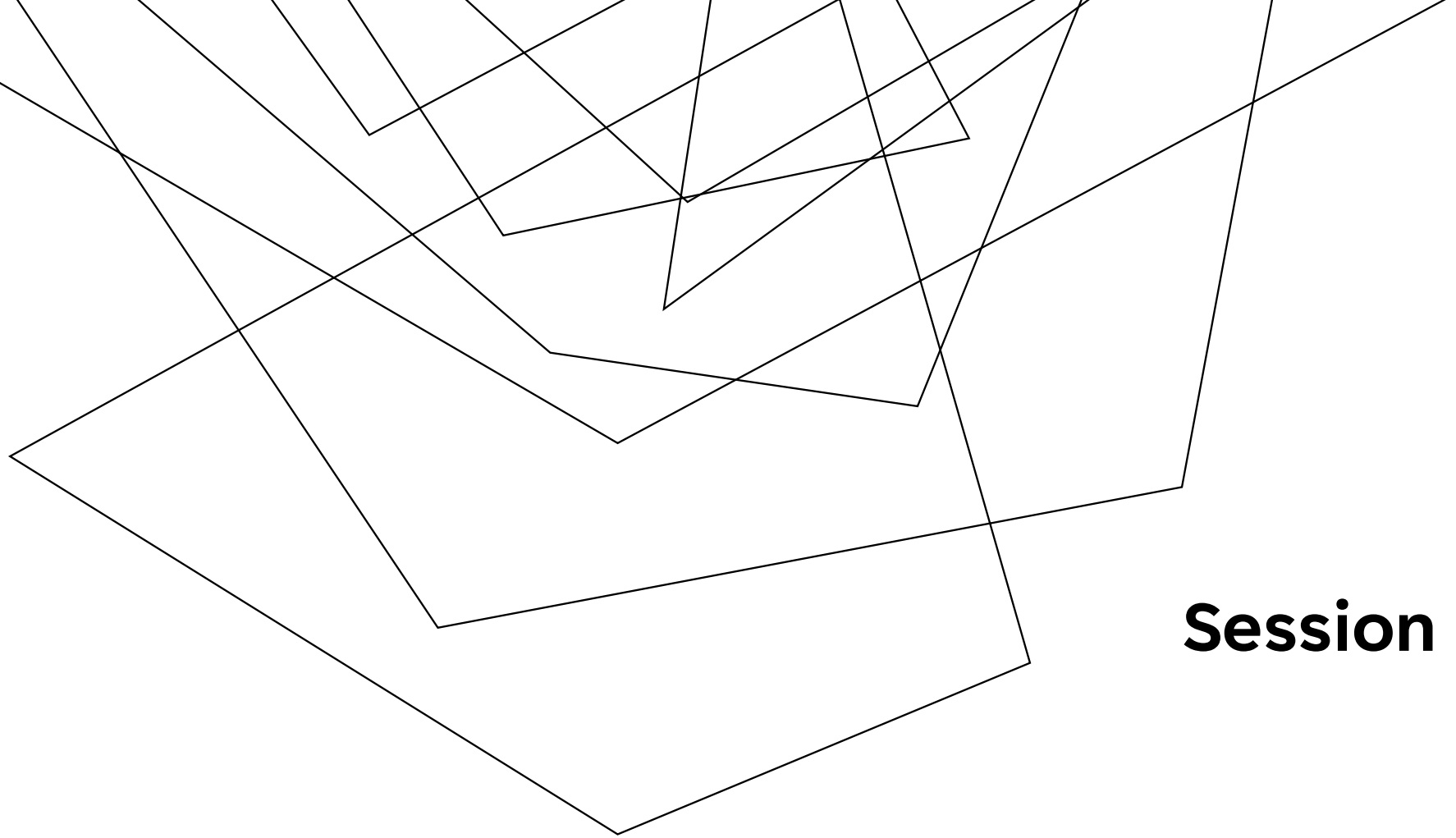


Session #4

ARCHITECTURAL INTELLIGENCE

DigitalFUTURES Summer 2022

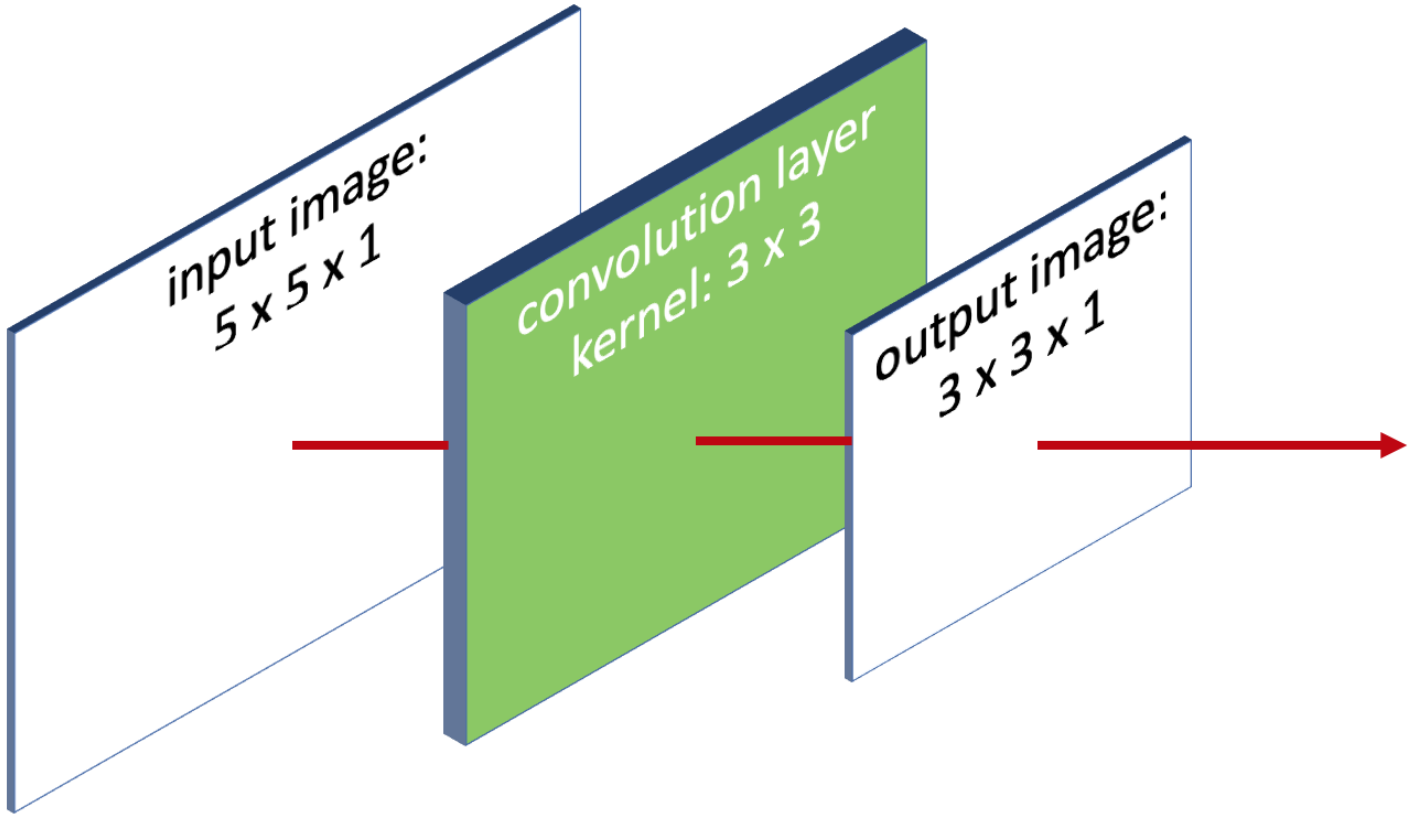
WHAT IS GENERATIVE ADVERSARIAL NETWORK?

A new method to generate new, synthetic instances of data that can pass for real data. They are used widely in image generation, video generation and voice generation.

Meaning? It's a pattern that is repeated over and over through the 4^{th} dimension (endless pattern)

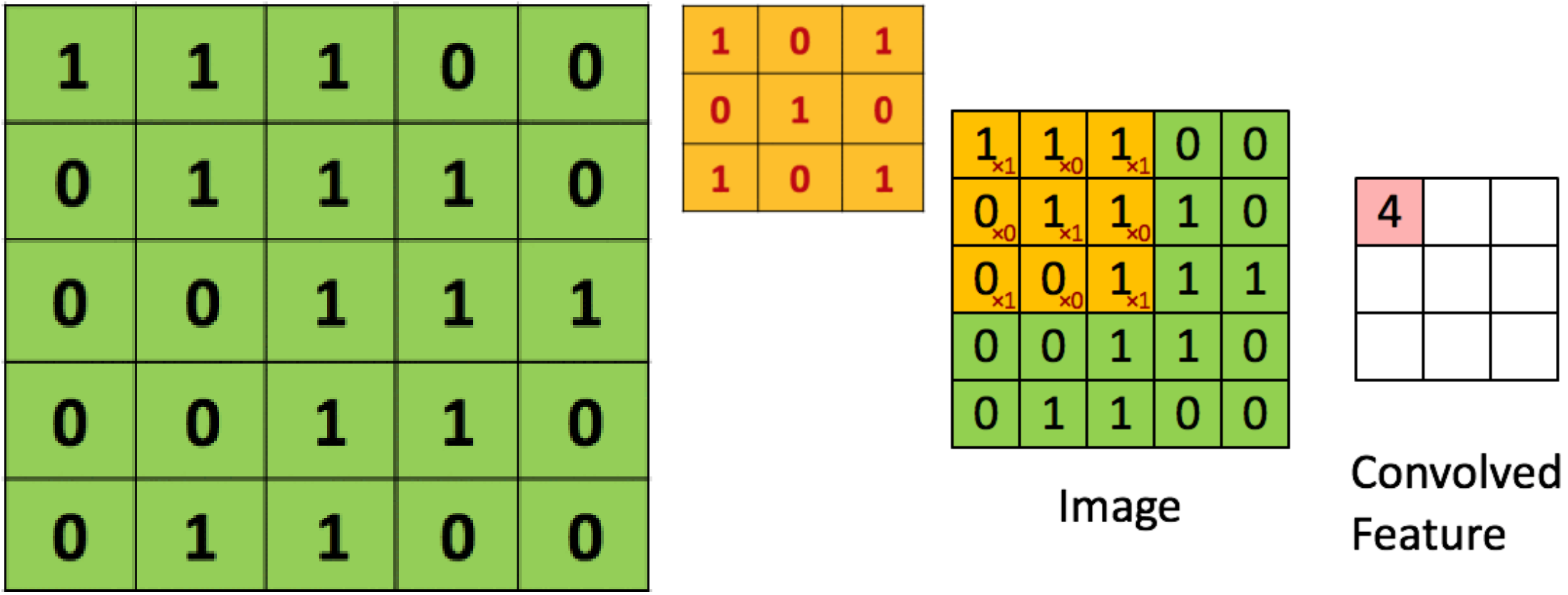
CONVOLUTIONAL NEURAL NETWORK

- We're going to input a 5x5 grayscale image into the network. We say that the shape of the image is 5x5x1, because it has a width of 5 pixels, a height of 5 pixels, and a depth of 1, which is the single-color channel: a brightness value between 0 and 1.



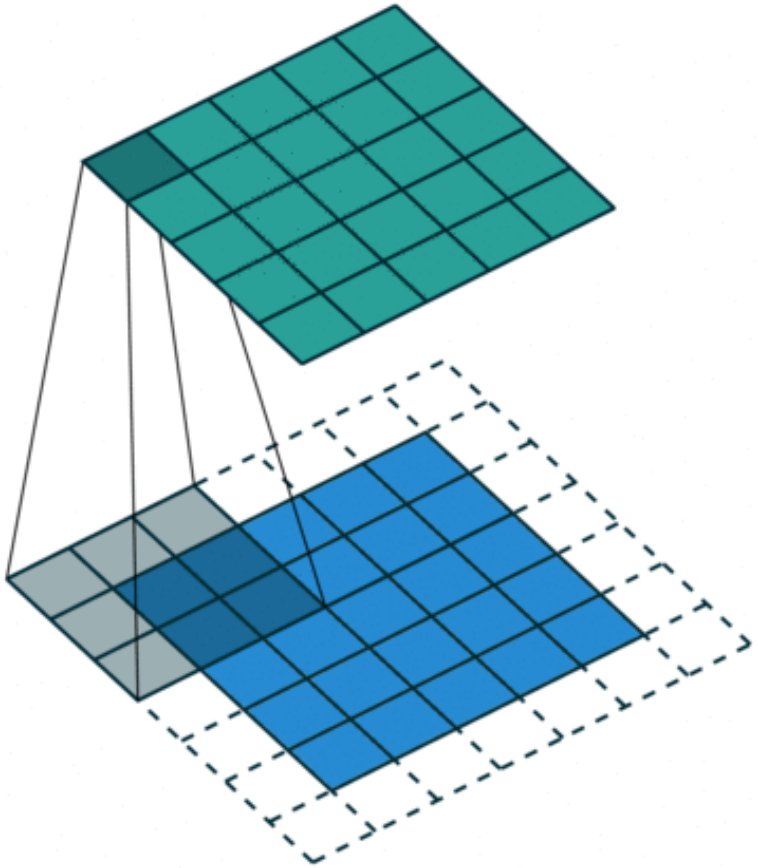
CONVOLUTIONAL NEURAL NETWORK

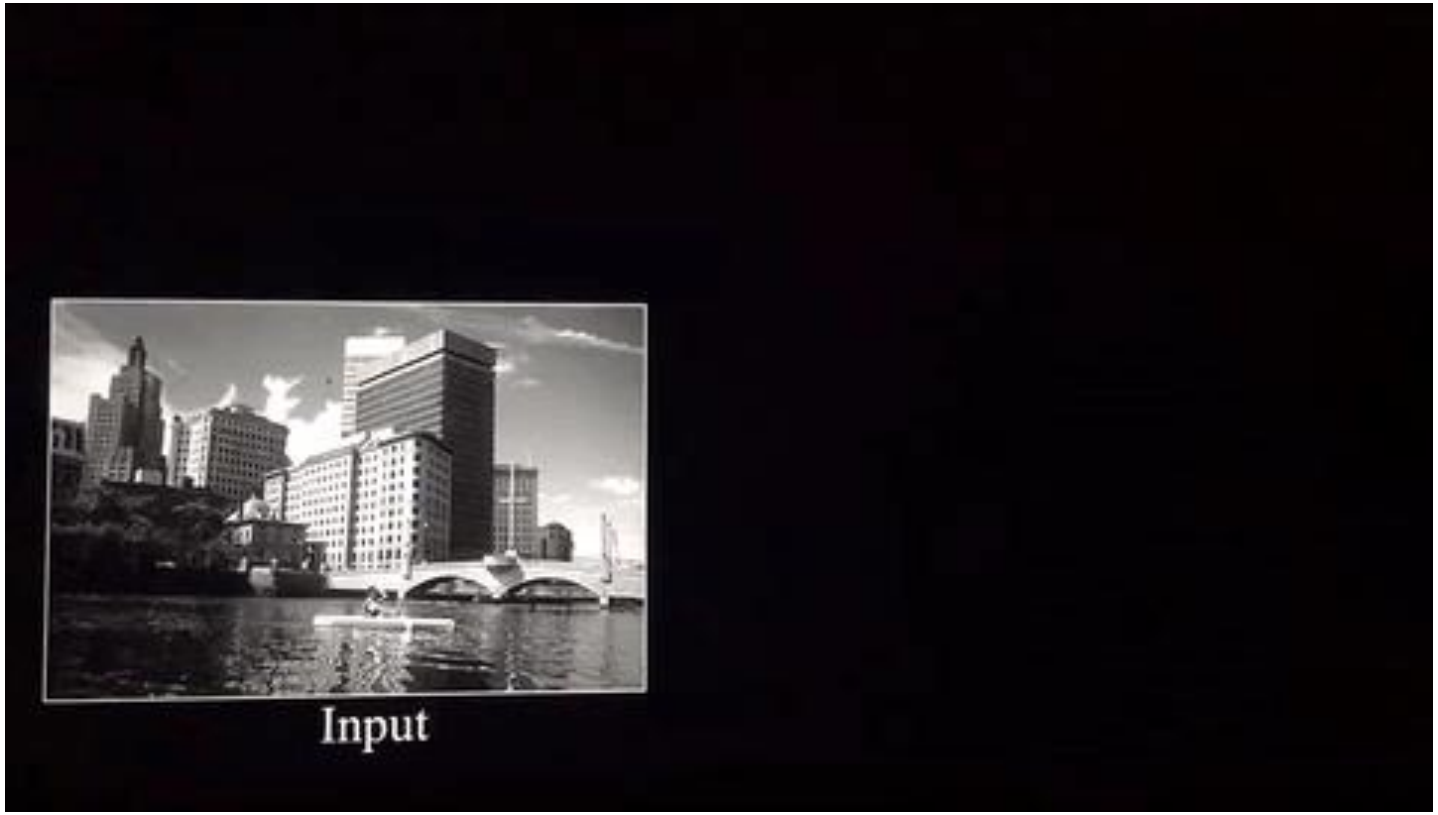
- The neural network consists of a single convolution layer with a 3x3 kernel. The output of this network will be a 3x3 image with also a depth of 1.



CONVOLUTIONAL NEURAL NETWORK

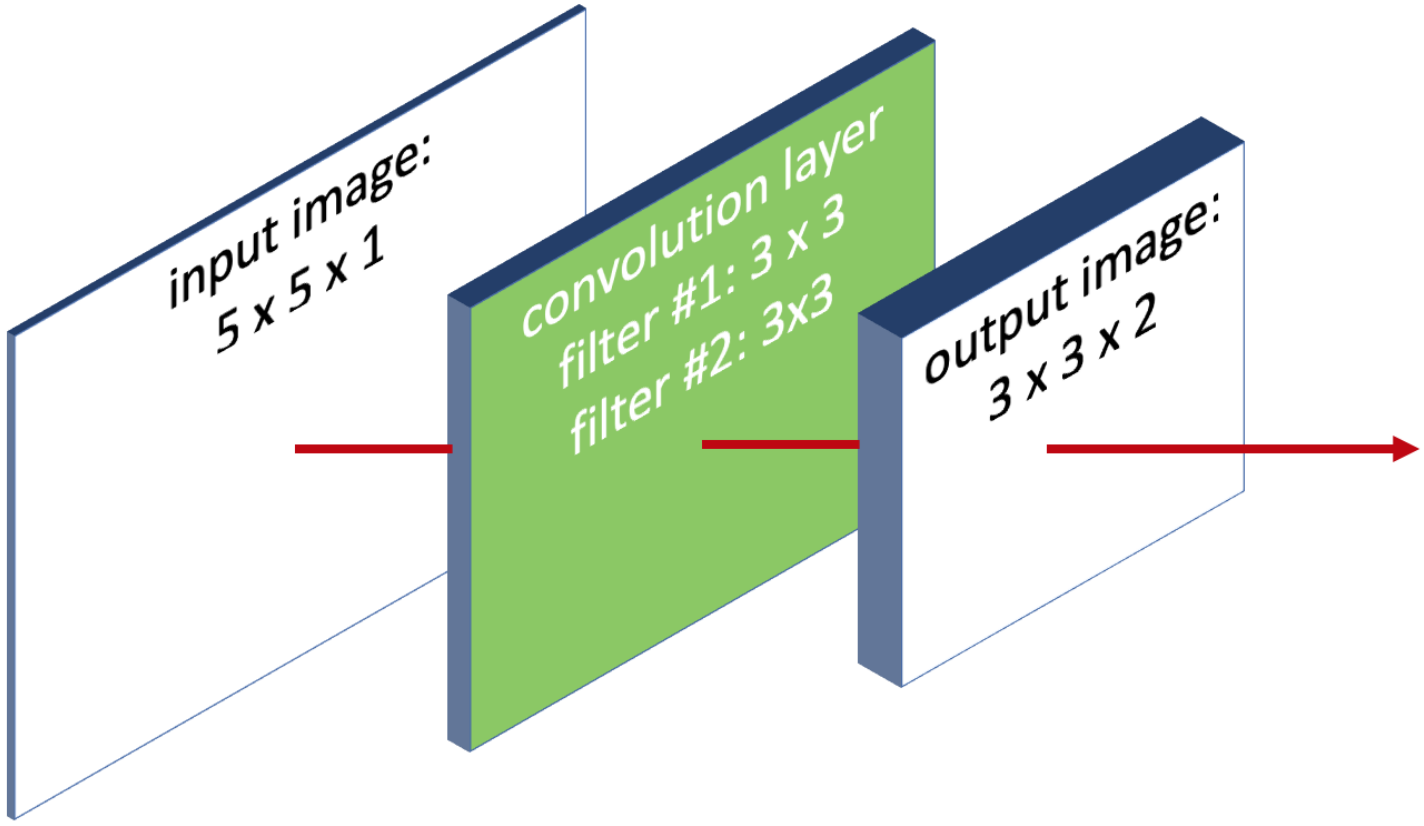
- In CNN terminology, the 3×3 matrix is called the Kernel or feature detector. The new matrix formed by sliding the kernel over the image and computing the result is called the Convolved Feature or Activation Map or the Feature Map.





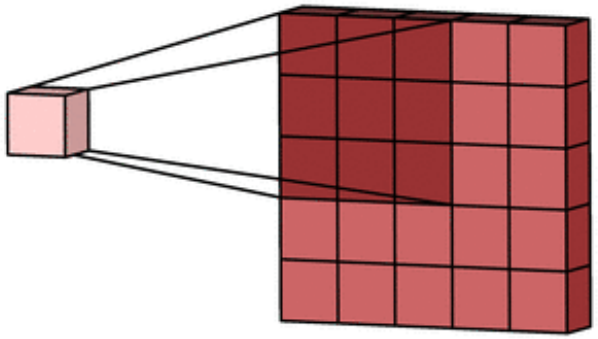
CONVOLUTIONAL NEURAL NETWORK

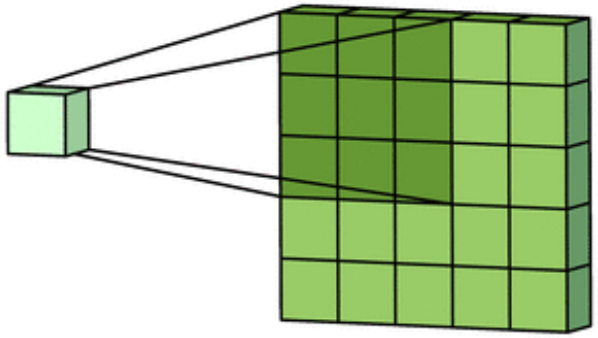
- So now every input image produces two feature maps, not one !

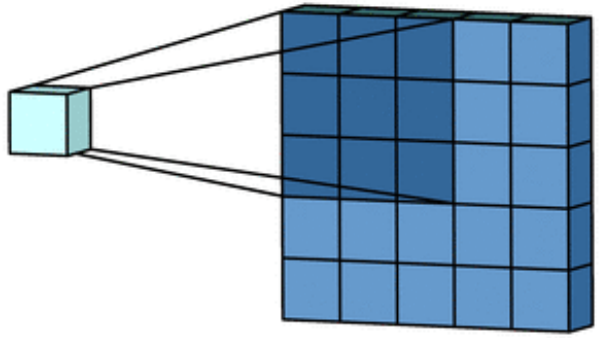


CONVOLUTIONAL NEURAL NETWORK

- The convolution layer then applies the red kernel to the red color image, the green kernel to the green color image, and the blue kernel to the blue color image:

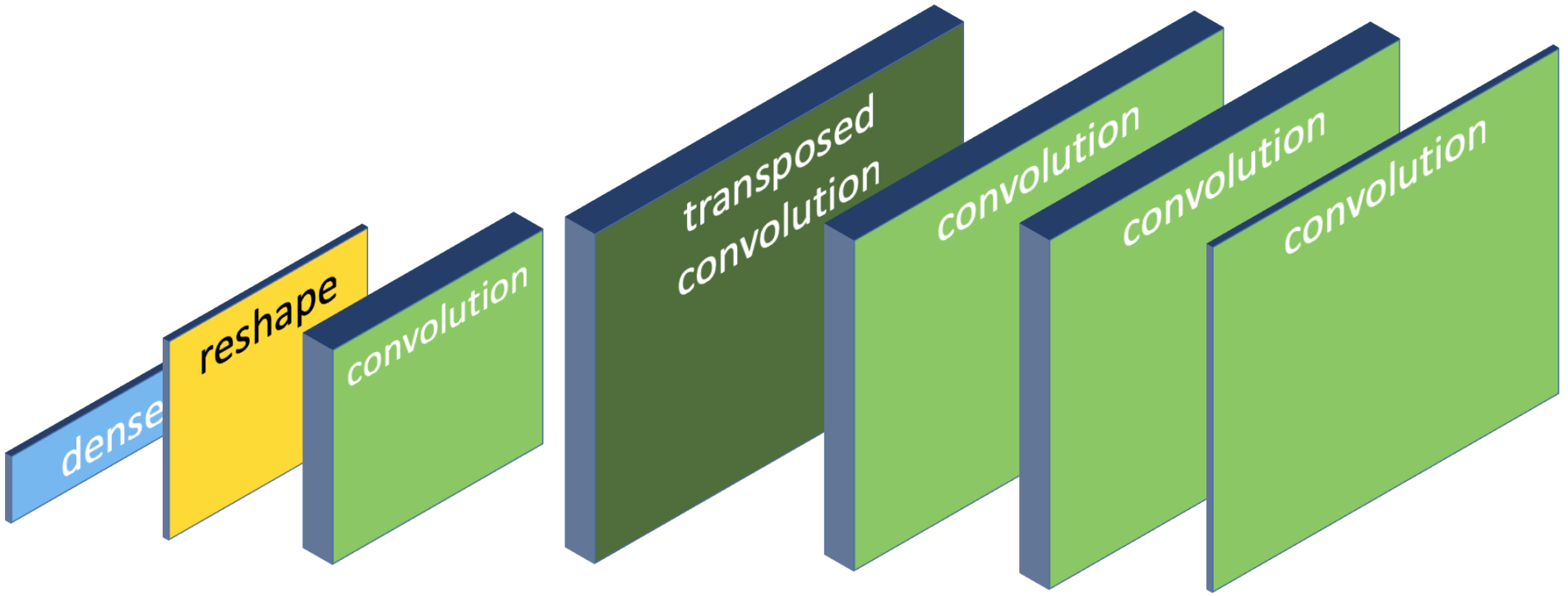






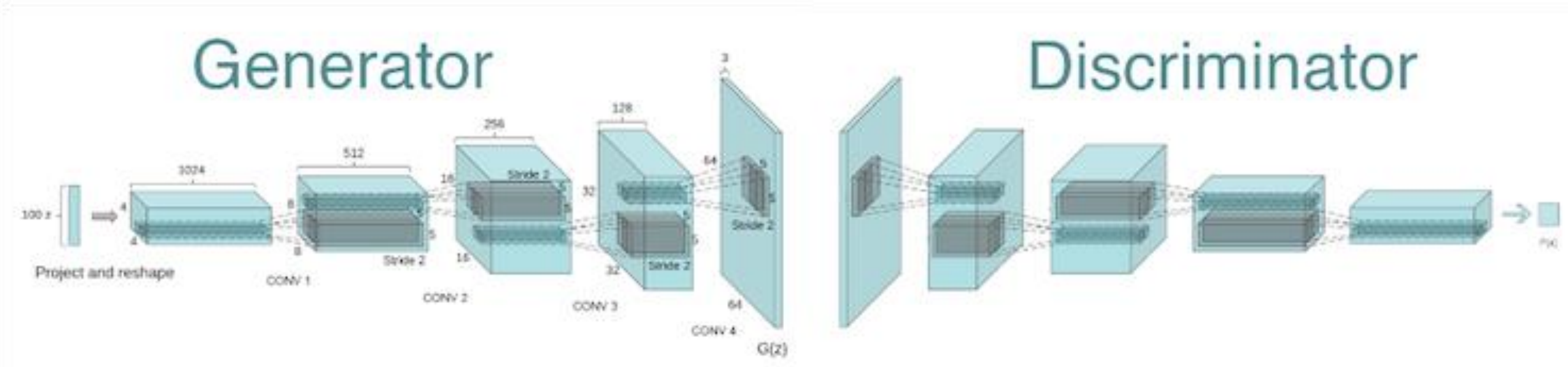
GENERATIVE ADVERSARIAL NETWORK

- This is basically a CNN running in reverse. We present randomized input data on the classifier side of the network, and it will produce an image from scratch at the other end.



GENERATIVE ADVERSARIAL NETWORK

- A GAN simply consists of these two networks mounted end-to-end:



EXAMPLES

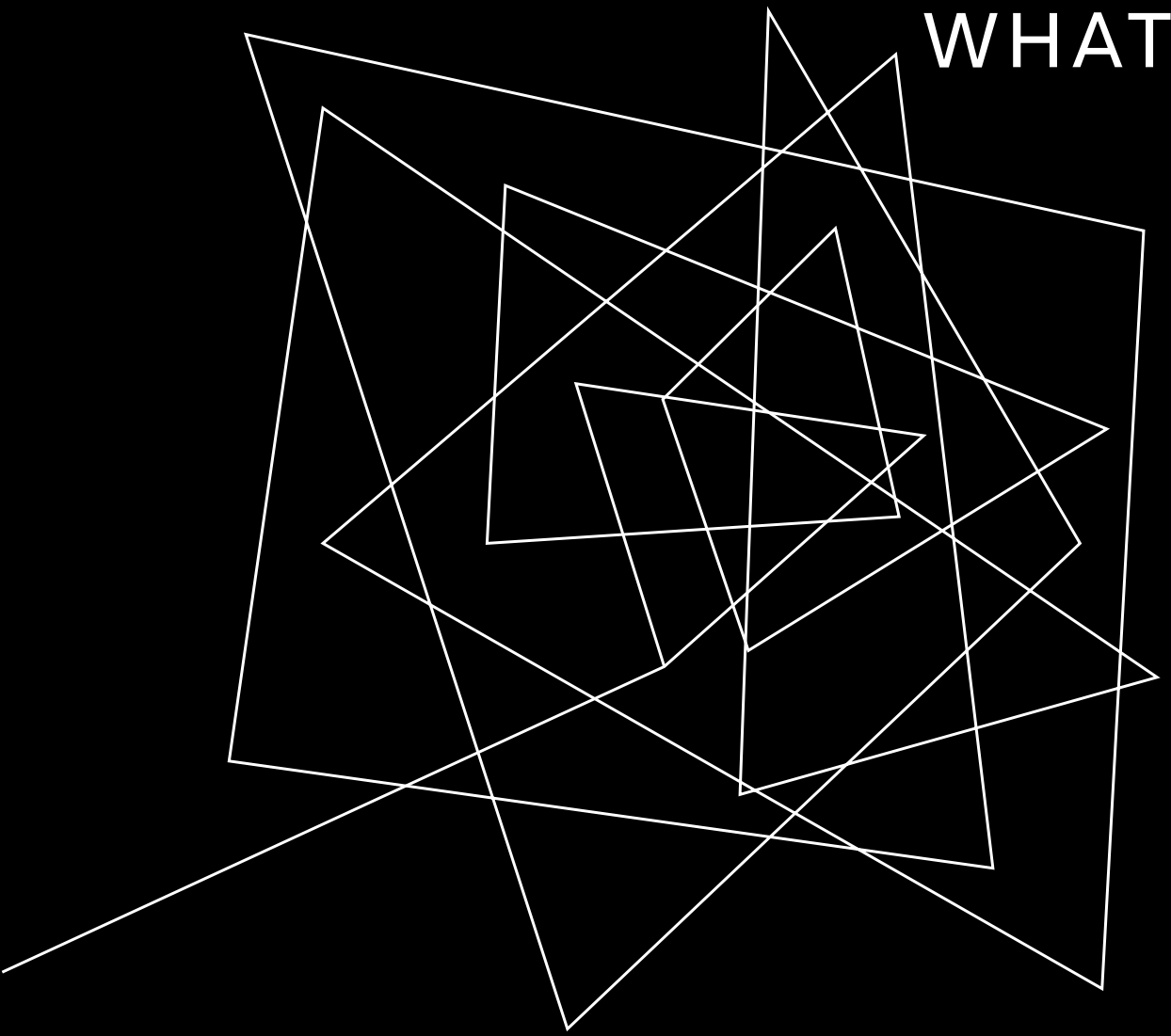
write a code that can generate handwriting digits

CODE_7.GH

EXAMPLES

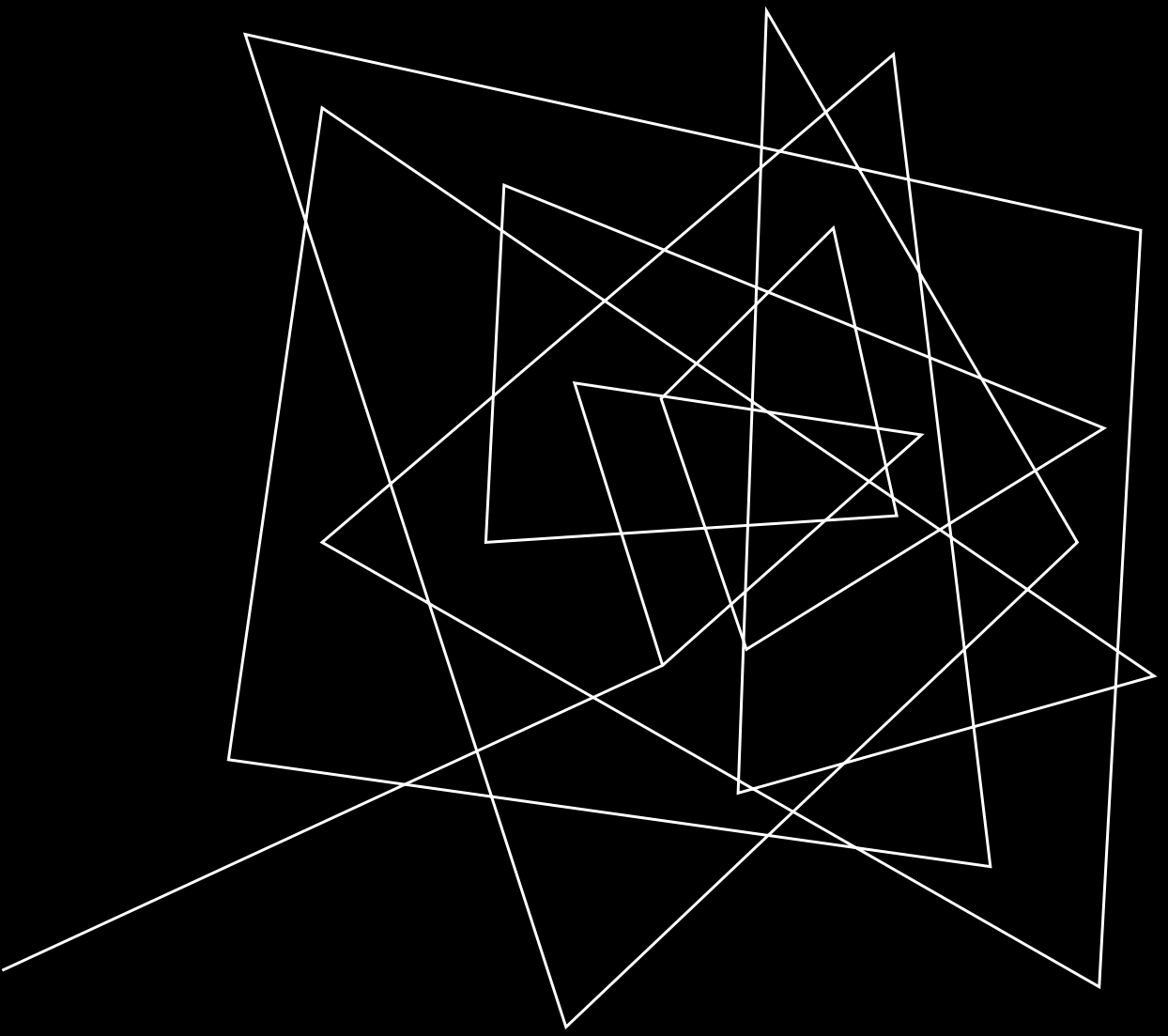
LABELED/SEGMENTED IMAGES INTO REAL FACADES

PYTHON



WHAT HAVE WE LEARNED TODAY?

HOW TO EMBED IT IN ARCHITECTURE?



THANK YOU ☺