Save Model (Important Step)

count of filters

Model: "sequential_1"

Layer (type)	Output Shape	Param #
conv2d (Conv2D)	(None, 26, 26, 32)	320
max_pooling2d (MaxPooling2D)	(None, 13, 13, 32)	0
flatten (Flatten)	(None, 5408)	0
dense_3 (Dense)	(None, 128)	692,352
dense_4 (Dense)	(None, 10)	1,290

$(13*13*32)$

$(5408+1)*128$

Total params: 2,081,888 (7.94 MB)
Trainable params: 693,962 (2.65 MB)
Non-trainable params: 0 (0.00 B)
Optimizer params: 1,387,926 (5.29 MB)

$(128+1)*10$

1290

Kernel size $= (3,3)$

Number

of $= 32$

filters

(Gray scale)

input shape $= 28 \times 28 \times 1$

$32 * ($ filter height $*$ filter width $*$ input channel $+$ Bias $)$

$$32 * (3 \times 3 \times 1 + 1) = 320$$

$$\frac{\eta - f + 2p}{s} + 1$$

output shape

$$\frac{28 - 3}{1} + 1 = 26$$

start

None $\longrightarrow$ Batch size

12	20	30	0
8	12	2	0
34	70	37	4
112	100	25	12

2×2 Max-Pool →

20	30
112	37

2
4

26

26

4

Reduce the size of
the output image

2×2

Reduce Computational
Cost

$*13*13$

most

Important features

Test set

↳ Sample image

↳ (28, 28, 1)

expand_dims
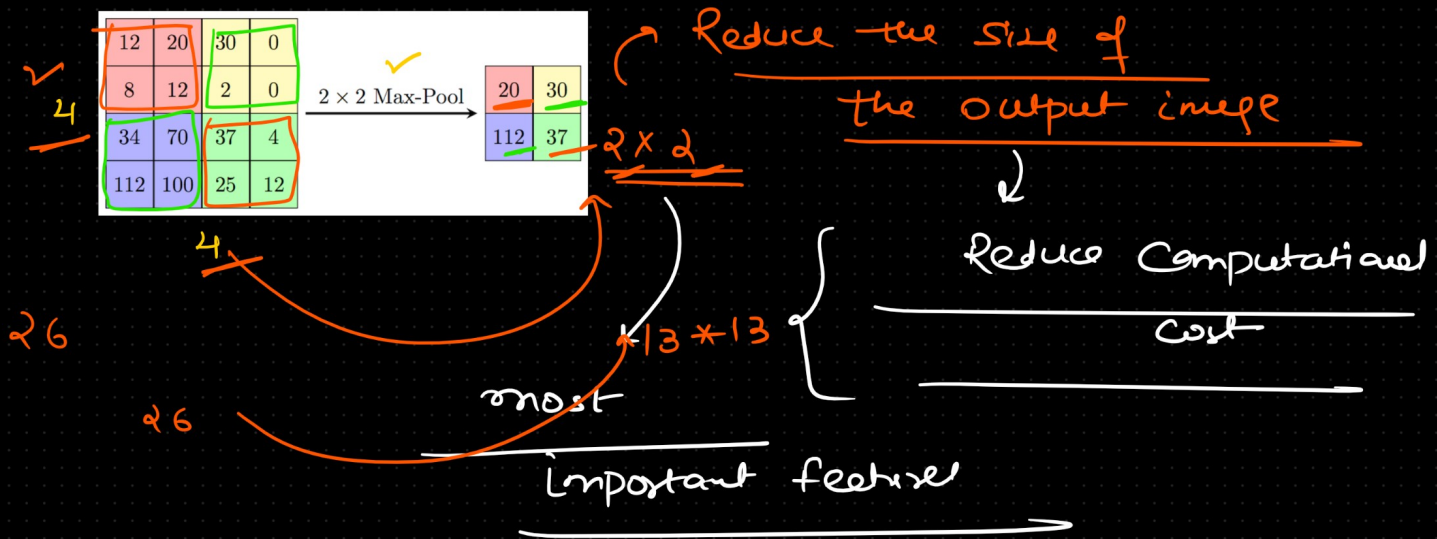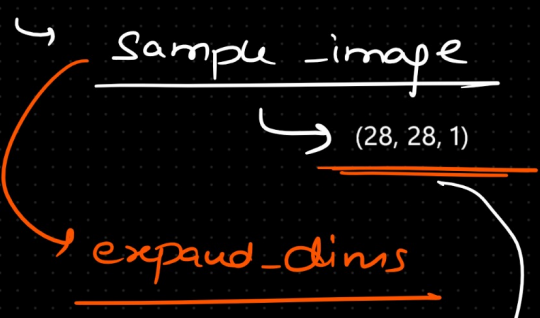
input image

↳ (1, 28, 28, 1)

total count
of test image

input
shape

10,000

x_test = x_test.reshape(-1, 28, 28, 1) / 255.0

Grayscale (Num of Channels)

In this step, we add 4 dimensions. Then how does it convert to 3D automatically?

(28, 28, 1)

Grayscale (MNIST Data)

Images

RGB (Imagenet)
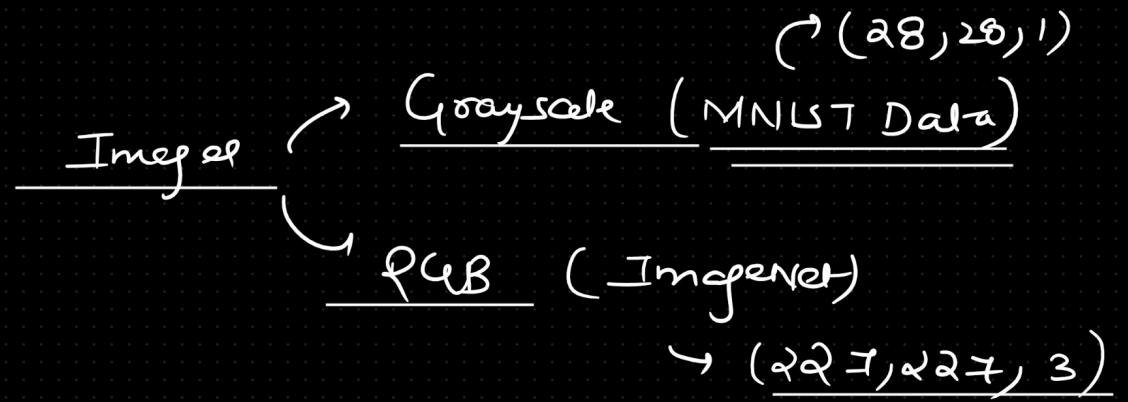
↳ (227, 227, 3)

AlexNet 𝛼 — CNN Architecture

227 × α
227 × 3
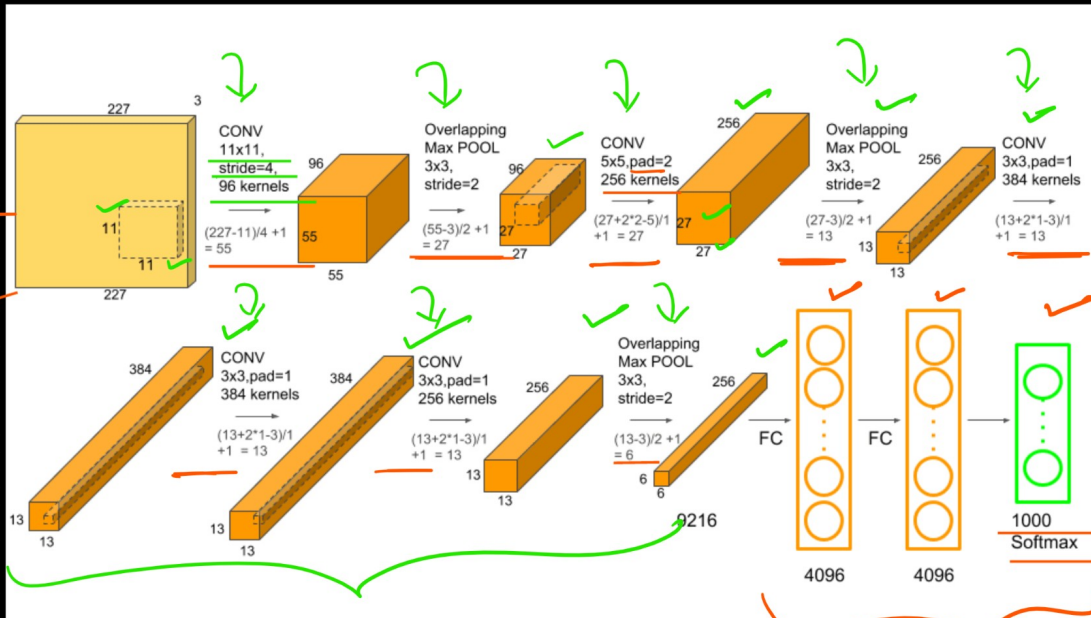
Step 1 (CNN)

$$Z = 227 \times 227 \times 3$$

$$K = 11 \times 11 \quad (\text{count} = 96)$$

$$\text{stride} = 4$$

$$\text{output shape} \implies \frac{227 - 11 + 2*0}{4} + 1$$

$$\implies \frac{216}{4} + 1$$

$$\implies 54 + 1$$

$$= 55$$

$$(55, 55, 96)$$

num of filters

step 2

4 Neural Networks

$$\Rightarrow \frac{55 - 3}{2} + 1$$

$$\Rightarrow \frac{52}{2} + 1$$

$$\Rightarrow \underline{27}$$

input shape = 27×27

Kernel = 5×5

$$\frac{27 - S + 2 * 2}{1} + 1$$

$$\underline{27}$$

Padding = " same"

input
────── = output
imape   ──────
            imape