CNN & caffe

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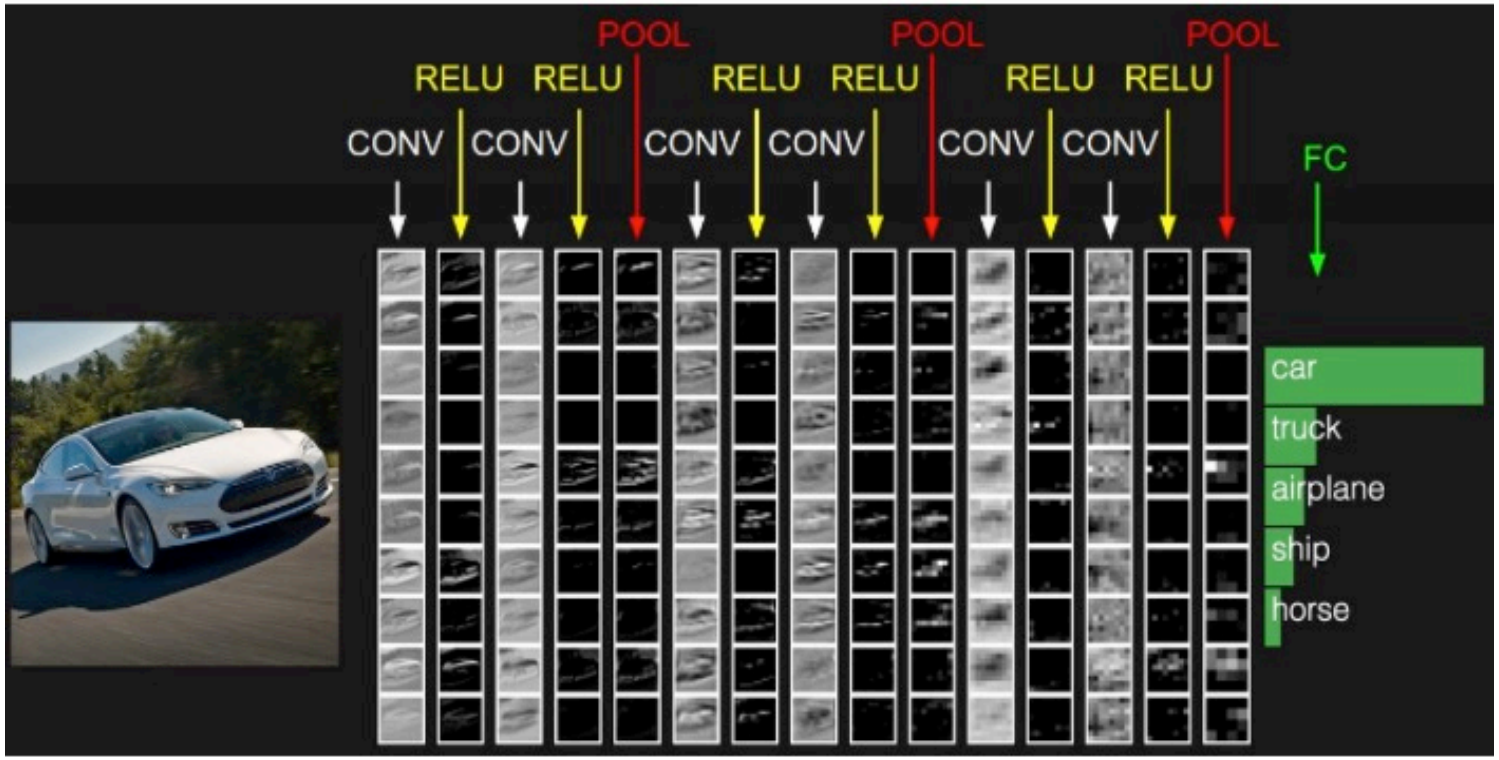
信息科学与工程学院

10.31

计算机视觉实验室

CNN： Convolutional Neural Network



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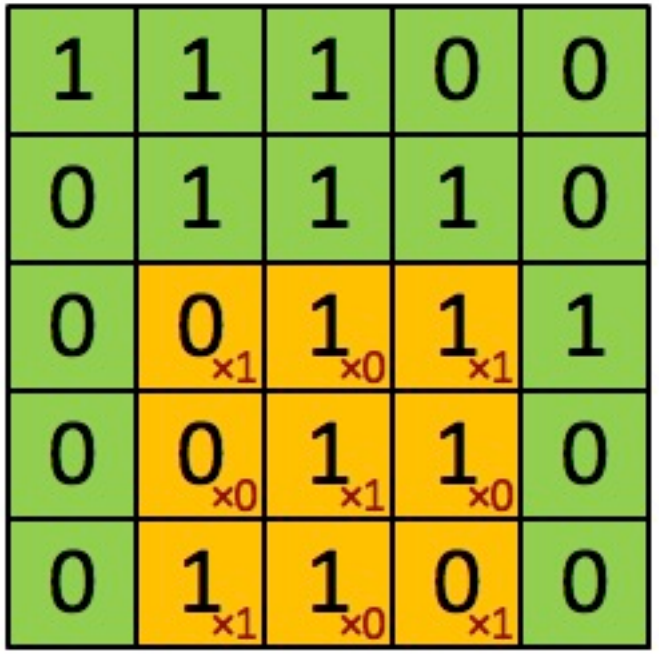
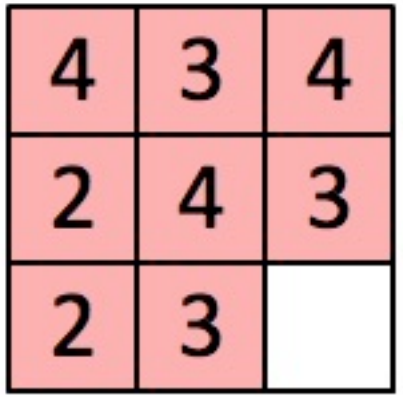
局部感知

参数共享



Image



Convolved Feature

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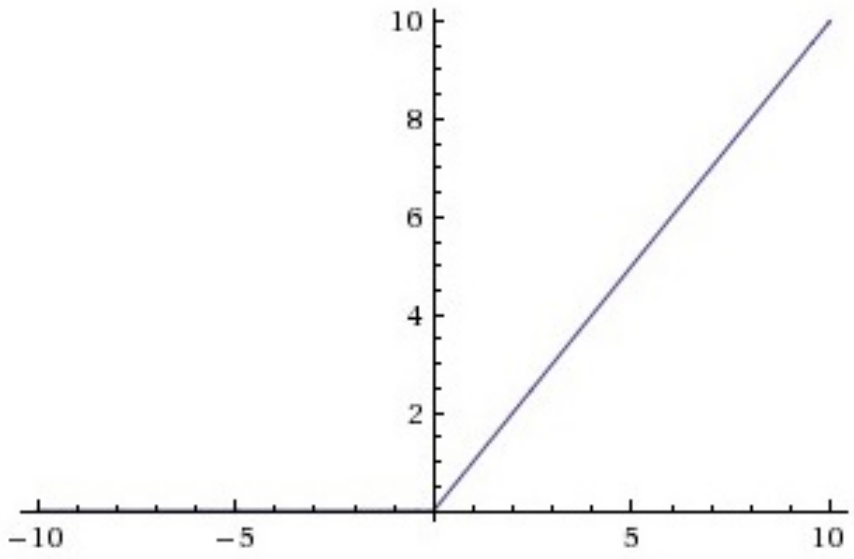
RELU: Rectified Linear Units layer

$$f(x) = \max(0, x)$$

优点：

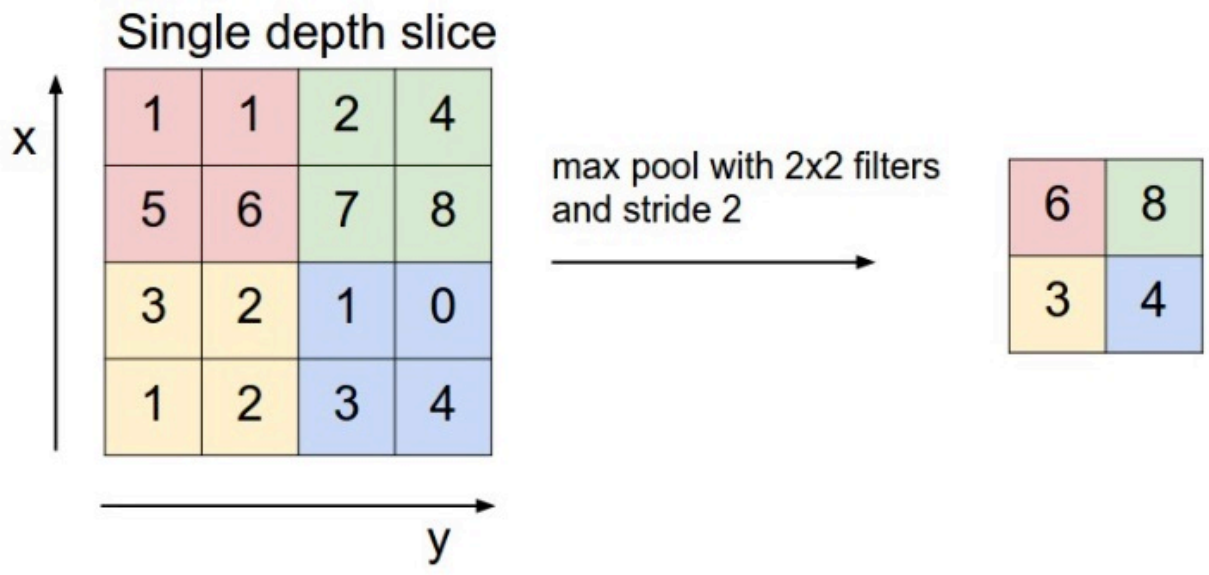
求梯度简单
缓解过拟合



POOL: pool层（下采样层）

Max-pooling: 选择pooling窗口中最大值作为采样值

Mean-Pooling:将所有值相加取平均，以平均值作为采样值



作用：

降维
提高鲁棒性

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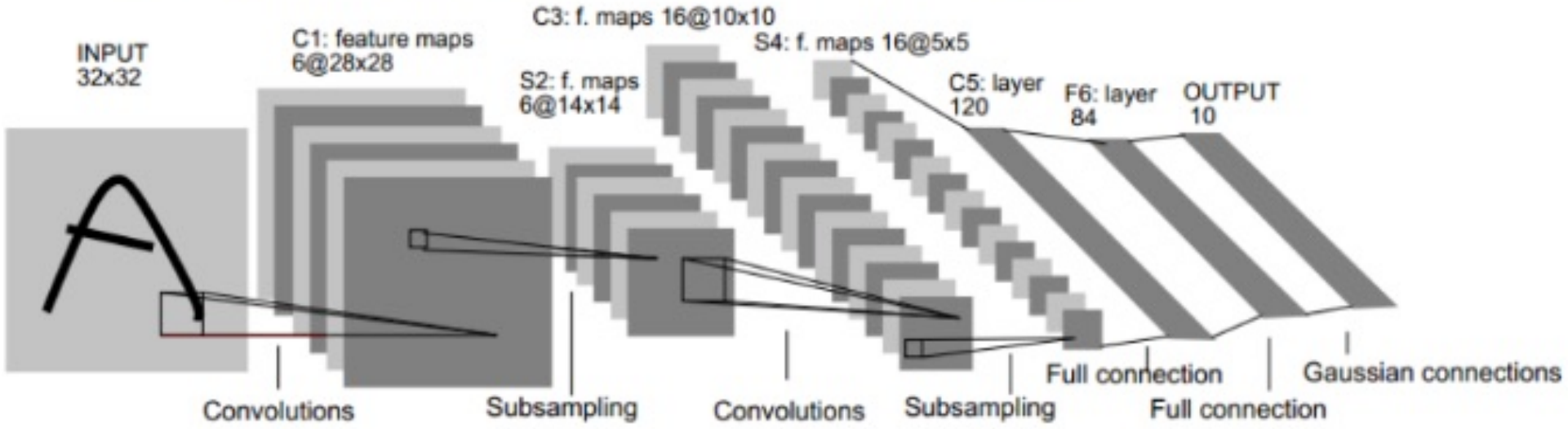
Caffe定义网络结构：



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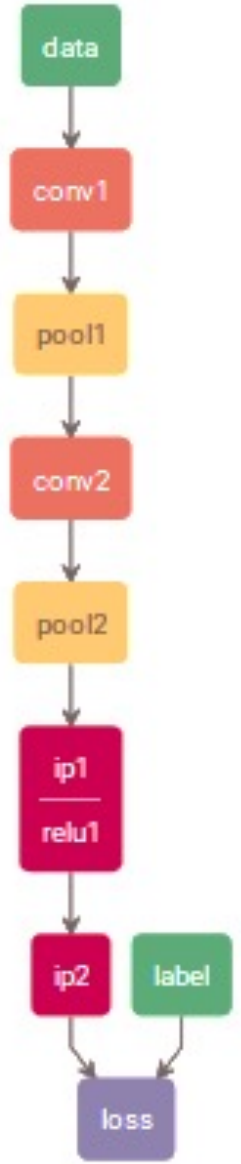
caffe

- 定义网络结构：
  - Data Layer
  - Convolution Layer
  - Pooling Layer
  - Fully Connected Layer
  - ReLU Layer
  - Loss Layer
- 定义Solver：



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训练与测试：

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./train_lenet.sh

```
convert_mnist_data.cpp:88] A total of 60000 items.
convert_mnist_data.cpp:89] Rows: 28 Cols: 28
convert_mnist_data.cpp:108] Processed 60000 files.
db_lmdb.cpp:35] Opened lmdb examples/mnist/mnist_te

convert_mnist_data.cpp:88] A total of 10000 items.
convert_mnist_data.cpp:89] Rows: 28 Cols: 28
convert_mnist_data.cpp:108] Processed 10000 files.
```

```
net.cpp:270] This network produces output accuracy
net.cpp:270] This network produces output loss
net.cpp:283] Network initialization done.
solver.cpp:60] Solver scaffolding done.
caffe.cpp:251] Starting Optimization
solver.cpp:279] Solving LeNet
```

```
I1029 18:39:21.661705 30936 sgd_solver.cpp:106] Iteration 8500, lr = 0.00630407
I1029 18:39:25.341925 30936 solver.cpp:228] Iteration 8600, loss = 0.000597327
I1029 18:39:25.341954 30936 solver.cpp:244]     Train net output #0: loss = 0.00
0597279 (* 1 = 0.000597279 loss)
I1029 18:39:25.341964 30936 sgd_solver.cpp:106] Iteration 8600, lr = 0.00627864
I1029 18:39:29.113770 30936 solver.cpp:228] Iteration 8700, loss = 0.0022585
I1029 18:39:29.113808 30936 solver.cpp:244]     Train net output #0: loss = 0.00
225845 (* 1 = 0.00225845 loss)
```

```
    Test net output #0: accuracy = 0.9906
    Test net output #1: loss = 0.0293944

 Optimization Done.
Optimization Done.
```

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Thanks for your attention !

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Q&A