Convolutional Neural Networks, an intuition...

Convolutional Network

- Image Processing
  - Input Image
  - Filter
  - Feature Maps

Convolution layer
- Input Image
- Feature Map
  - Activation function $f = \text{ReLU} = \max(0,z)$

Pooling
- Input Image
  - Output Image
    - Max($x_r$)
    - Smaller than Input Image

- LeNet-5
1. Initializing weights.
2. We feed examples (input images).
3. We compute error.
4. Modify weights to minimize error.

Repeat 2, 3, 4 until error is acceptable.

2009: "CUDA" GPU for computation.
2012: AlexNet by Alex Krizhevsky (ImageNet Challenge)
2013: ZF Net by Matthew Zeiler
2014: GoogleNet by Alex Krizhevsky & Ilya Sutskever

Current Research:
- Train the network
- Check what activates each unit.

Sometimes units don't activate

- Trains
- Bikes
- Cat
- Dog
- Goose
When do these classifiers fail?

- How to fool them

Hardware has enabled neural model to produce exciting results!!