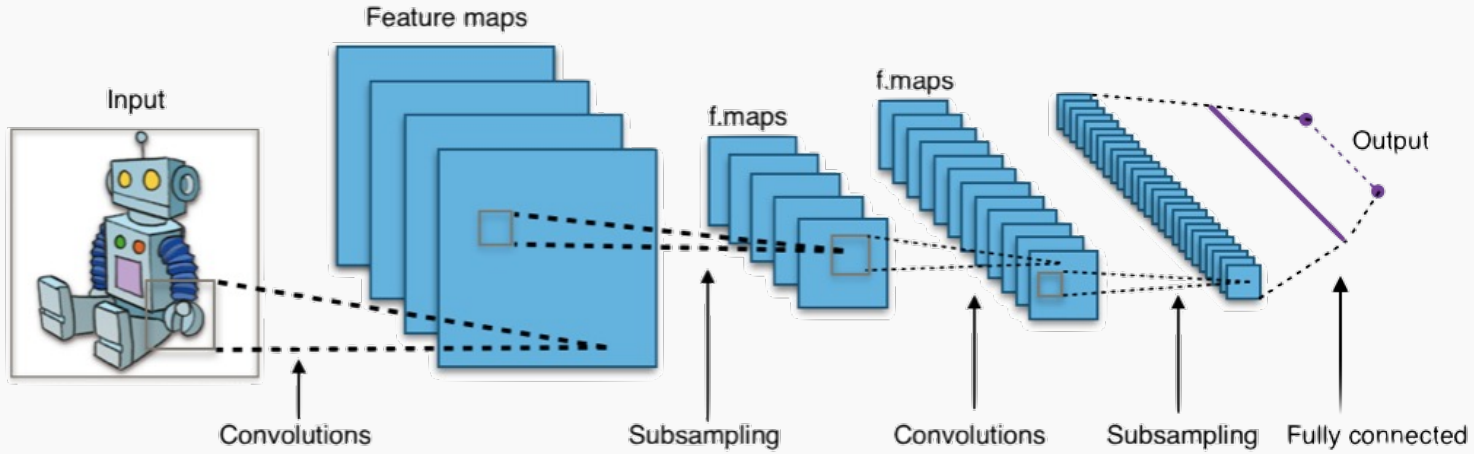
kokchun giang

convolutional neural network

– a feedforward network that can learn feature engineering by itself via kernels



inspiration from eyes

MLP for 2D image

2D → 1D through flattening

→ loss of spatial info

→ fully connected networks has too many parameters

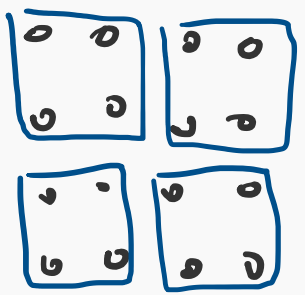
→ easy overfit

In biology

- local receptive fields in eyes
  → react on small regions of visual field

A convolutional layer

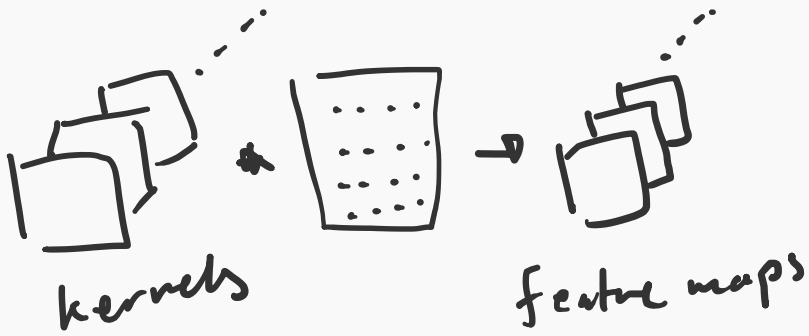
2D grayscale



← local receptive fields

stride (2,2)

use many kernels to convolve w. image to extract feature maps



kernel weights adjusted through backpropagation

convolutional neural networks

→ we get 1 feature map / kernel

→ different kernels see different aspects of an image

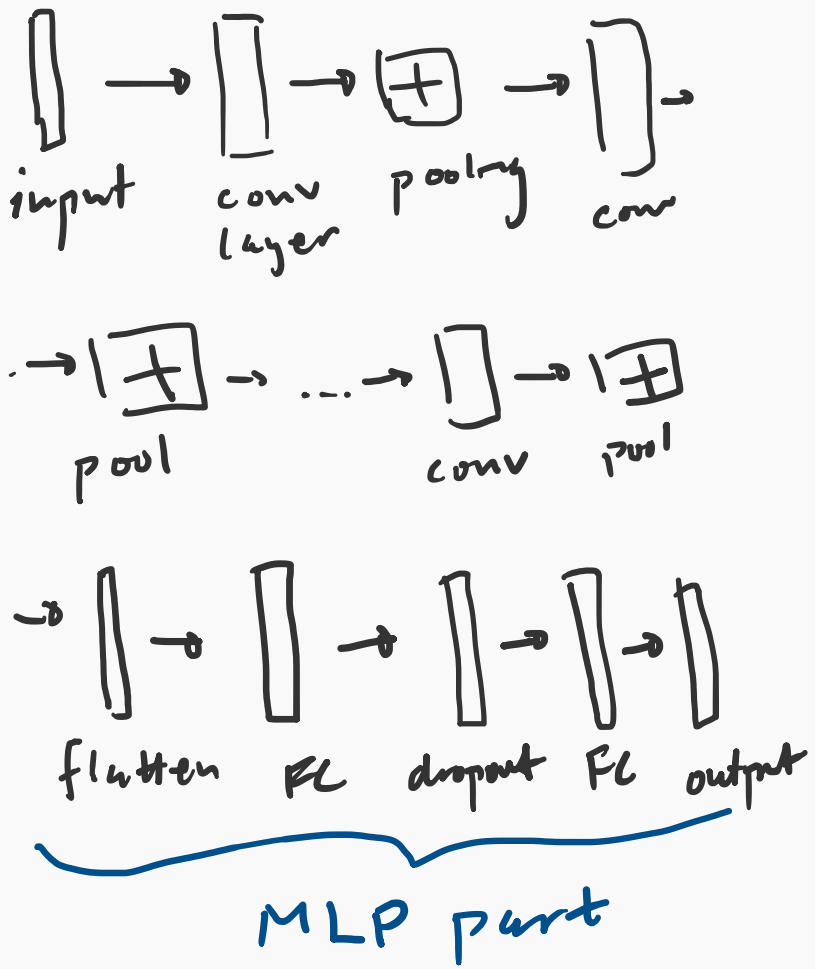
→ the convolution operation makes CNN translation invariant

→ first layers are simple such as edge detectors

→ then more and more complex features extracted

as we get deeper in the network

convolutional neural networks architecture



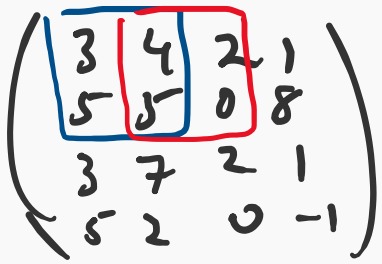
Pooling

form of subsampling

to reduce complexity

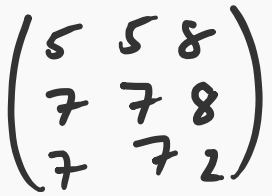
→ max-pooling

→ avg pooling



pool 2x2 window

less params



max pool stride (1,1)

Dropout rational

- certain prob. on individual nodes

→ every individual learns other peoples tasks

- neurons in network randomly off per epoch

→ unique netw.

→ ↑ robust

↑ generality of nets

↓ overfit