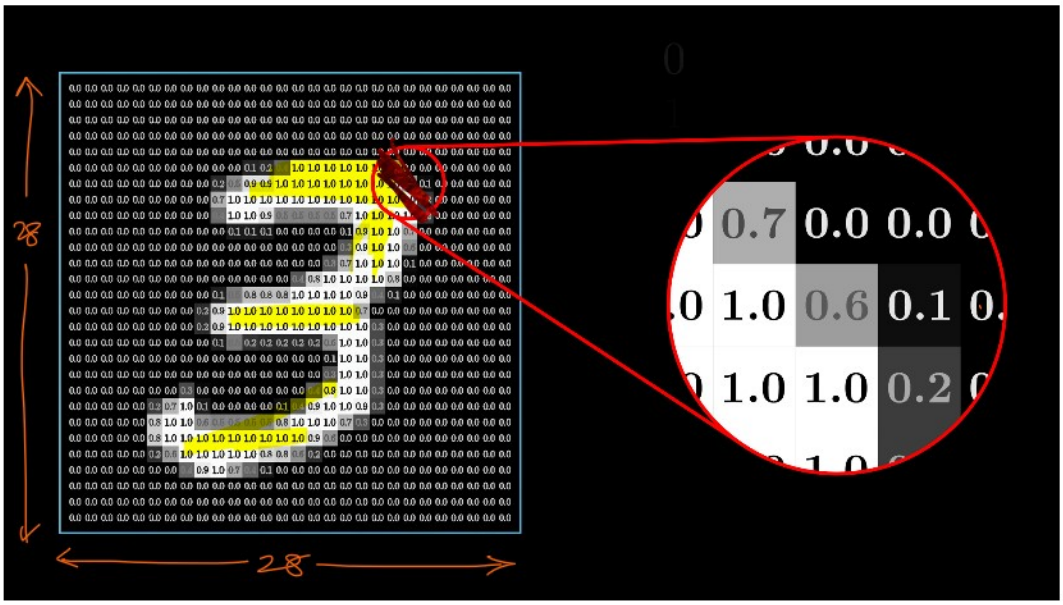
Intuitive Understanding (going one layer deep)

How does the training work?



edges → pattern → digit

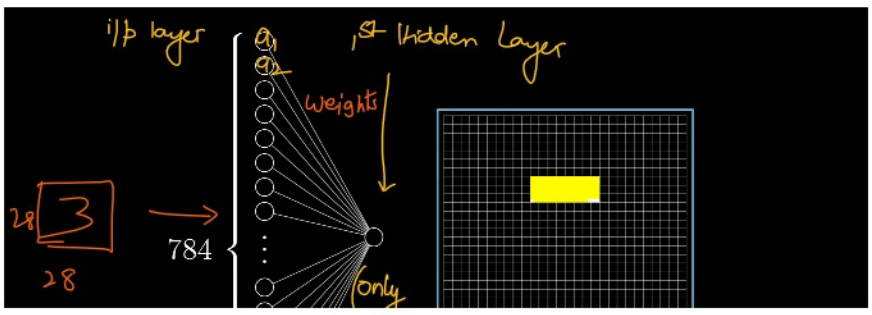


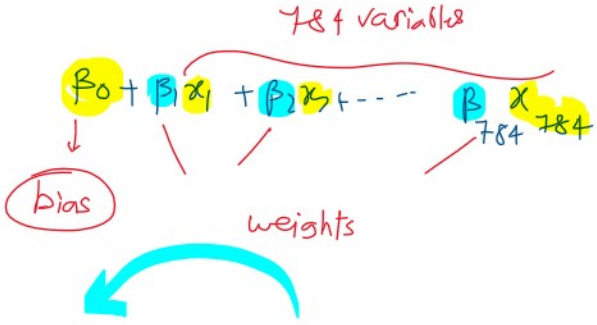


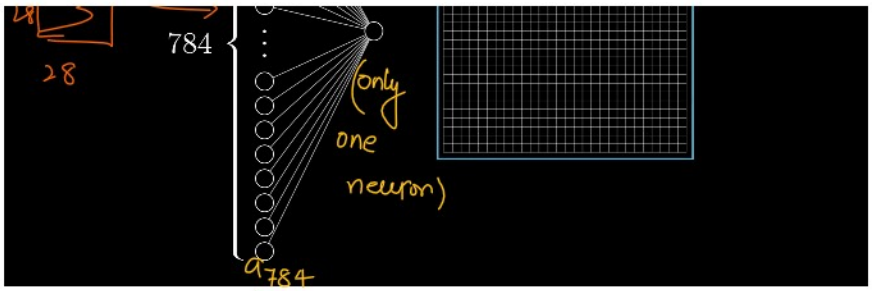
Detecting edges and forming patterns to help us with image recognition tasks

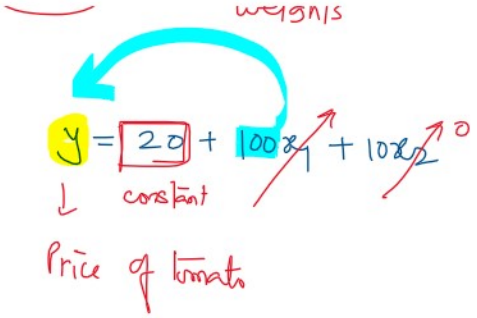
Source: Kevin Pluck

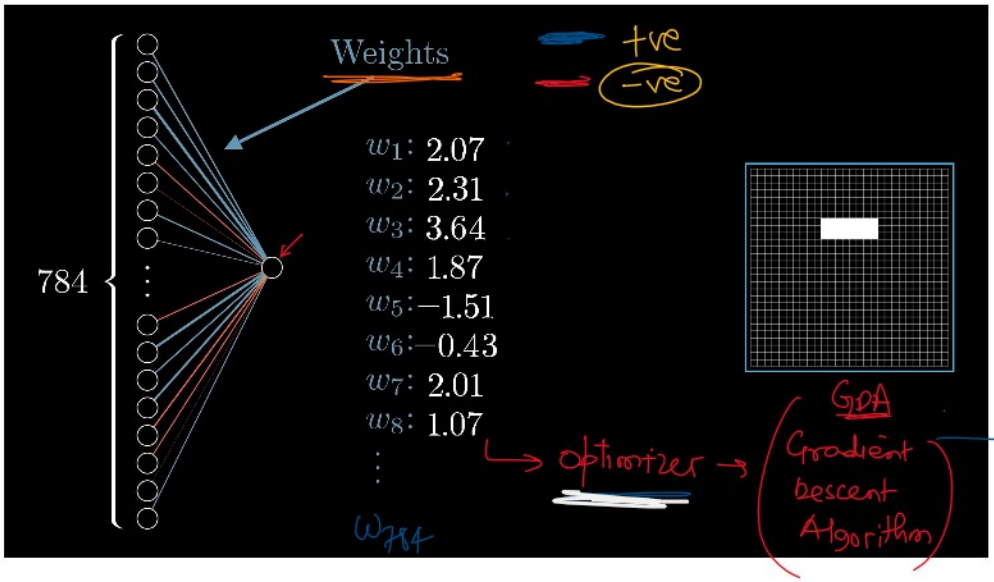
How information passes between layers

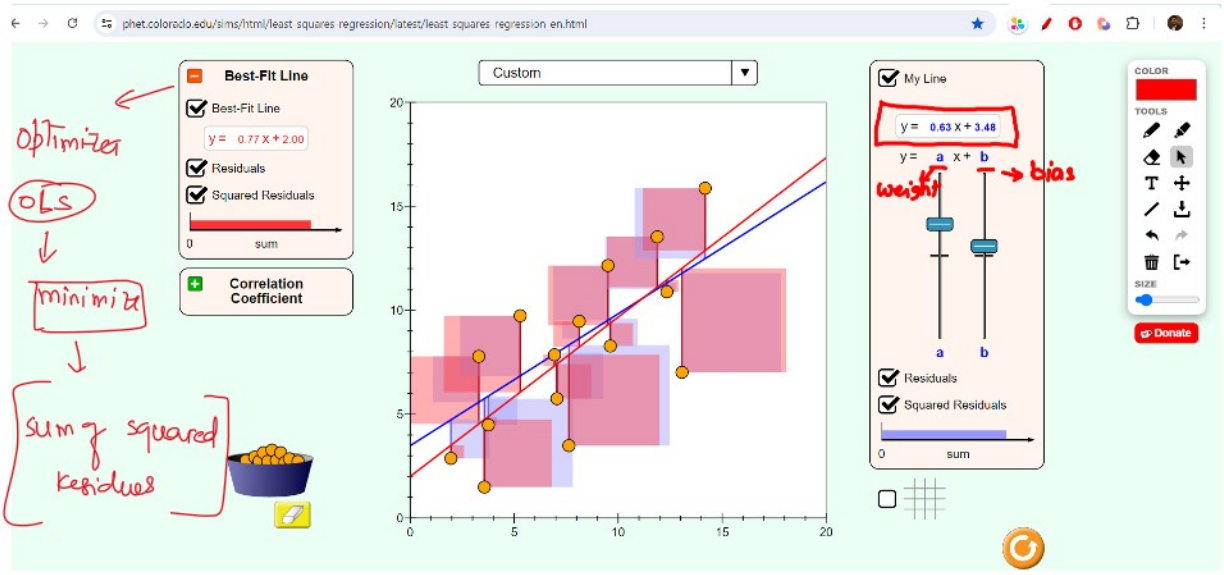












[Least-Squares Regression]