

# Image Basics with CNN

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# Topics to be covered today

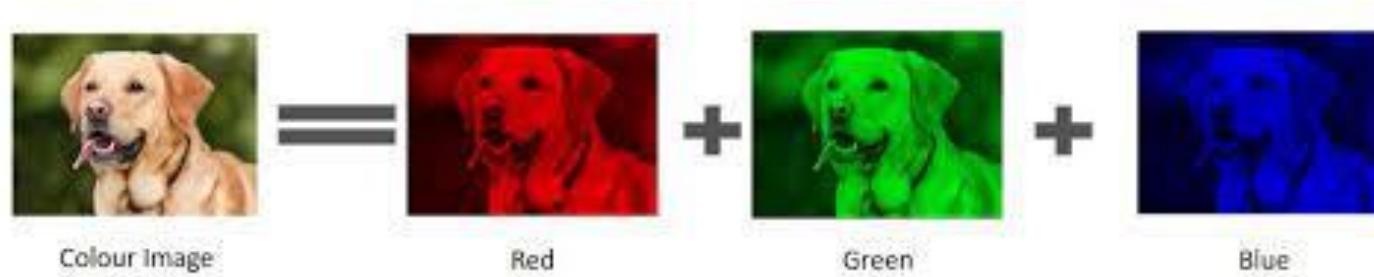
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- How is image stored inside a computer?
- Image Processing and reading with OpenCV Library
- Need For image classification
- Convolution Layer
- Max Pooling Layer
- Average Pooling Layer
- Flatten Layer
- Architecture of CNN (Convolutional Neural Network)

# How is image stored inside a computer

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Coloured Image



# Grayscale Image

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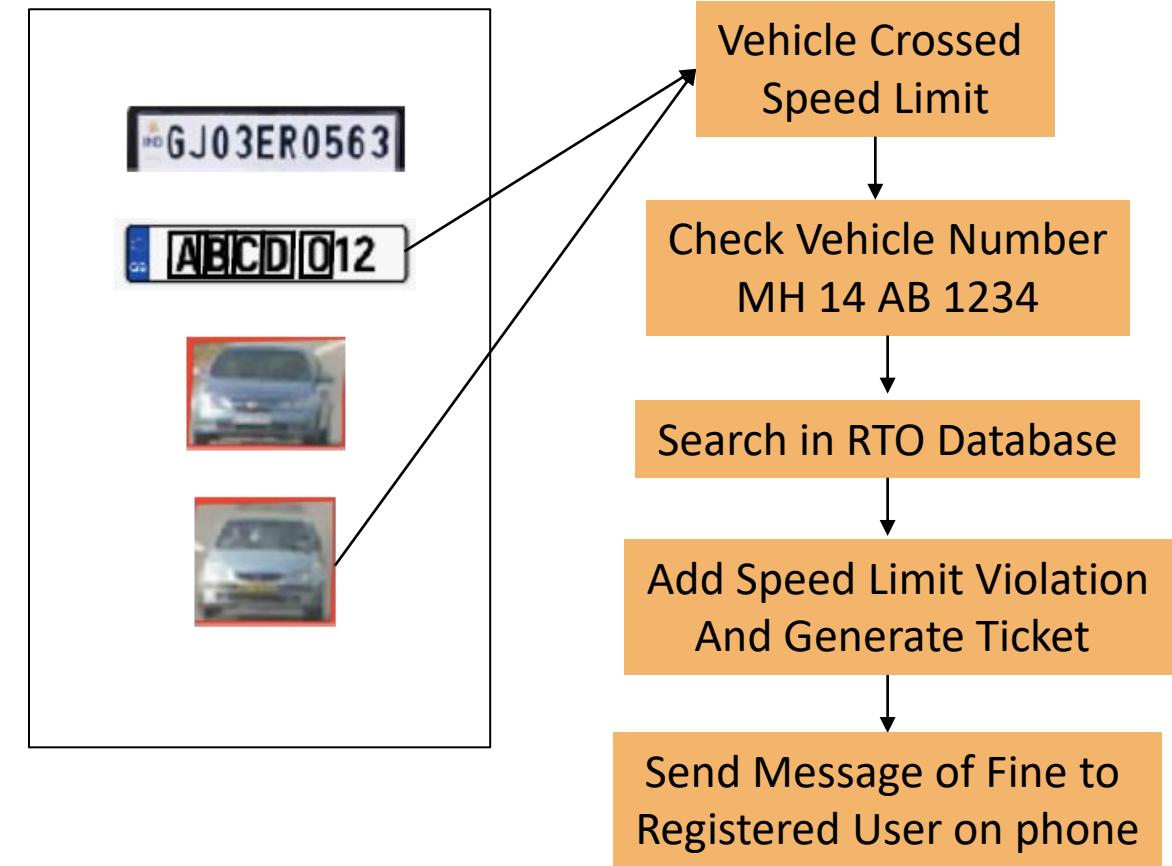
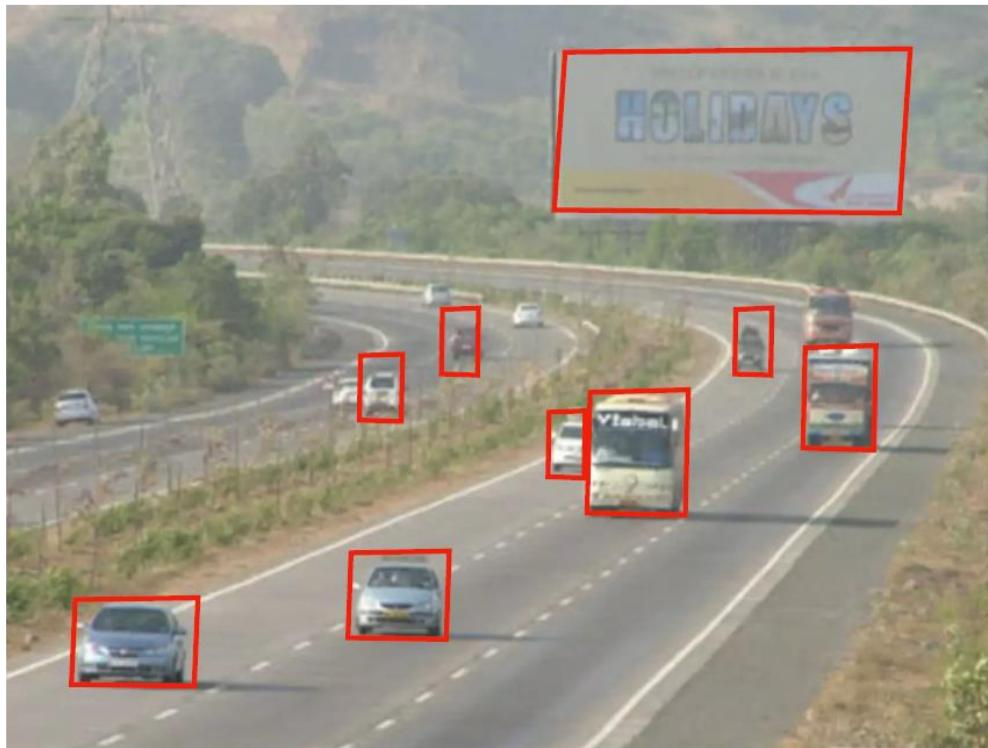
0	2	15	0	0	11	10	0	0	0	0	9	9	0	0	0
0	0	0	4	60	157	236	255	255	177	95	61	32	0	0	29
0	10	16	119	238	255	244	245	243	250	249	255	222	103	10	0
0	14	170	255	255	244	254	255	253	245	255	249	253	251	124	1
2	98	255	228	255	251	254	211	141	116	122	215	251	238	255	49
13	217	243	255	155	33	226	52	2	0	10	13	232	255	255	36
16	229	252	254	49	12	0	0	7	7	0	70	237	252	235	62
6	141	245	255	212	25	11	9	3	0	115	236	243	255	137	0
0	87	252	250	248	215	60	0	1	121	252	255	248	144	6	0
0	13	113	255	255	245	255	182	181	248	252	242	208	36	0	19
1	0	5	117	251	255	241	255	247	255	241	162	17	0	7	0
0	0	0	4	58	251	255	246	254	253	255	120	11	0	1	0
0	0	4	97	255	255	255	248	252	255	244	255	182	10	0	4
0	22	205	252	246	251	241	100	24	113	255	245	255	194	9	0
0	111	255	242	255	158	24	0	0	6	39	255	232	230	56	0
0	218	251	250	137	7	11	0	0	0	2	62	255	250	125	3
0	173	255	255	101	9	20	0	13	3	13	182	251	245	61	0
0	107	251	241	255	230	98	55	19	118	217	248	253	255	52	4
0	18	148	250	255	247	255	255	249	255	240	255	129	0	5	
0	0	23	113	215	255	250	248	255	255	248	248	118	14	12	0
0	0	6	1	0	52	153	233	255	252	147	37	0	0	4	1
0	0	5	5	0	0	0	0	0	14	1	0	6	6	0	0

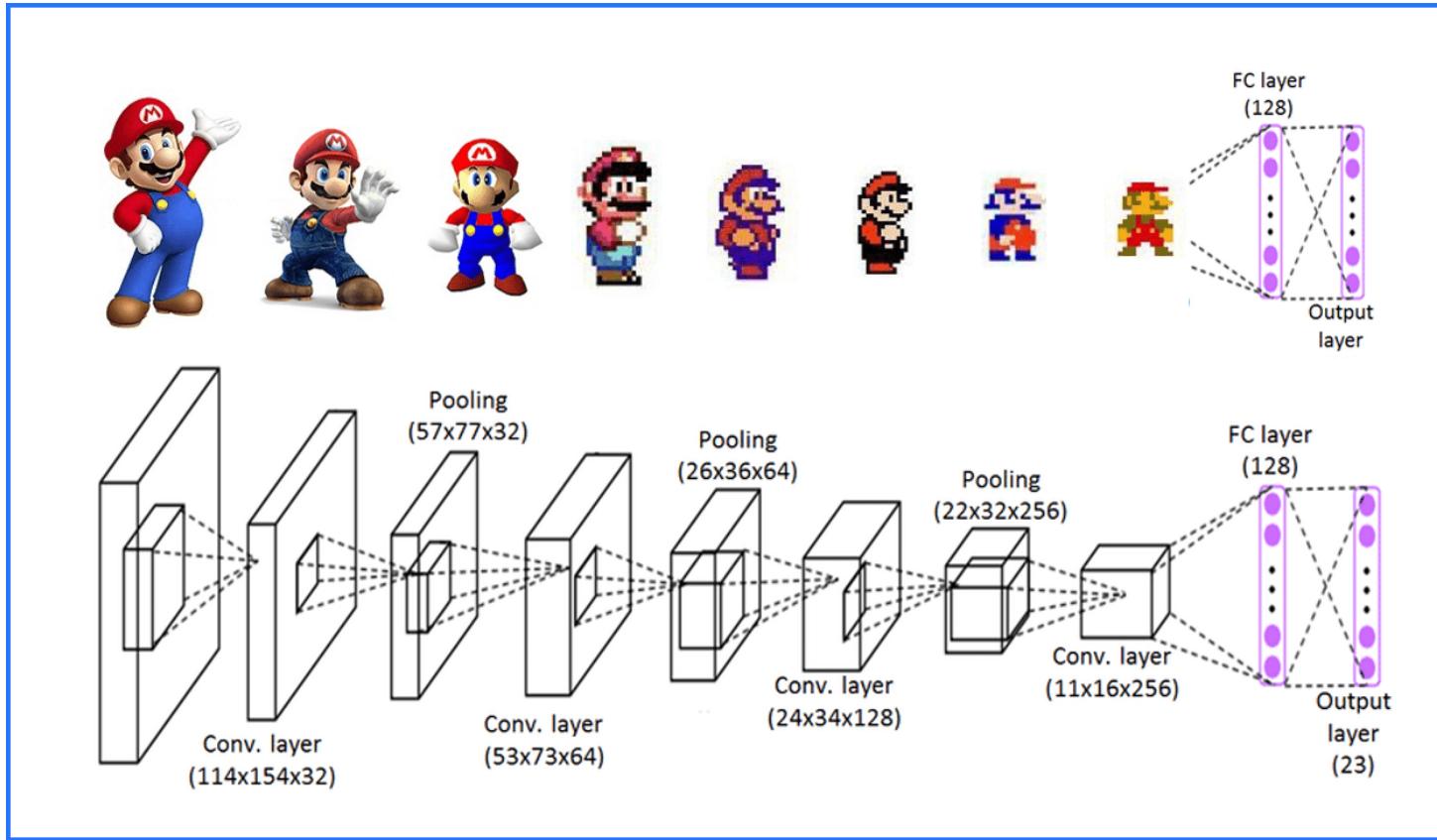
# CV2 Library to read images as array

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```
import cv2  
cv2.imread(image_path)  
  
# Convert BGR to RGB  
cv2.cvtColor(arr, cv2.COLOR_BGR2RGB)  
  
# Showing image inside python  
plt.imshow(img_arr)  
  
# Read image as grayscale  
plt.imshow(img_arr,cmap='gray')
```

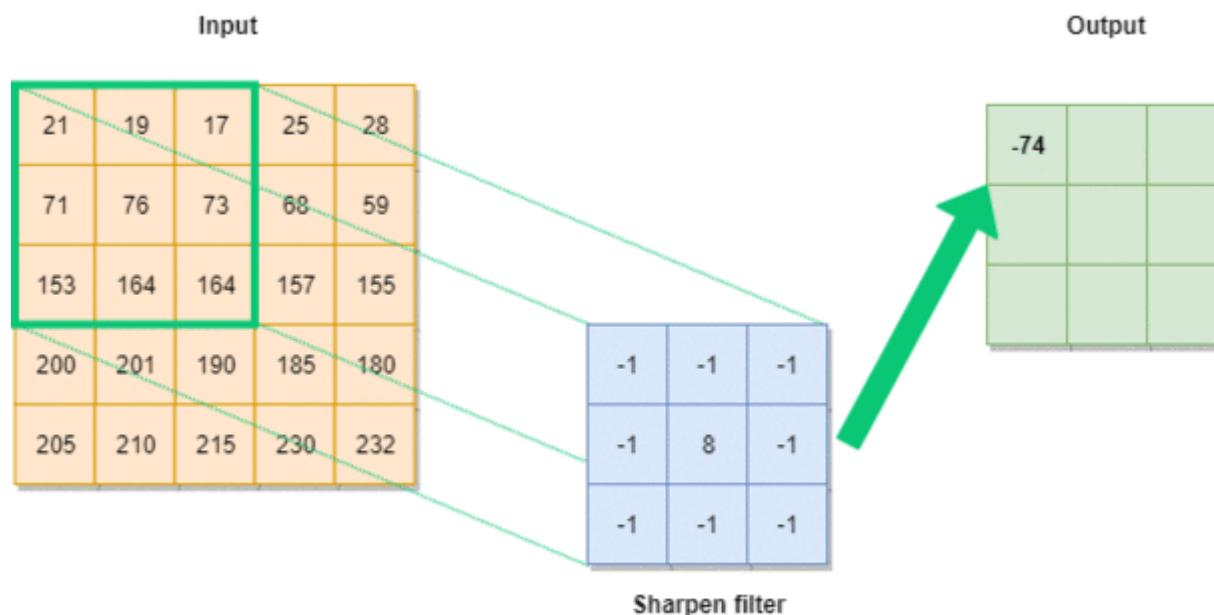
# Need of Image Classification



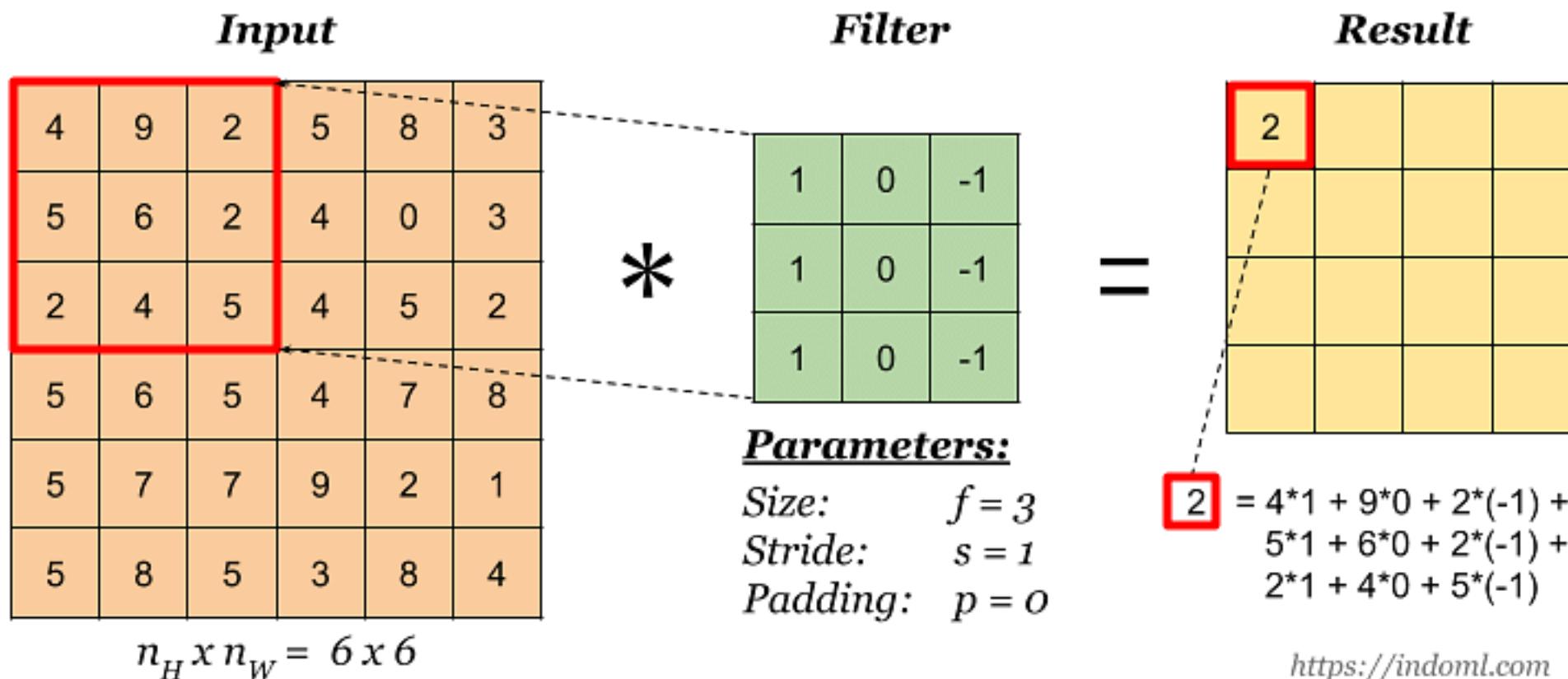


# Convolution Layer

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# Convolution Layer continued

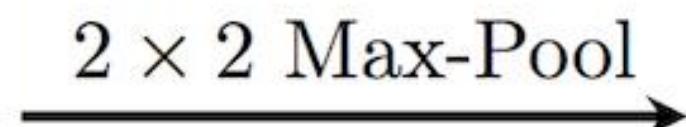


# MaxPooling Layer

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

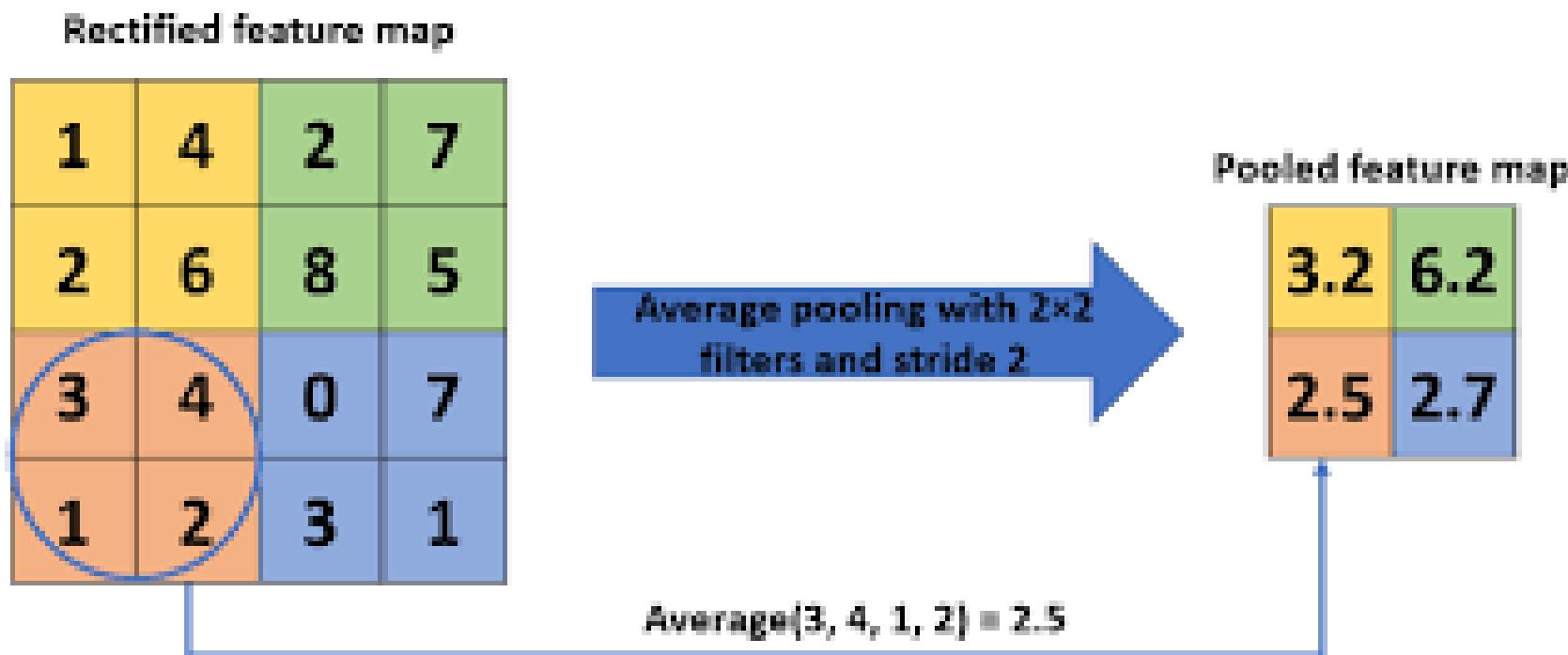
$2 \times 2$  Max-Pool



20	30
112	37

# AveragePooling Layer

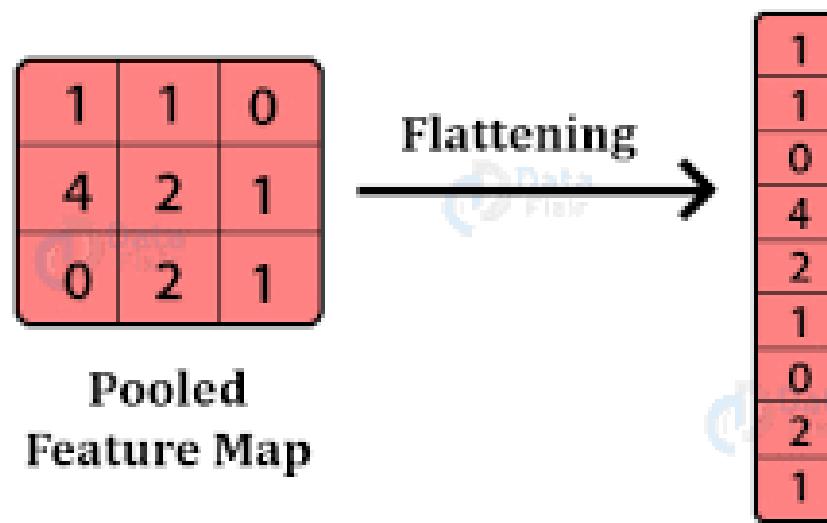
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# Flatten Layer in Keras

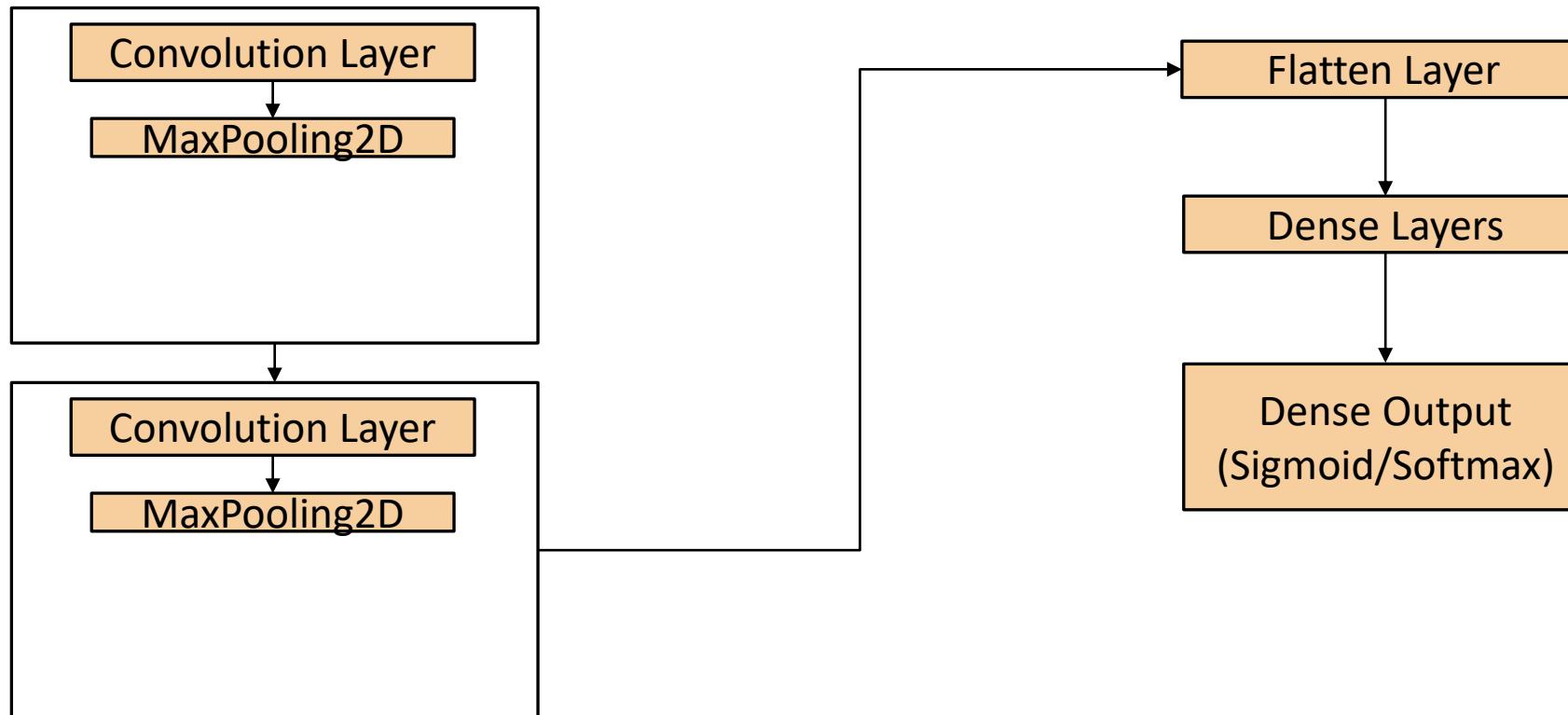
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## Flatten Layer in Keras



# Architecture of CNN

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# Thank You

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PING ME ON SKYPE GROUP IF YOU HAVE ANY FURTHER QUERIES