简介

Tensorflow

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Tensorflow

- Tensor + Flow
- Graph + Run
- 1. 构造计算图
- 2. 将数据注入得到某个节点的输出

如何学习？

- 多看代码、多写代码、多参考API文档、多总结
- Python: https://www.liaoxuefeng.com/wiki/0014316089557264a6b348958f449949df42a6d3a2e542c000
- 计算机视觉基础：CS231N
- 安装：https://www.tensorflow.org/install/
- API文档：https://www.tensorflow.org/api_docs/
- Tensorflow与Numpy在API的设计上有相似之处，可共同学习
- 不需要死记硬背，用心理解，清楚有什么API可以使用即可

计算矩阵乘法： np & tf

```
import tensorflow as tf
import numpy as np
```

```
def np_matmul():
    a = np.ones([3, 3], np.float32)
    b = np.ones([3, 3], np.float32)
    c = np.matmul(a, b)
    print(c)
```

```
[[3. 3. 3.]
 [3. 3. 3.]
 [3. 3. 3.]]
```

```
def tf_matmul():
    p1 = tf.placeholder(tf.float32, [None, None])
    p2 = tf.placeholder(tf.float32, [None, None])
    c = tf.matmul(p1, p2)

    sess = tf.Session()
    a = np.ones([3, 3], np.float32)
    b = np.ones([3, 3], np.float32)
    out = sess.run(c, feed_dict={p1: a, p2: b})
    print(out)
    sess.close()
```

```
[[3. 3. 3.]
 [3. 3. 3.]
 [3. 3. 3.]]
```

理解Tensor

```
def tf_matmul_2():
    a = tf.ones([3, 3], tf.float32)
    b = tf.ones([3, 3], tf.float32)
    c = tf.matmul(a, b)
    print(c)

What is c?

Tensor("MatMul:0", shape=(3, 3), dtype=float32)
```

理解Tensor

```python
def tf_demo_1():
    a = tf.Variable(1, dtype=tf.float32)
    b = tf.Variable(2, dtype=tf.float32)
    assign_op = tf.assign(a, 2)
    c = a + b
    init_op = tf.global_variables_initializer()
    sess = tf.Session()
    sess.run(init_op)
    print(sess.run(c))
    sess.close()

Out: 3.0
```

```python
def tf_demo_2():
    a = tf.Variable(1, dtype=tf.float32)
    b = tf.Variable(2, dtype=tf.float32)
    c = a + b
    assign_op = tf.assign(a, 2)
    init_op = tf.global_variables_initializer()
    sess = tf.Session()
    sess.run(init_op)
    out, _ = sess.run([c, assign_op])
    print(out)
    sess.close()

Out: ?
```

理解计算图构建

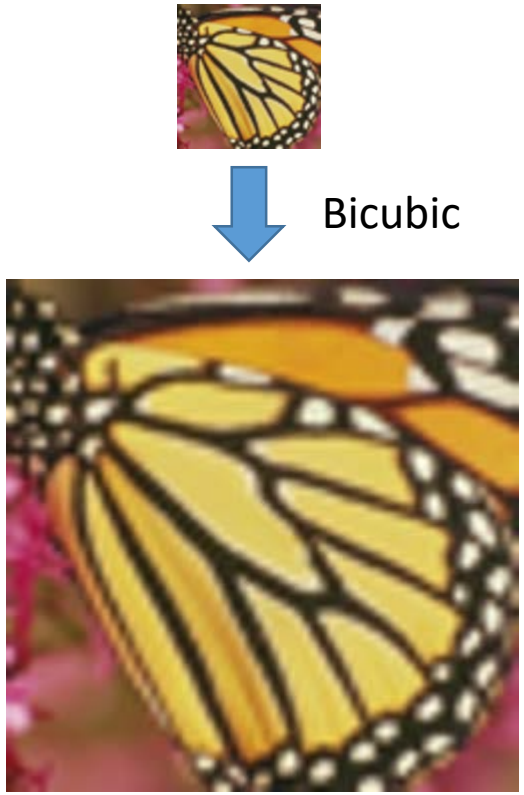
- 计算图的构建必须全部由tensorflow的API组成
- 计算图为静态图，在运行过程中不允许修改
- 例子：实现输入数字p，p大于0则加一，否则减一

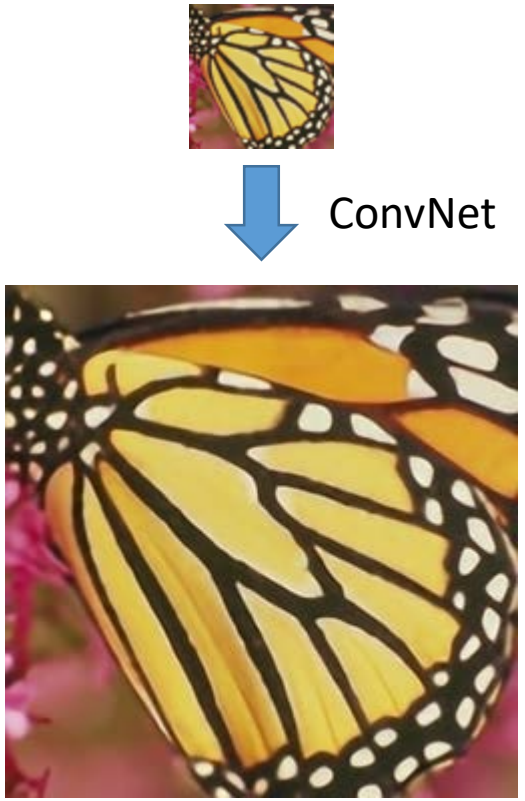
```
def tf_demo_3():
    p = tf.placeholder(tf.float32, [])
    if p > 0:
        p = p + 1
    else:
        p = p - 1

    sess = tf.Session()
    print(sess.run(p, feed_dict={p: 1}))
    sess.close()

Run error!
```

```
def tf_demo_3():
    p = tf.placeholder(tf.float32, [])
    c = tf.cond(p > 0, lambda: p + 1, lambda: p - 1)

    sess = tf.Session()
    print(sess.run(c, feed_dict={p: 1}))
    print(sess.run(c, feed_dict={p: -1}))
    sess.close()

Out:
2.0
-2.0
```

训练图像超分模型

- 下采样4倍的小图直接bicubic放大到原图大小，缺乏很多高频信息，利用深度学习来学习补充这些高频信息





训练图像超分模型

- 1. 处理训练数据，构造训练样本（输入，输出）
- 2. 构造网络模型
- 3. 训练模型，训练过程可视化
- 4. 在测试集上测试模型性能

- 代码：
- https://github.com/linchuming/ImageSR-Tensorflow