Image classification

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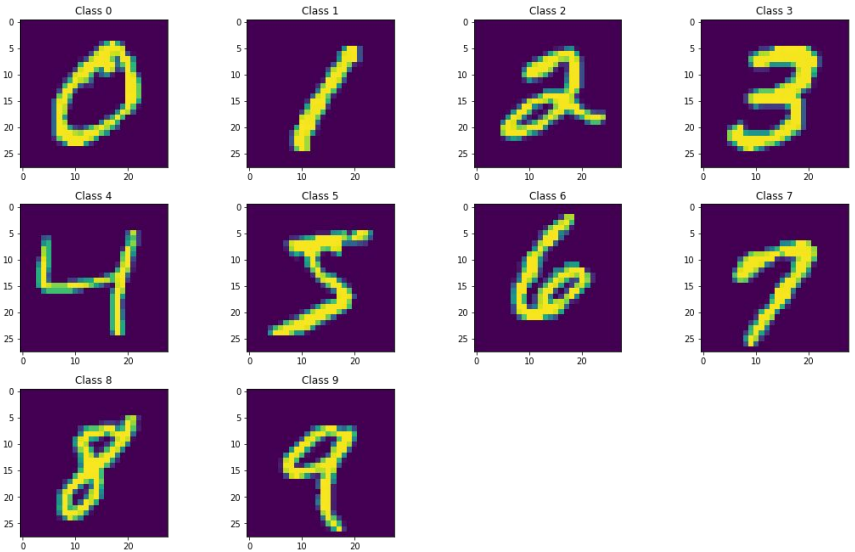
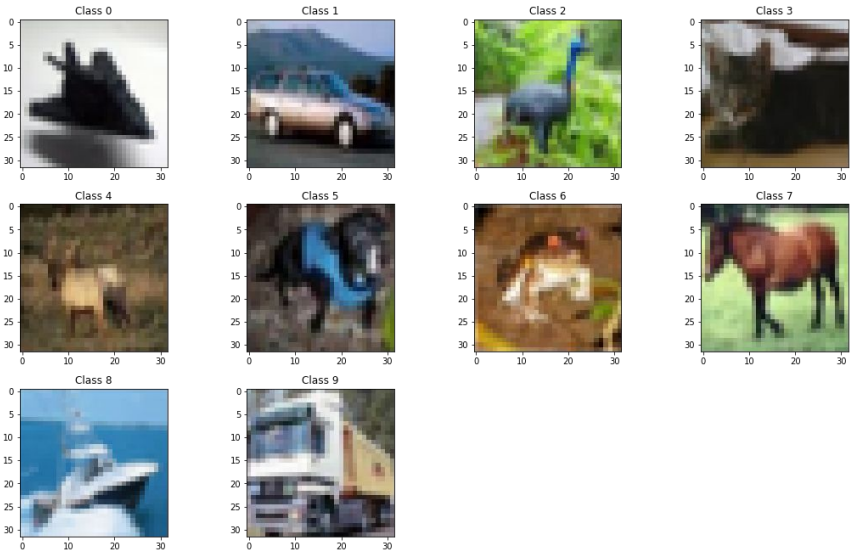
Exercise 1 - Visualization





Exercise 2 - Create a CNN

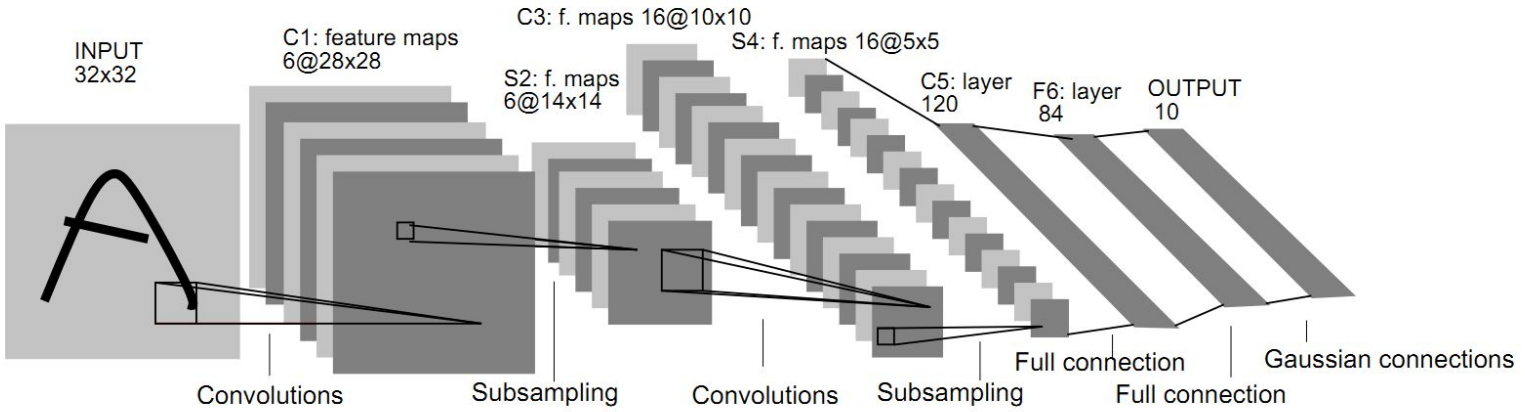


Fig. 2. Architecture of LeNet-5, a Convolutional Neural Network, here for digits recognition. Each plane is a feature map, i.e. a set of units whose weights are constrained to be identical.

Exercise 3.1 - Test the functions

Regularizers

```
0) None
    Loss: 2.2, Acc: 0.511
1) l1_l2
    Loss: 1.5e+02, Acc: 0.126
2) l2
    Loss: 6.6, Acc: 0.126
3) l1
    Loss: 1.3e+02, Acc: 0.099
```

Initializers

```
0) he_uniform
    Loss: 2.2, Acc: 0.364
1) RandomNormal
    Loss: 2.2, Acc: 0.275
2) he_normal
    Loss: 2.2, Acc: 0.231
3) TruncatedNormal
    Loss: 2.3, Acc: 0.213
4) glorot_uniform
    Loss: 2.3, Acc: 0.211
5) lecun_uniform
    Loss: 2.3, Acc: 0.198
6) RandomUniform
    Loss: 2.3, Acc: 0.18
7) VarianceScaling
    Loss: 2.3, Acc: 0.174
8) glorot_normal
    Loss: 2.4, Acc: 0.116
9) lecun_normal
    Loss: 2.3, Acc: 0.11
10) Ones
    Loss: 1.4e+01, Acc: 0.11
11) Zeros
    Loss: 2.3, Acc: 0.099
```

Optimizers

```
0) Adagrad
    Loss: 0.25, Acc: 0.926
1) Nadam
    Loss: 0.26, Acc: 0.921
2) Adamax
    Loss: 0.36, Acc: 0.889
3) RMSprop
    Loss: 0.41, Acc: 0.88
4) Adam
    Loss: 0.41, Acc: 0.871
5) Adadelta
    Loss: 1.2, Acc: 0.601
6) SGD
    Loss: 2.2, Acc: 0.371
```

Exercise 3.2 - Hyperparameter search