

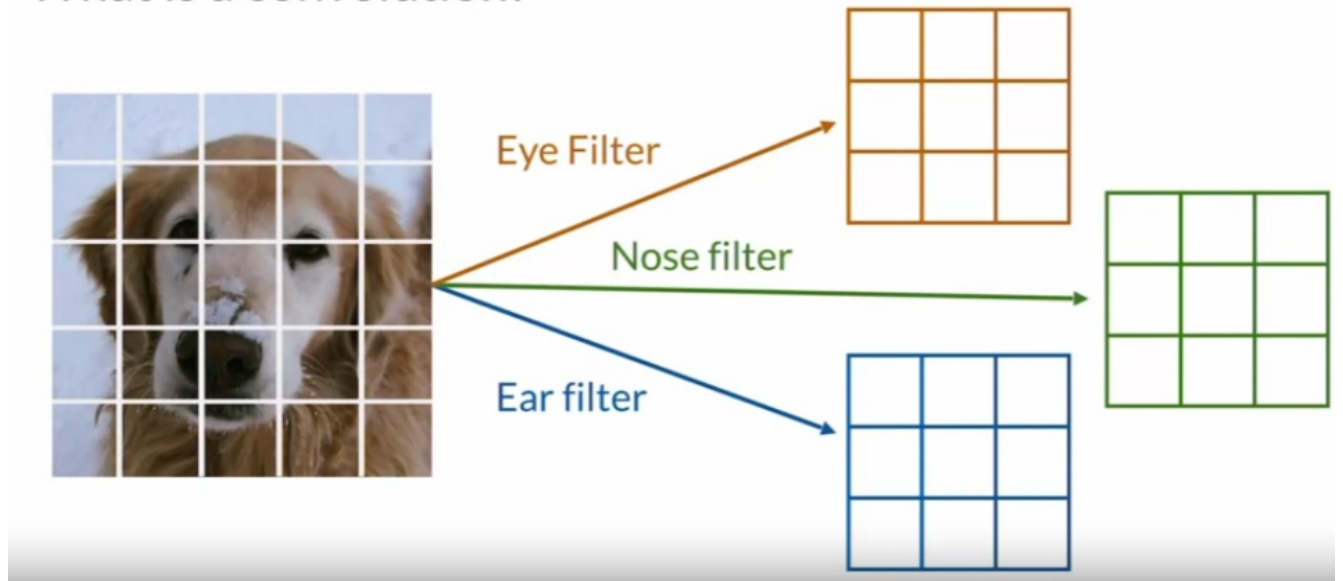
5, Review of Convolutions

□ Outline of this video

□ Notes

- ▼ Convolution allows you to detect key features in different areas of an image using filters

What is a convolution?



in reality, they're much more abstract than eye or nose filters, but they do pick up on fairly high level features such as eyes and noses. (normally just filter like pick up just edges? for example la)

example of actual filter:

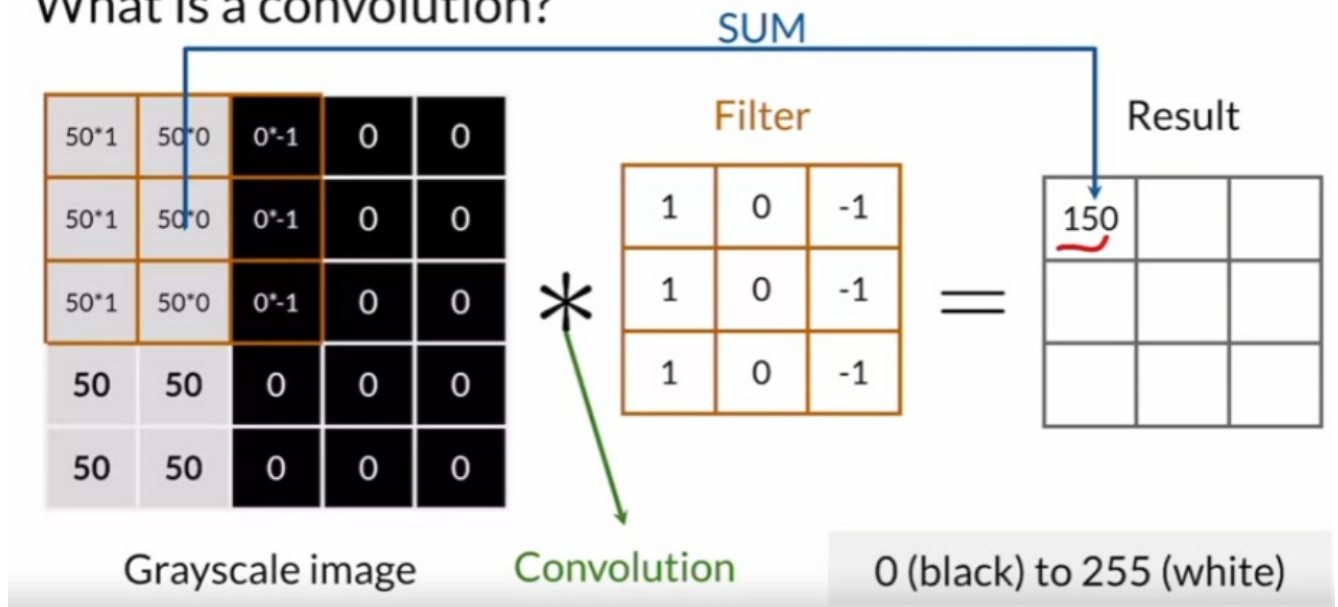
1. Gaussian filter
2. kernel filter

- ▼ what is filter, and how it related to convolution operation of the image

Each of these filters is just a matrix of real values and these exact values are learned during training. These values are used to compute a convolution on the input image.

- ▼ what is convolution? (that applied with vertical filter)

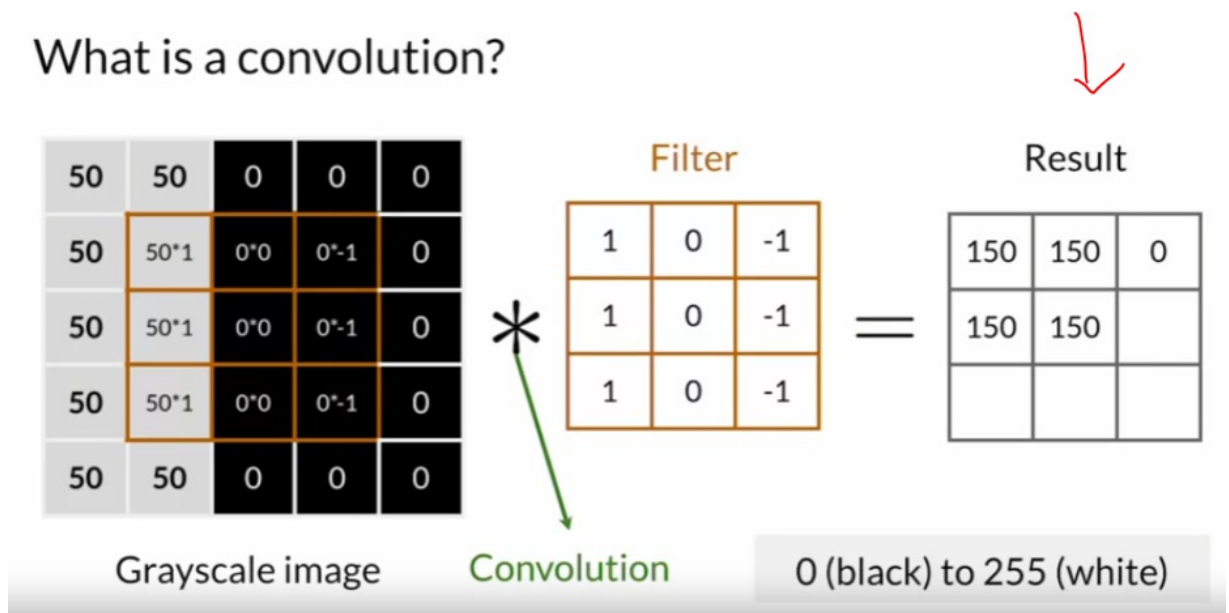
What is a convolution?



move your filter one step to right (also called, `stride=1`)

▼ after keep applying the filter and go down

What is a convolution?

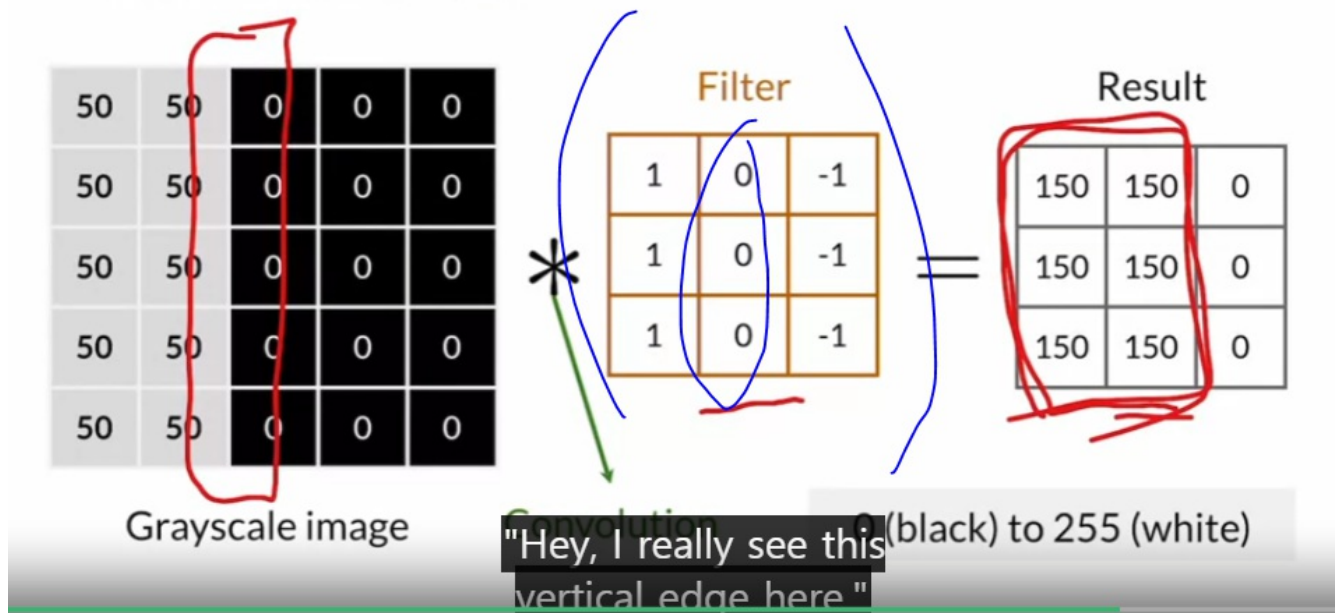


So you put that in the first cell here. After that you move your filter one position to the right to get the element-wise product, sum the results again, and store that value in your matrix and so on and so forth

store that value in your matrix>> matix here is the filter!

▼ what is actually going on filter? (explanation)

What is a convolution?



>> filter that used just now, is actually called as vertical filter

you get this three-by-three result **at the end**. What's interesting is that your filter is actually **a vertical line detector**. So there is a vertical line here in your image, and your filter see some really high values here and it's trying to say, **"Hey, I really see this vertical edge here."**

your filter see some really high values>> after convolution, the value of the filter bcm higher. (see the value is 150 over 2 over 3)

These filters could be of many different values and composing multiple layers of these filters will get those more abstract, higher level concepts such as a nose or an eye.

>> so u see here, the filter is just matrix with 3×3 \times 33×3 , and zero column at middle: if u want to have nose detector or eye detector, your filter will need to be more different values and more abstract.

□ Vocab

□ QOTD

□ Summary

▼ summary of convolution

Summary

- Convolutions are useful layers for processing images
- They scan the image to detect useful features
- Just element-wise products and sums!



URL

95 - What is digital image filtering and image convolution?

Most digital image processing tasks involve the convolution of a kernel with the image. This tutorial explains the basics of the convolution operation by usi...

◦ <https://www.youtube.com/watch?v=1GUgD2SBI9A&t=466s>

