Face recognition with Convolutional Neural Network

Martin Vels
Face recognition with CNN

- Labeled Faces in the Wild (LFW) dataset with 13,233 images, 5749 persons (classes)
- Only using classes with 5 or more samples: 423 classes
- Using Convolutional Neural Network (CNN) to recognize person on the image
Motivation

- Face recognition and in general pattern recognition are interesting topics.
- My research is related to analyzing video data to find certain patterns.
- Video is a sequence of images.
- Get to know the topic of CNN and use the knowledge in my research.
Goal

- CNN can achieve really good results on image data
- Sample CIFAR-10 dataset with 60k images and 10 classes achieves <2% error rates
- With LFW dataset, achieving 30% error rate would be reasonable
LFW Dataset

- 423 classes, 5985 images,
- median number of images per class: 8,
- 50% of classes with 5 images,
- most images per class: 530
- image size 250x250px
- cropping 128x128 from center, resizing to 64x64px
- some experiments with grayscale images
LFW Dataset - resizing
Convolutional Neural Network

- Similar to regular neural network
- Basic building block is neuron
- Neurons are organized into layers
- Various types of layers
- Idea is to gradually reduce high dimensional input and classify the image
Neuron - the main building block
ConvNet architecture

Various types of layers to reduce dimensions

http://cs231n.github.io/convolutional-networks/
MatConvNet

- MATLAB toolbox
- Implements Convolutional Neural Networks for computer vision applications
- CNN building blocks available as functions
Results

10 classes with at least 50 images per class

32x32 RGB
64x64 grayscale
Results

423 classes with mostly less than 8 images per class

32x32 RGB

64x64 grayscale
Conclusion

- CNN is an interesting and promising tool
- Works well with large dataset
- Disappointing results with my dataset

Future ideas:

- Use horizontal flipping and cropping from corners to generate more data
- Experiment with different configurations and parameters