Tutorial on MatConvNet

Bolei Zhou
Oct. 29, 2015

MatConvNet

- http://www.vlfeat.org/matconvnet/quick/
- Easy to install, work both on CPU and GPU

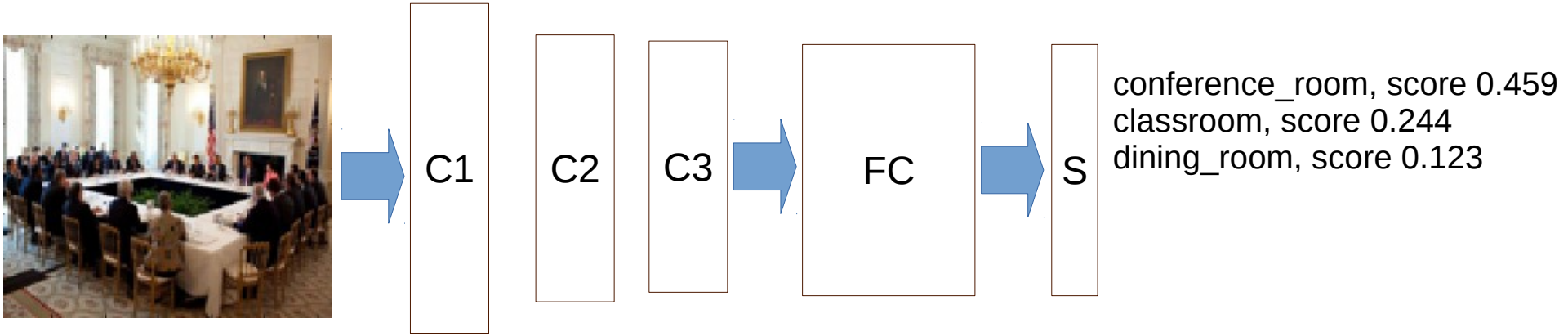
```
% install and compile MatConvNet (needed once)
untar('http://www.vlfeat.org/matconvnet/download/matconvnet-
1.0-beta16.tar.gz') ;
cd matconvnet-1.0-beta16
run matlab/vl_compilenn

% setup MatConvNet (every time you restart matlab)
run matlab/vl_setupnn.m
```

miniPlacesCNNs

- http://6.869.csail.mit.edu/fa15/challenge/miniplacesCNN.zip

  MiniPlaces-refNet1:

- 3 Convolutional layers + 1 Fully Connected layer + 1 Softmax layer



How to Get Started

http://www.vlfeat.org/matconvnet/training/

- Go through the examples of MNIST, CIFAR, and ImageNet (optional).
- Write the pipeline to train the miniPlacesCNN
- Improve the miniPlacesCNN on the validation set
- Submit the prediction result to the evaluation server to rank in the leaderboard for the final test set.

RefNet1: Top 1 accuracy as 0.355 and Top 5 accuracy as 0.649 on the validation set

Training pipeline

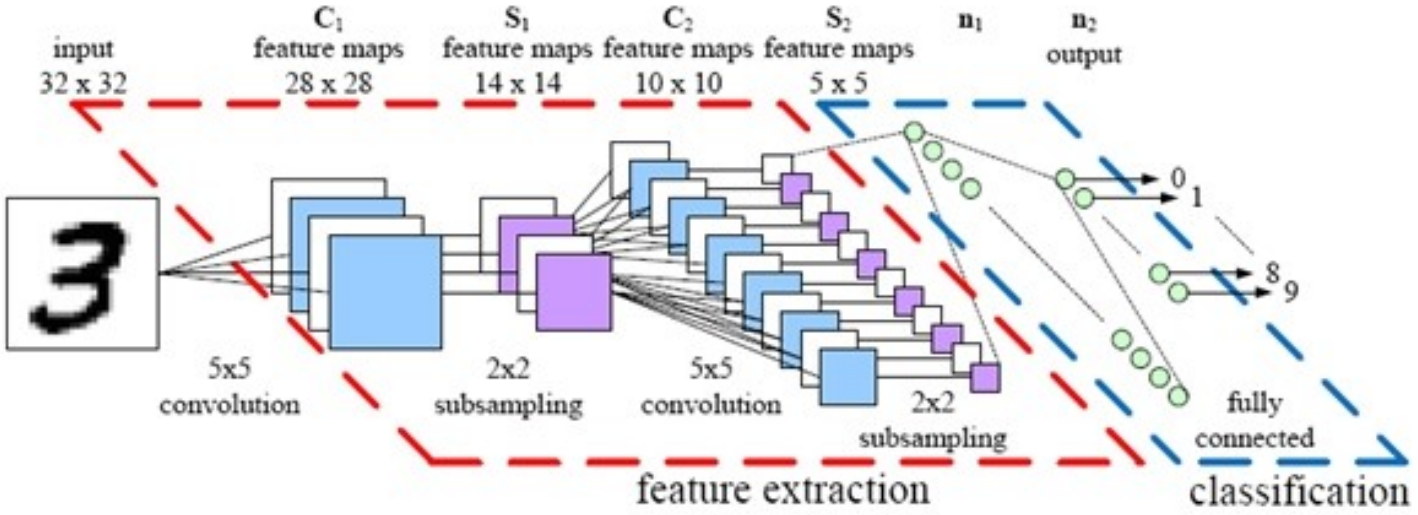
- Prepare data
- Set up training parameters
- Initialize the network model
- Train process:

```
for num = 1 : nEpoch
  train model on training set
  test on validation set
end
test on final test set
```

Training network on MNIST

- MNIST dataset

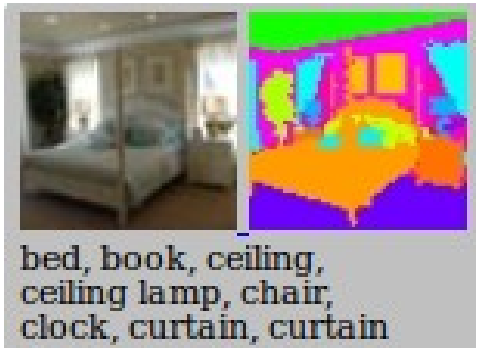
- LeNet

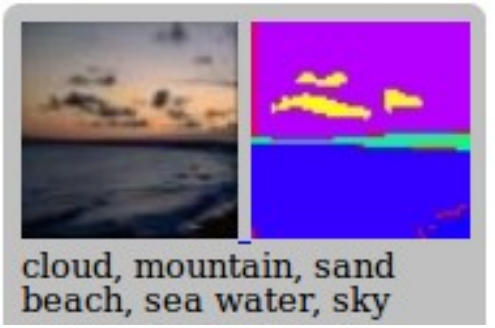


matconvnet-1.0-beta16/examples/cnn_mnist.m

Some possible tricks to improve the accuracy

- More layers: slower, over-fit if not enough data
- Leverage the object labels in some training data.





- Data augmentation: generate more training samples from original image.

Flip

Crop

Effect