Convolutional Neural Network

COMP 4211 - Tutorial 07

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Objective

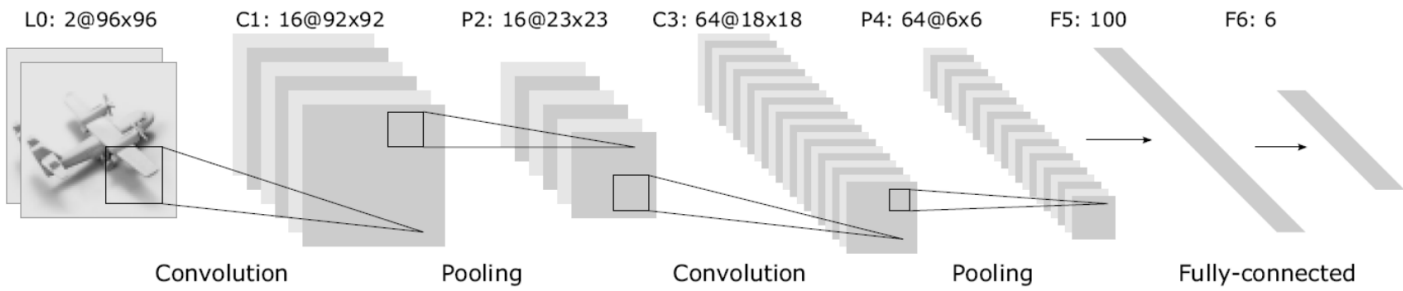
In this tutorial, you will implement convolutional neural network (CNN) using TensorFlow.

Agenda

1. Review of CNN.
2. Implement CNN in TensorFlow.

Recap

- Convolutional neural network.



Let's code

Building CNN in TensorFlow.

To better understand today tutorial, the following .ipynb is covered:

- T07_CNN_with_TensorFlow.ipynb

Convolution in TensorFlow

`tf.nn.conv2d` is the TensorFlow operation for convolution.

```
layer = tf.nn.conv2d(
  input=input,
  filter=weights,
  strides=[1, 1, 1, 1],
  padding='SAME'
)
```

`strides` can be conceived as the moving step in each dimension. The first one is for the image-number and the last one is for the input-channel, whereas the second and third one represent the pixels-number across the x- and y-axis of the image respectively.

Question: Why stride = [1,1,1,1], but not others?

Max-pooling in TensorFlow

`tf.nn.max_pool` is the TensorFlow operation for max-pooling.

```
# strides=[1, 2, 2, 1] would mean that the max-pooling-filter
# is moved 2 pixels across the x- and y-axis of the image.
layer = tf.nn.max_pool(
  value=layer,
  ksize=[1, 2, 2, 1], # pooling window size
  strides=[1, 2, 2, 1],
  padding='SAME'
)
```

This is 2x2 max-pooling, which means that we consider 2x2 windows and select the largest value in each window. Then we move 2 pixels to the next window.

Question: What changes should be made if 3x3 max-pooling is desired?