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Classifying MNIST digits using CNN

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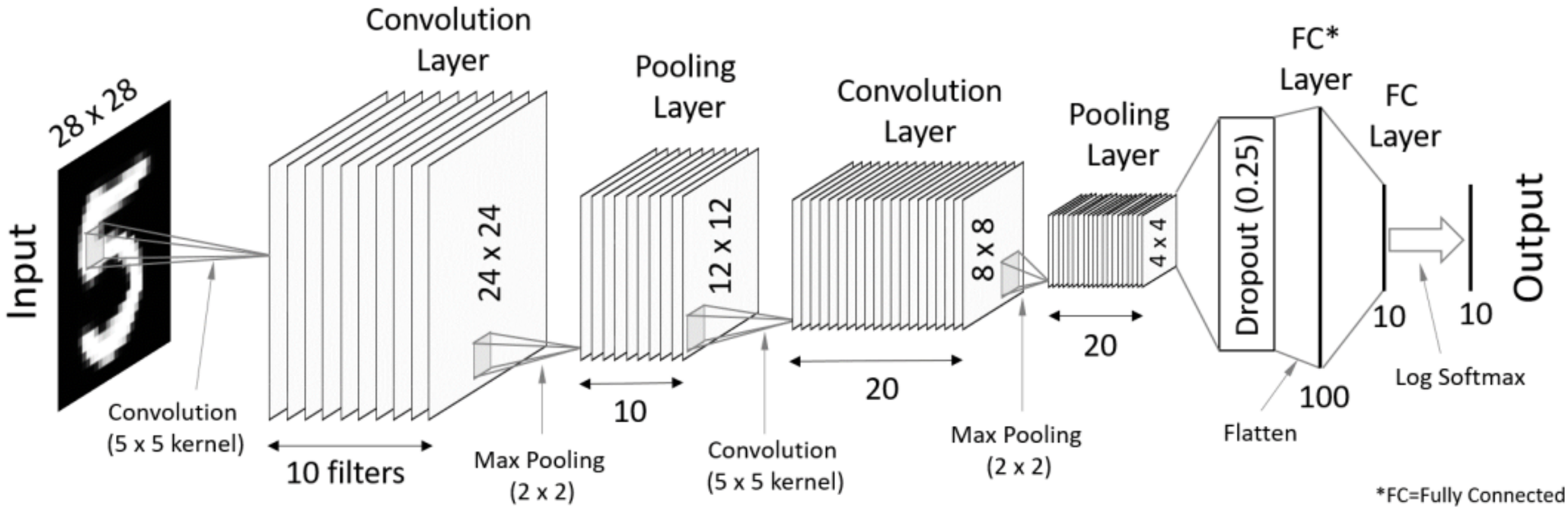
MNIST / CNN

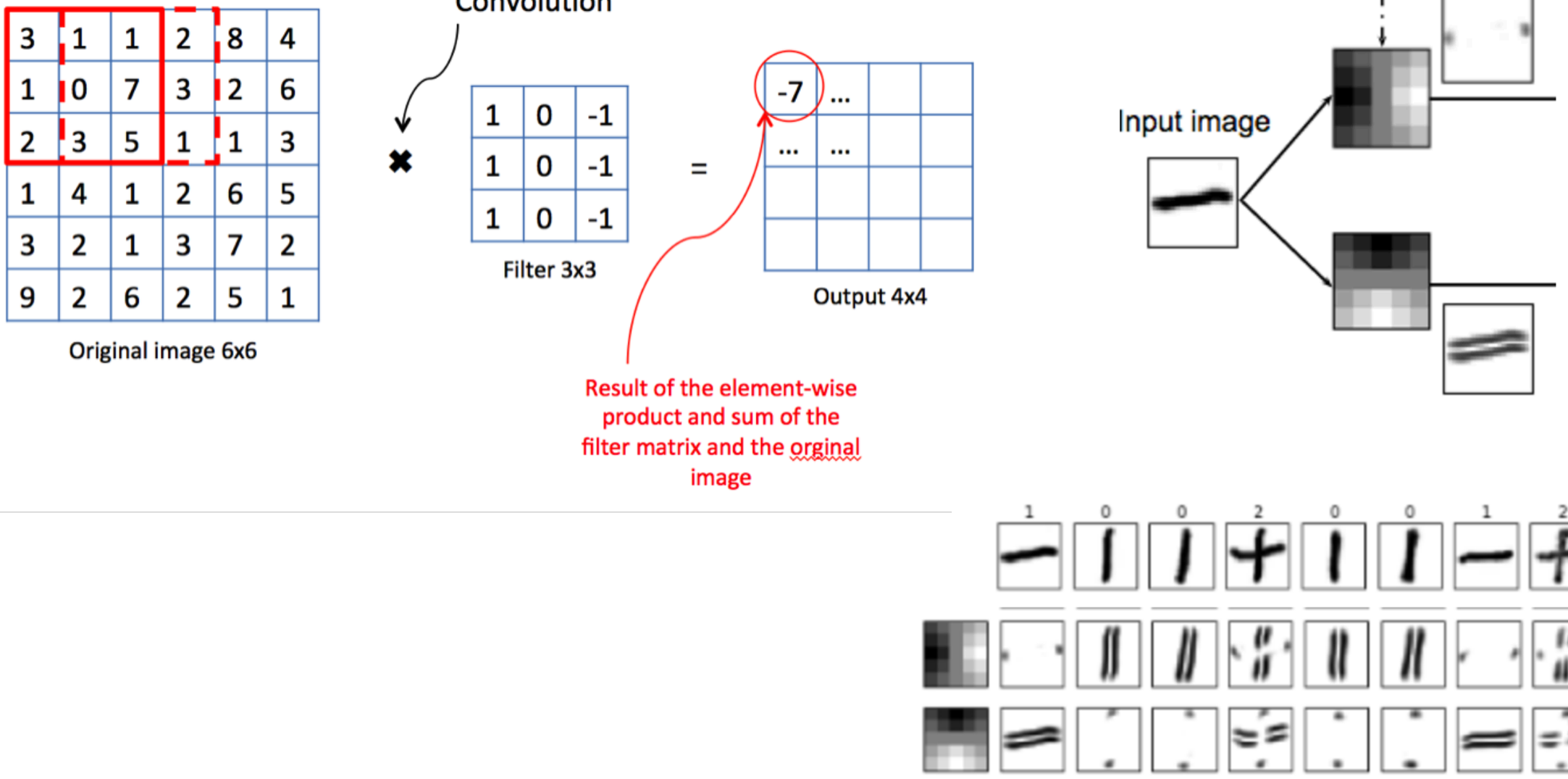


Now we try to classify MNIST digits using Convolutional Neural Network (CNN)

- Feed the digit images as 2-d vector (gray scale image)
- Size : (60000, 28, 28), (10000, 28, 28)

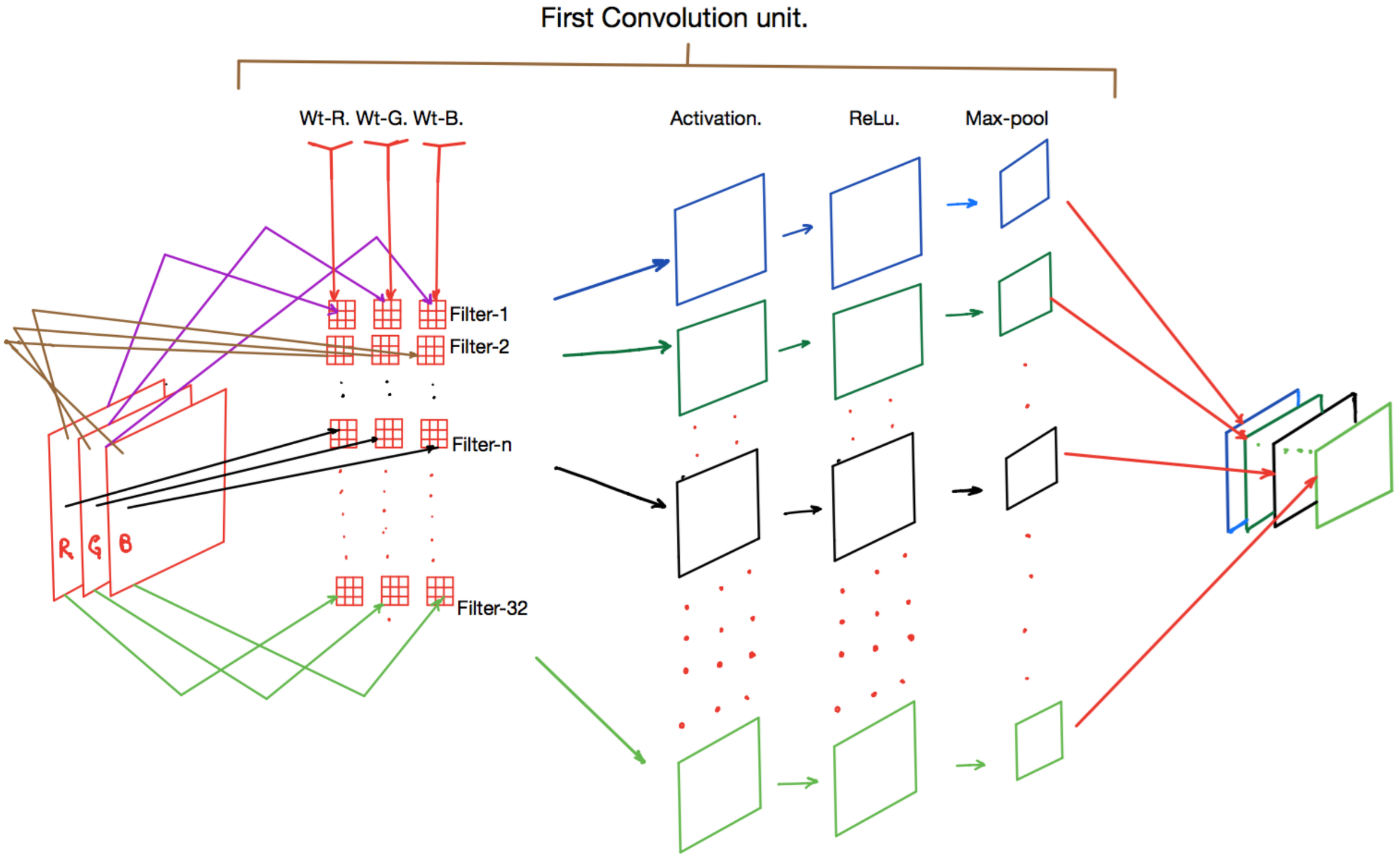
```
# input image dimensions
img_rows, img_cols = 28, 28

# the data, split between train and test sets
(x_train, y_train), (x_test, y_test) = mnist.load_data()

if K.image_data_format() == 'channels_first':
    x_train = x_train.reshape(x_train.shape[0], 1, img_rows, img_cols)
    x_test = x_test.reshape(x_test.shape[0], 1, img_rows, img_cols)
    input_shape = (1, img_rows, img_cols)
else:
    x_train = x_train.reshape(x_train.shape[0], img_rows, img_cols, 1)
    x_test = x_test.reshape(x_test.shape[0], img_rows, img_cols, 1)
    input_shape = (img_rows, img_cols, 1)
```

Convolution Operation



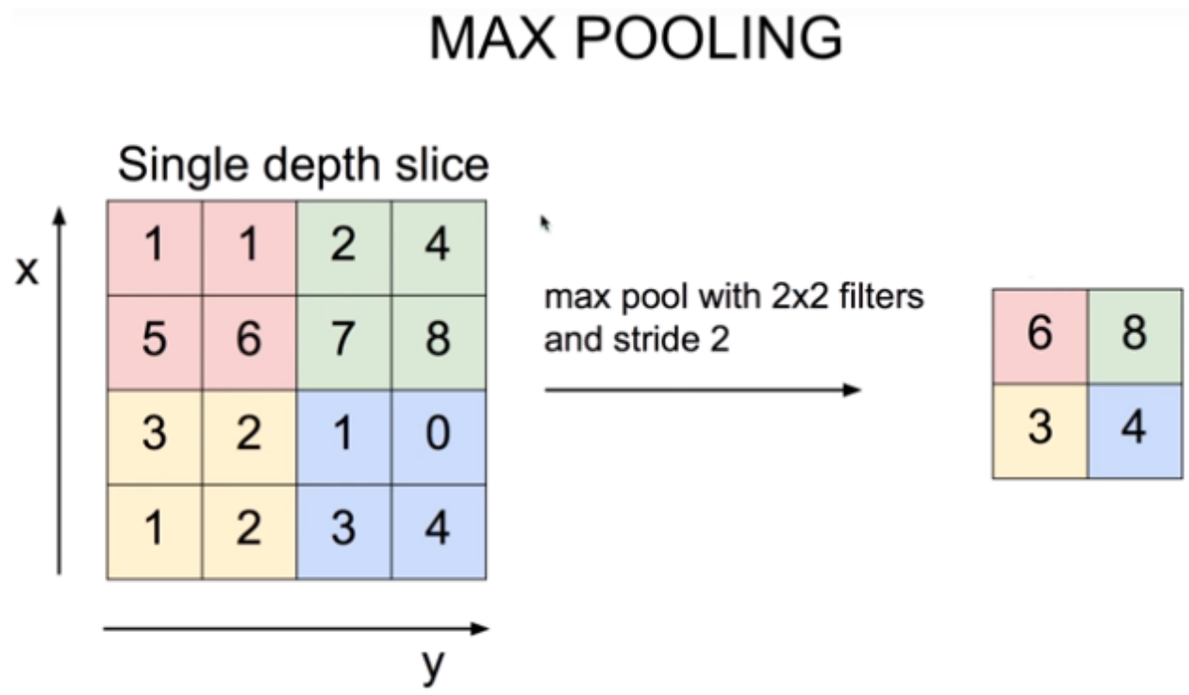
- Note that the size of the output may be different from the size of the input.
- The output of the filter will be large if the input has the feature that the filter can detect.

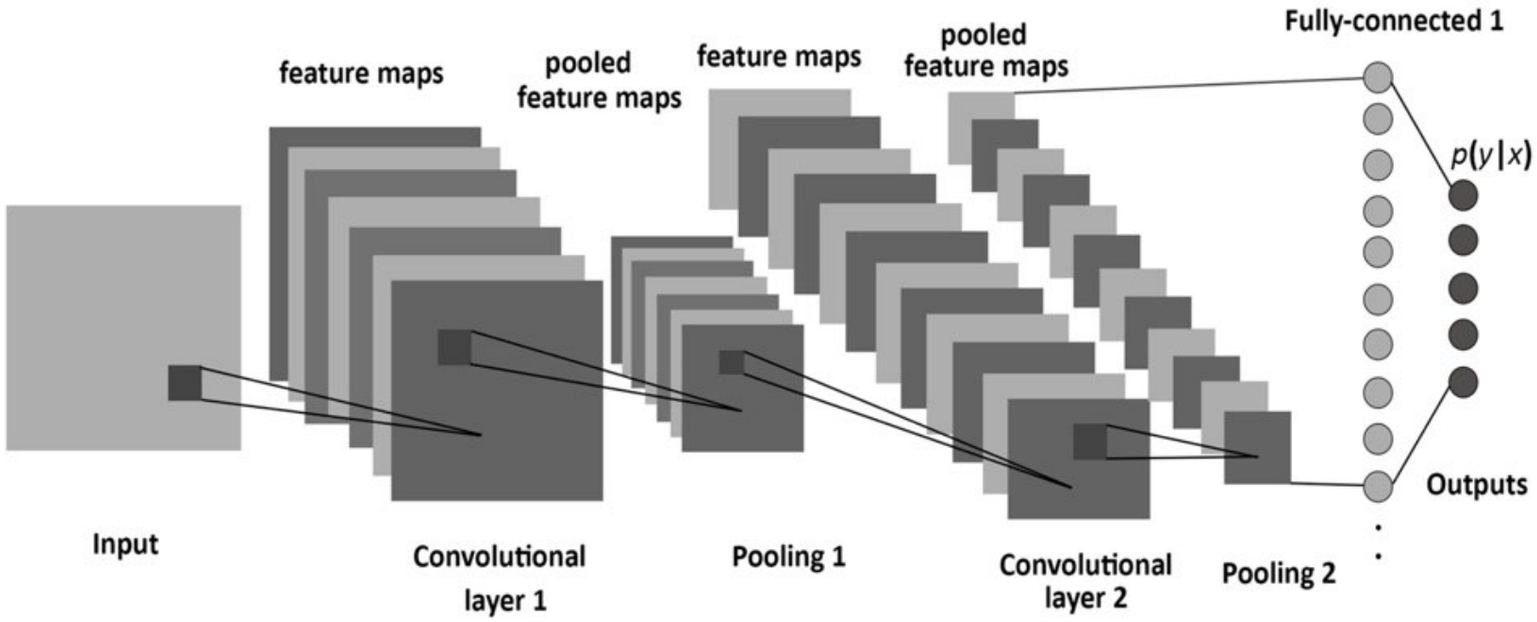
Convolution Layer



- The weights and the biases which are the components of the filters change when training the network.

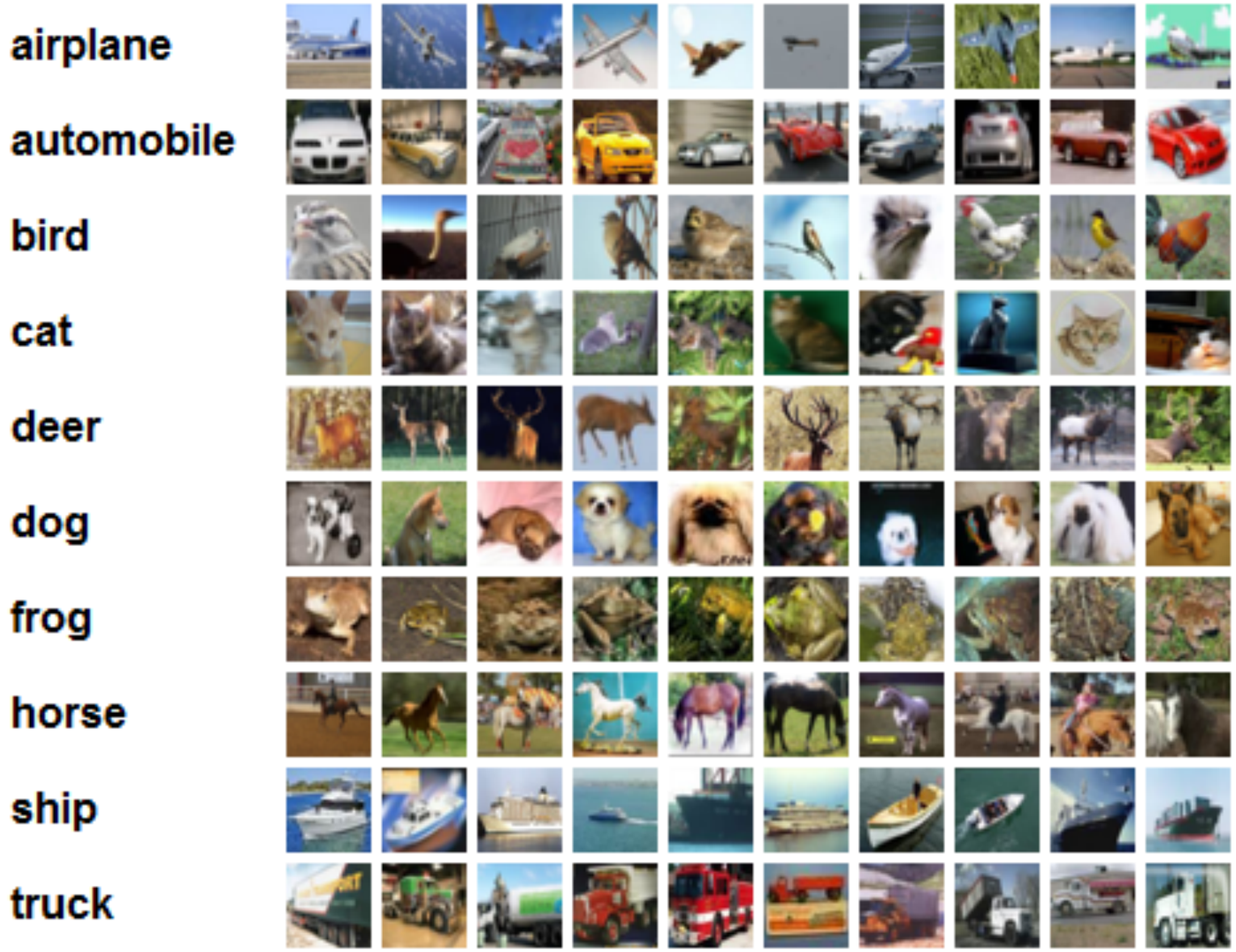
Max Pooling





- To lower the number of the features
- ie. Max-pooling, average-pooling

Assignment – Cifar-10 and CNN



- Submit your .py code and the single page report (no format).
- Discuss the differences between the MNIST and the Cifar-10. (Data, model, results)