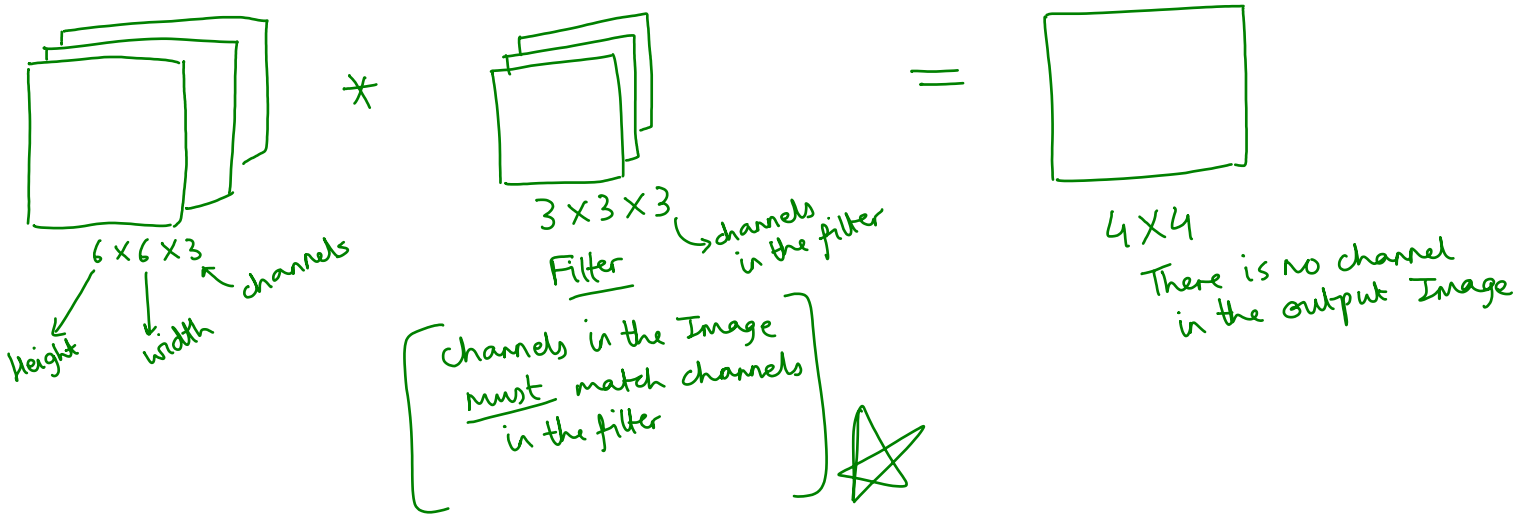
deeplearning.ai

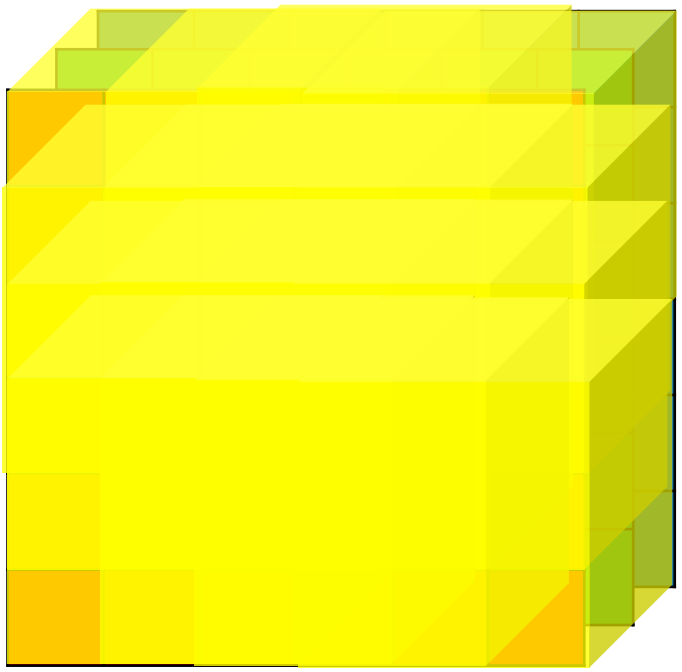
Convolutional Neural Networks

Convolutions over volumes

Convolutions on RGB images

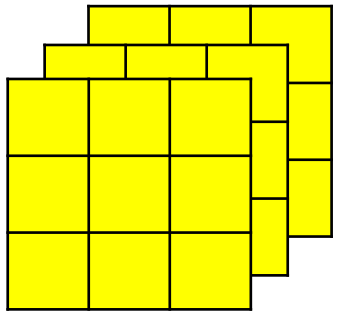


Convolutions on RGB image

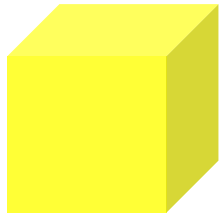


6 x 6 x 3

*

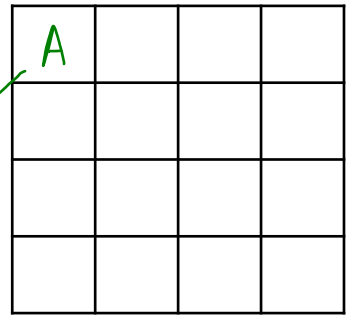


3 x 3 x 3



Simplified diagram of the filter

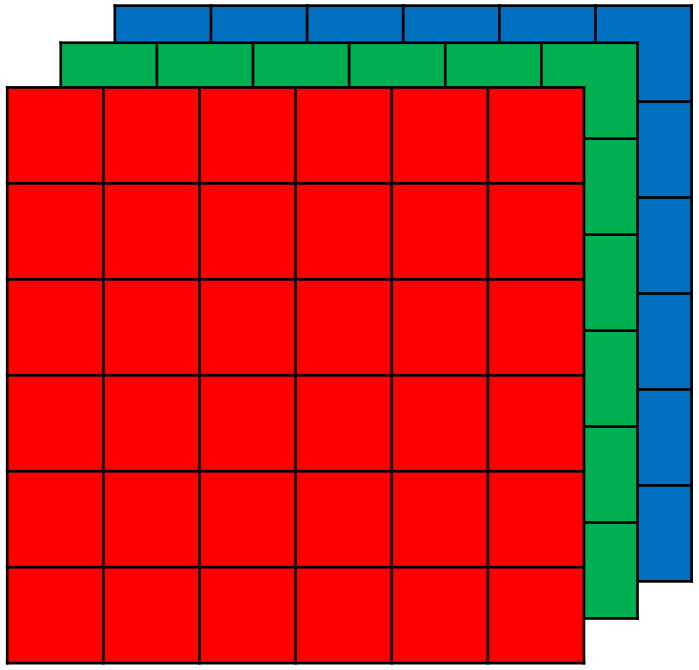
=



4 x 4

The output "A" comes when we multiply (element-wise) the 27 pixels in the i/p w/ 27 pixels in the filter & Add everything up

Multiple filters



6 x 6 x 3

channels (depth)

For example
If we just want to detect a vertical edge (irrespective of the channel)

R
1 0 -1
1 0 -1
1 0 -1

G
1 0 -1
1 0 -1
1 0 -1

B
1 0 -1
1 0 -1
1 0 -1

* A

3 x 3 x 3

= A'

4 x 4

Convolving Image w/ Filter A may give A'

Convolving Image w/ Filter B may give B'

eg A could be a vertical edge detector
B could be a horizontal edge detector

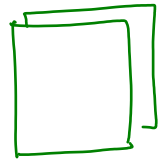
* B

3 x 3 x 3

= B'

4 x 4

If we combine A' with B', we get



4 x 4 x 2 volume

2 = # filters

For example
To detect vertical edges only in the Red channel

R
1 0 -1
1 0 -1
1 0 -1

G
0 0 0
0 0 0
0 0 0

B
0 0 0
0 0 0
0 0 0