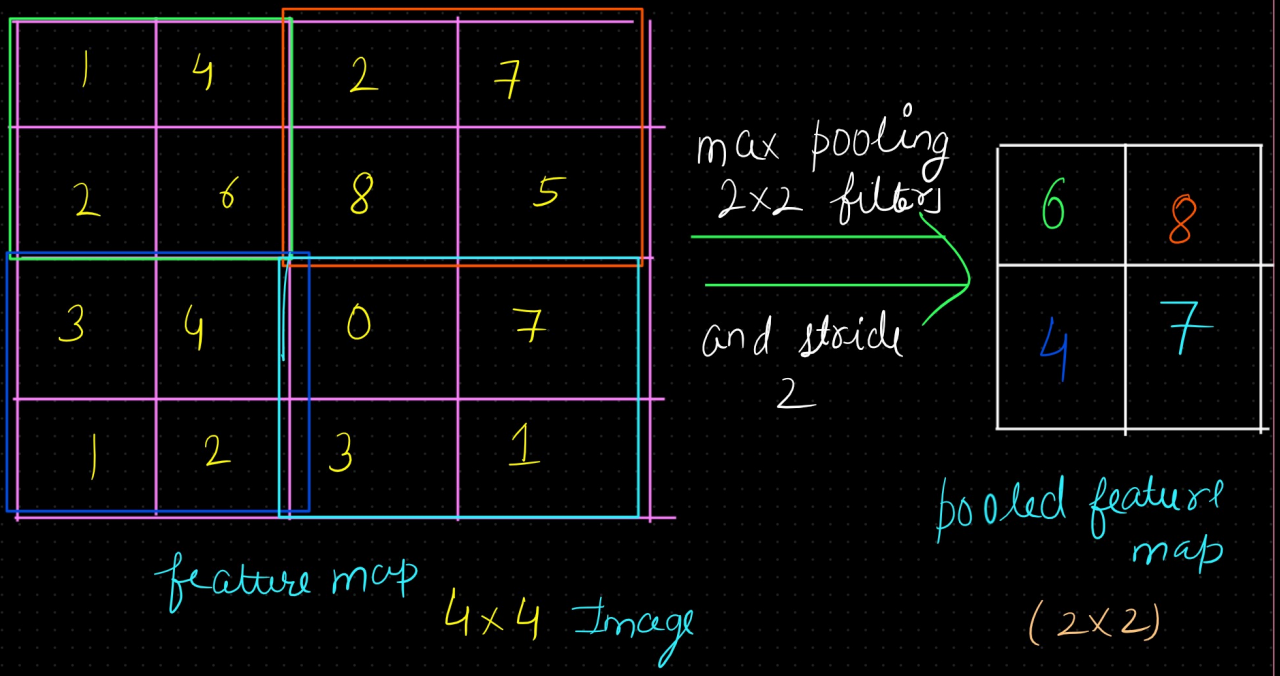
Convolutional Neural Network (CNN)

Pooling → Down sampling operation

→ To reduces the dimensionality of the feature map.



(1) max(1, 4, 2, 6)

(2) max(2, 7, 8, 5)

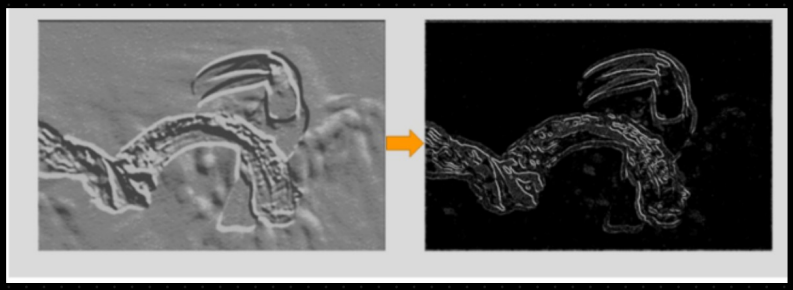
(3) max(3, 4, 1, 2)

(4) max(0, 7, 1, 3)

Why do we need Max Pooling ?

→ 1) Reduce Image size, thus reduce computational cost.

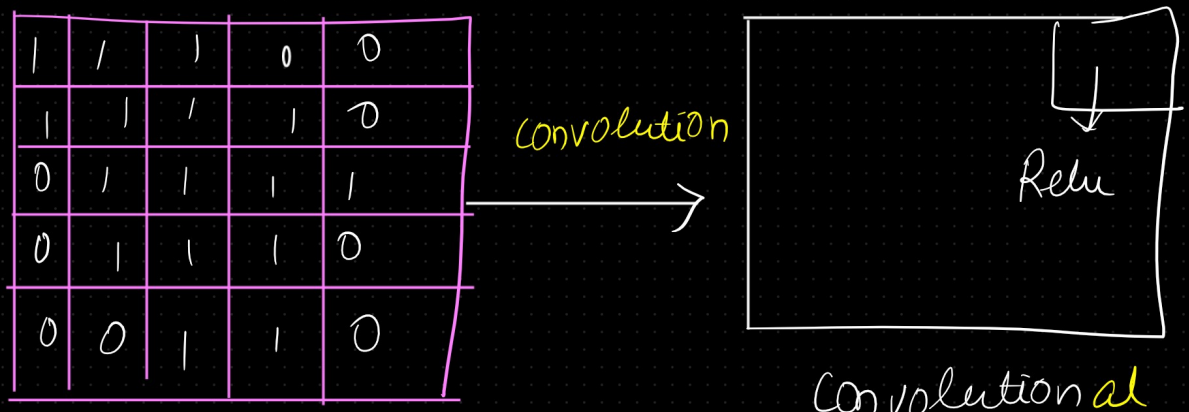
→ 2) Enhance the feature of the Image.



Convolutional layer

Pooling layer
- edges
- corners
- body
- feather
- eyes

Convolutional Neural Network Structure



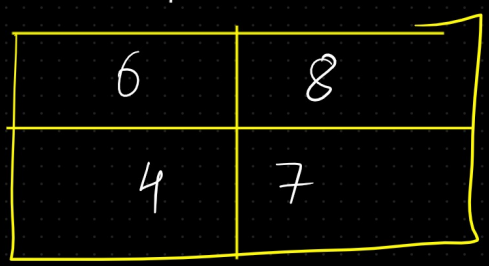
Input Image

Convolutional layer

Pooling

Where ?

After Convolutional layer



Pooling layer

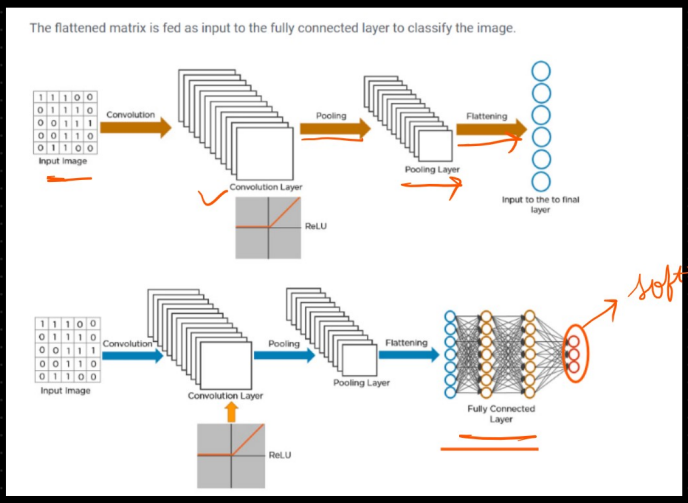
Flattening → Image → vector linear

6	8
4	7

Flattening →

Pooled feature map

6
8
4
7



Relu → Rectified linear unit

negative — set — 0

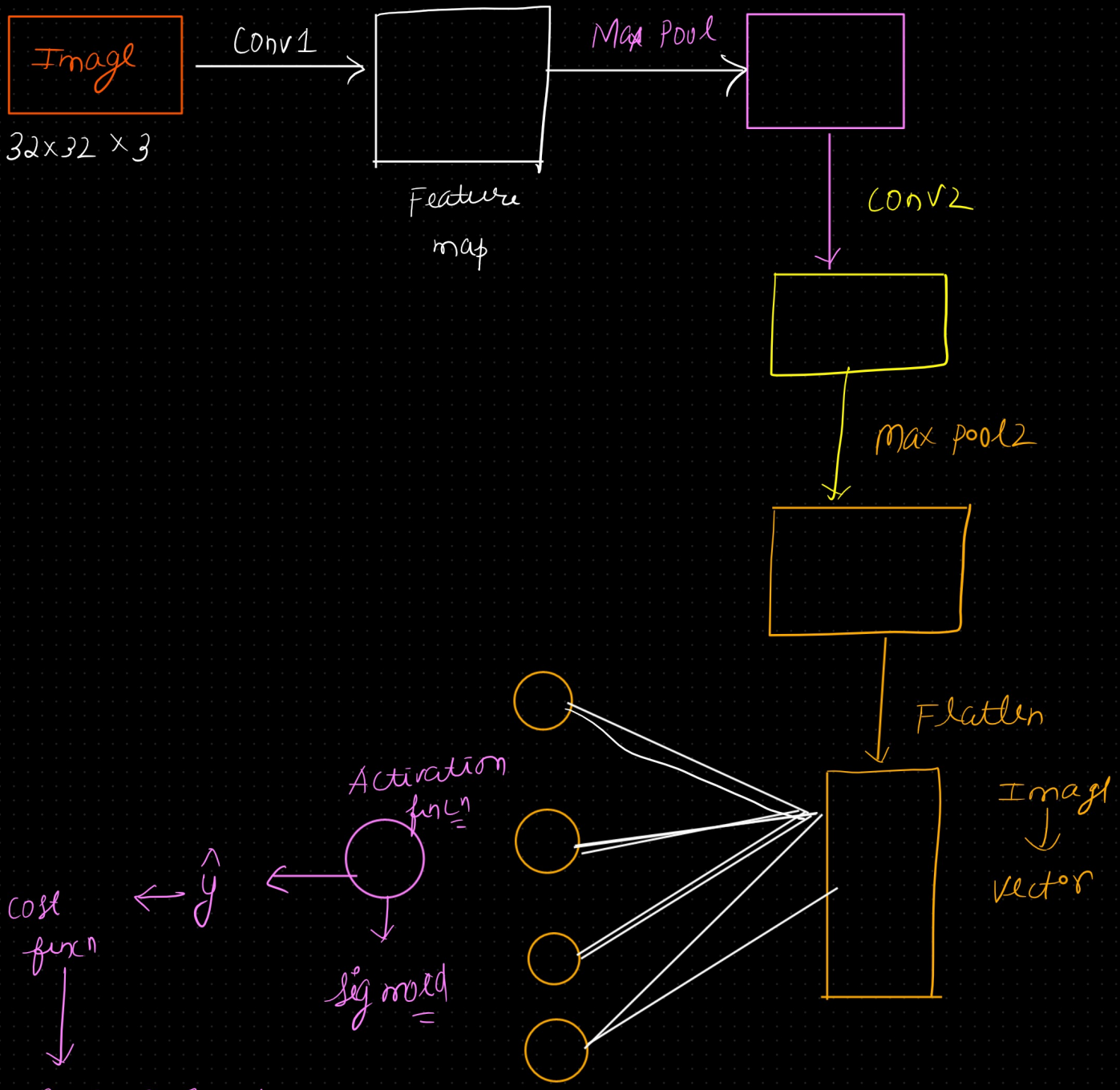
=

If Binary classification task → which activation function I will use ?

=

tensorflow

CNN


Imagl
32x32 x3
Conv1
Feature map
Max Pool
CONV2
Max pool2
Flatten
Imagl
vector
Activation funcn
sigmoid
ŷ
cost funcn
Back Postpogation
ANN
SGD
Adam
momentum

Summary

→ What are the steps of CNN?

A. The steps involved in a Convolutional Neural Network (CNN) can be summarized as follows:
1. Convolution: Apply convolutional filters to input data to extract local features.
2. Activation: Introduce non-linearity by applying an activation function (e.g., ReLU) to the convolved features.
3. Pooling: Downsample the convolved features using pooling operations (e.g., max pooling) to reduce spatial dimensions and extract dominant features.
4. Flattening: Convert the pooled features into a one-dimensional vector to prepare for input into fully connected layers.
5. Fully Connected Layers: Connect the flattened features to traditional neural network layers to learn high-level representations and make predictions.
6. Output Layer: The final layer produces the network's output, often using a suitable activation function based on the problem (e.g., softmax for classification).
These steps collectively allow CNNs to effectively learn hierarchical representations from input data, making them particularly suited for tasks such as image classification, object detection, and computer vision applications.

What are the two main parts of CNN?

The two main parts of a Convolutional Neural Network (CNN) are the convolutional layers and the fully connected layers. Convolutional layers perform feature extraction and capture local patterns in the input data, while fully connected layers use the extracted features to make predictions or perform classification. These two components work together to enable CNNs to learn and recognize complex patterns in images or other types of data.