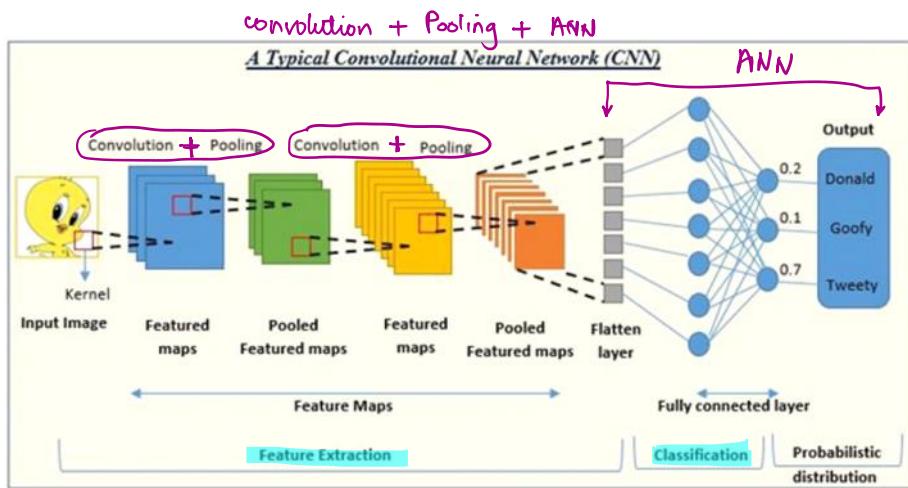
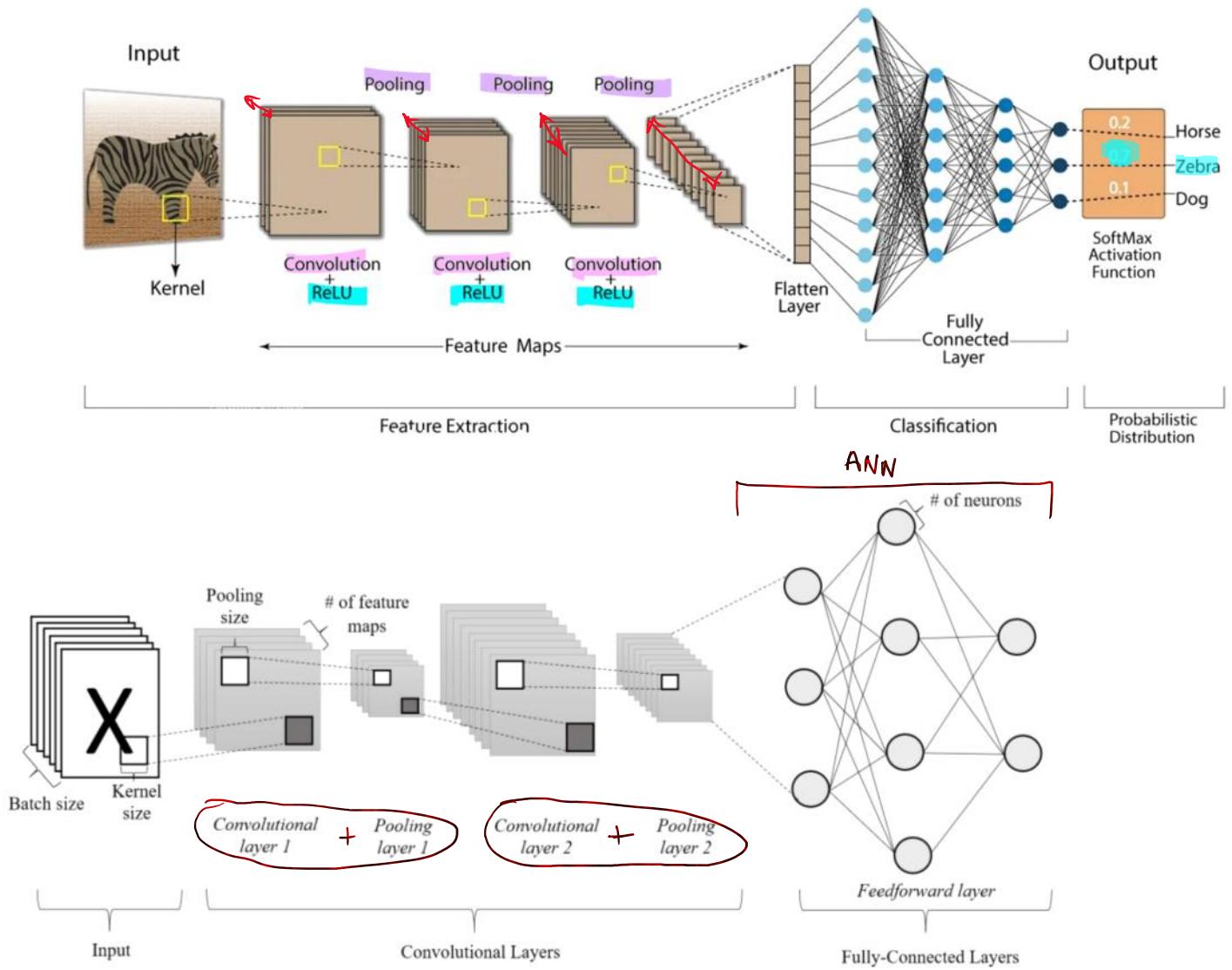


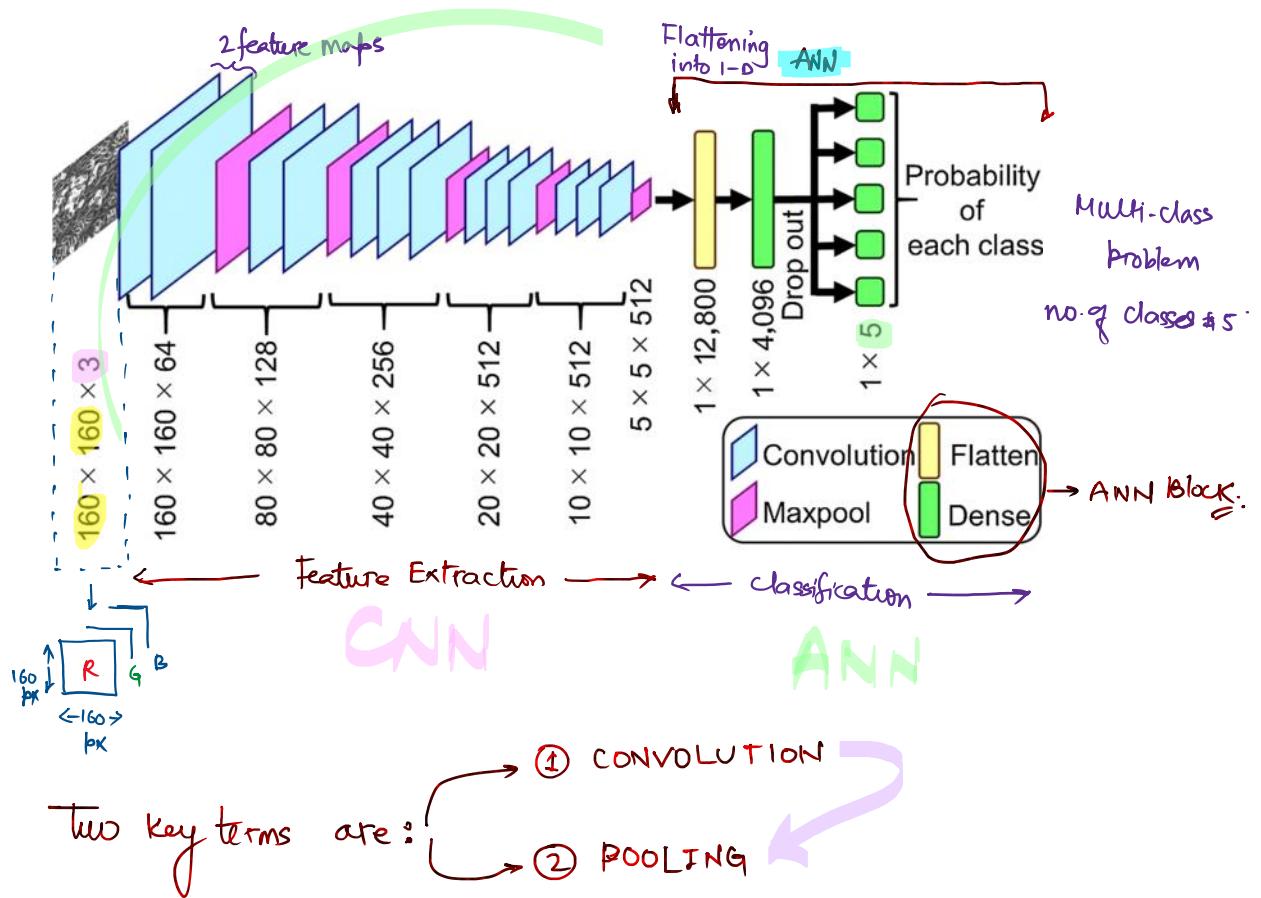
CNN Model Architecture

09 November 2025 11:31



Convolution Neural Network (CNN)





1. INPUT LAYER

Input layer of a CNN model receives the raw image data in the form of multi-dimensional array called TENSORS

For grayscale image

MNIST Use-case

Input Tensor

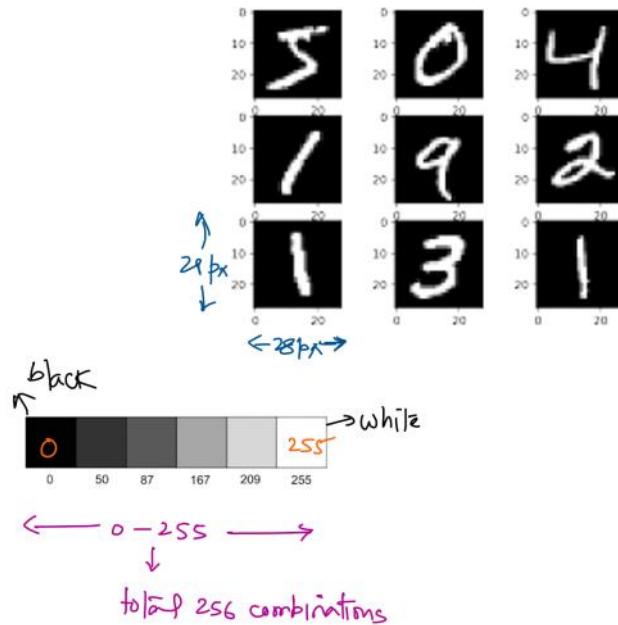
For each image: $(H \times W \times 1)$

H : Height of the image (no. of pixels vertically)

W : Width of the image (—, —, horizontally)

1: single color channel : grayscale.

a grayscale image has no color but only intensity information



For color images: RGB

Input Tensor: ($H \times W \times 3$)

↳ represents three color channels

Red
Green
Blue

<https://www.csfieldguide.org.nz/en/interactives/rgb-mixer/>

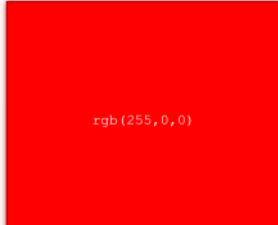
RGB Colour Mixer - Used by Screens



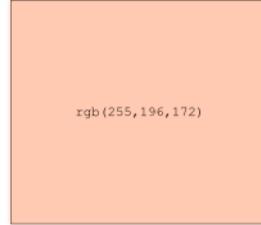
RGB Colour Mixer - Used by Screens



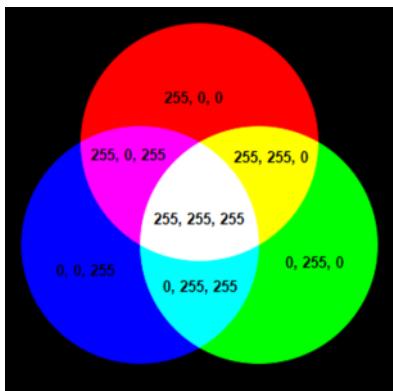
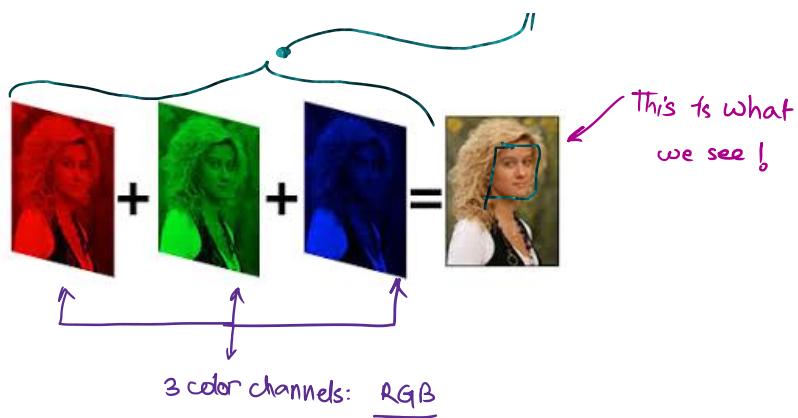
RGB Colour Mixer - Used by Screens



RGB Colour Mixer - Used by Screens



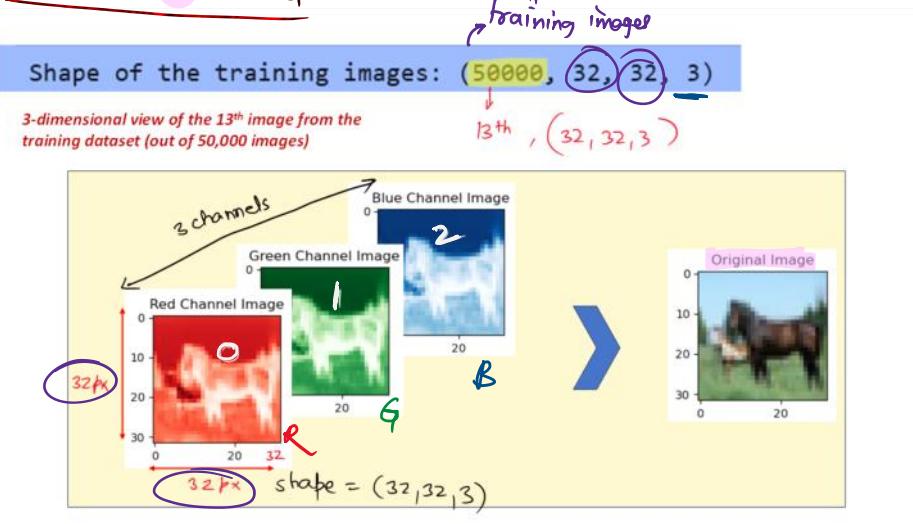
/ This is what



Note: CNNs are naturally designed to work with multi-channel inputs

[batch size, 3, height, width] \rightarrow 4-dimensional array
 ↓ ↓
 (50,000) no. of channels
 Images
 In training set.

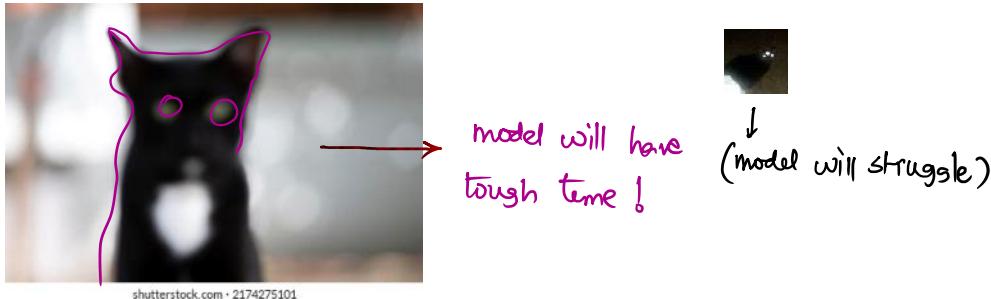
CIFAR - 10 dataset \rightarrow 10 classes \rightarrow <https://www.cs.toronto.edu/~kriz/cifar.html>



	Grayscale	RGB	(In CNN model)
① MNIST Handwritten Digits Recognition	✓	✗	shapes/patterns matter not color.
② Medical Imaging (X-rays, CT scan)	✓	✗	shapes/patterns matter intensity is enough.
③ Need extra information/ compare colors	✗	✓	stop sign → Red (Red circle) Pass/Go → Green (Green circle)

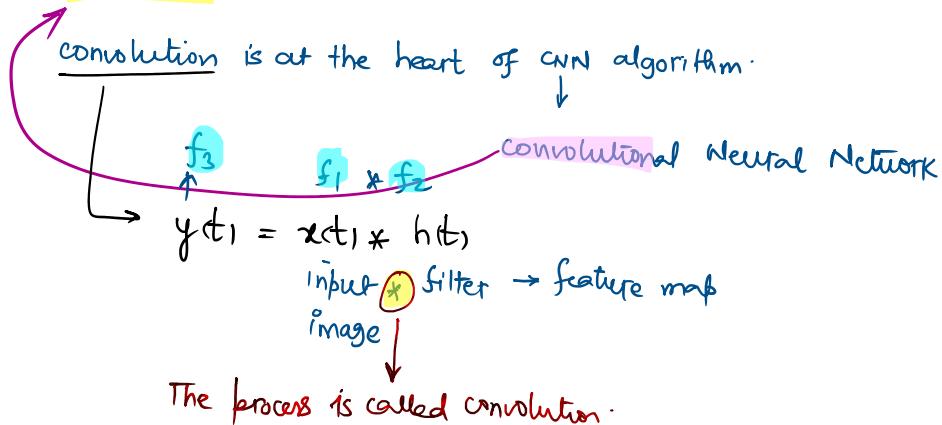
Conclusion: Build the baseline model using 'grayscale' and switch over to RGB if needed.

<https://imagecolorpicker.com/>

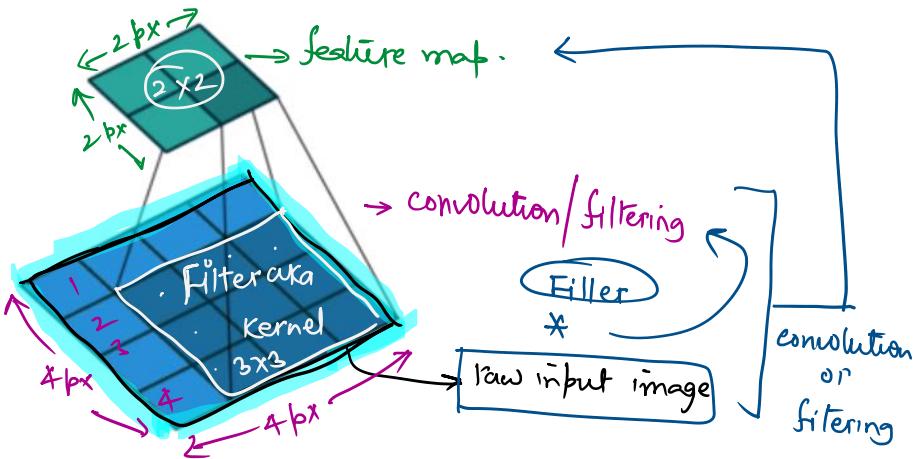


Yes, blurring does hurt CNN models.

2. CONVOLUTION (FILTERING) LAYER



Convolution is a mathematical operation - that blends two functions to produce a third function expressing how one modifies or shapes the other.



https://maucher.home.hdm-stuttgart.de/Pics/gif/no_padding_no_strides.gif

https://adamharley.com/nv_vis/cnn/2d.html

