

TensorFlow Quickstart

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<https://youtu.be/fUyU3IKzoio>

Installing with Docker

- `$ docker run -it -p 8889:8888 tensorflow/tensorflow`
- `$ docker exec -it ${container id} bash`
- `$ python`

Your First TensorFlow Program

```
import tensorflow as tf

const1 = tf.constant(2)

const2 = tf.constant(3)

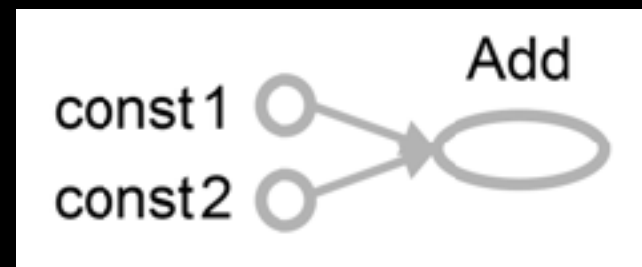
add = const1 + const2

sess = tf.Session()

print(sess.run(add))
```

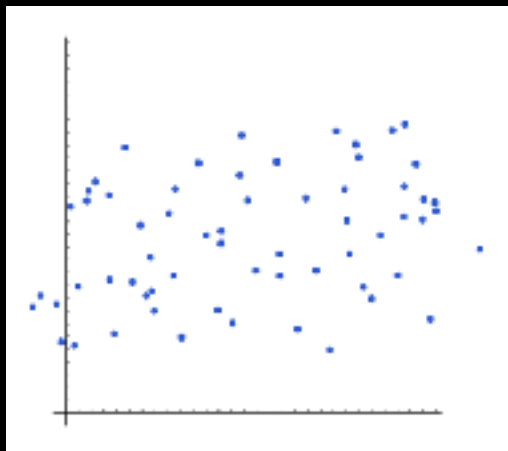
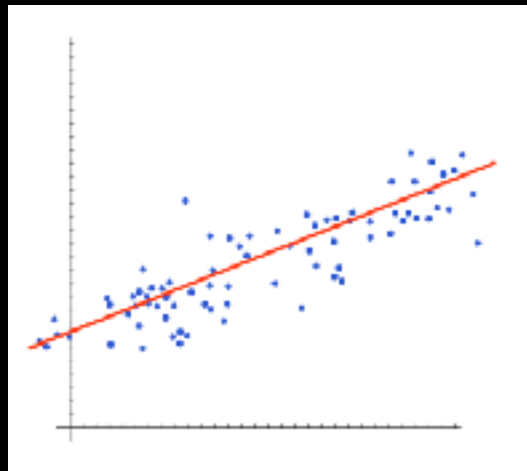
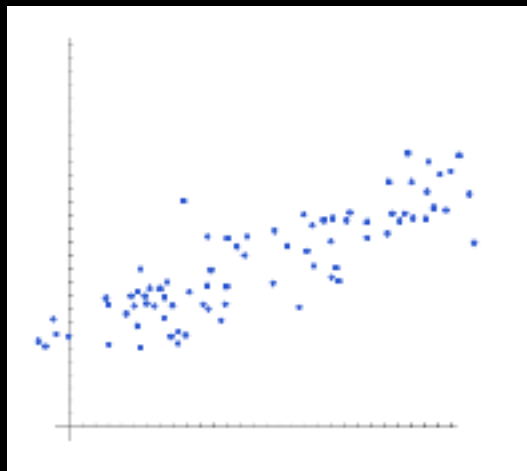
You Must Know

- Tensor
- Placeholder
- Variable
- Session



1. Tensor: TensorFlow 運算中最基本的單位，通常是高維度矩陣
2. Placeholder: 在 Tensorflow 中我們都是先建好 Graph 再決定資料的 input 與 output，在執行這個 Graph 時再把 input 丟入
ex:

```
a = tf.placeholder(tf.float32)
b = tf.placeholder(tf.float32)
c = a + b
sess.run(c, {a:3, b:4.5})
```
3. Variable: 非 Constant & Placeholder
4. Session: session 幫助我們定義我們所需要 run 的 Graph 的 input 和 output，讓 Tensor 流動，Graph 是如何流動的過程



1. 如何找出線性迴歸線

Statistics And Probability - Variance

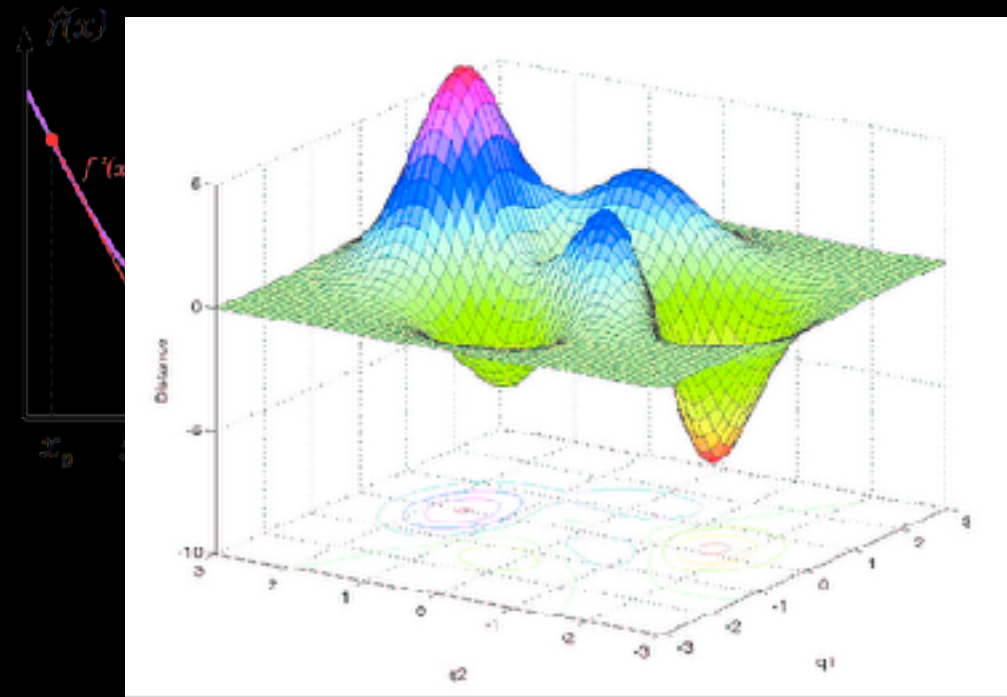
- Continuous Probability Distribution

$$\text{Var}(X) = \sigma^2 = \int (x - \mu)^2 f(x) dx = \int x^2 f(x) dx - \mu^2$$

- Discrete Probability Distribution

$$\text{Var}(X) = \sum_{i=1}^n p_i \cdot (x_i - \mu)^2 = \sum_{i=1}^n (p_i \cdot x_i^2) - \mu^2$$

Gradient Descent



1. 梯度下降 (<https://zh.wikipedia.org/wiki/%E6%A2%AF%E5%BA%A6%E4%B8%8B%E9%99%8D%E6%B3%95>)
- 2.

Your First Training

```
import tensorflow as tf
```

```
import numpy as np
```

```
# create data
```

```
x_data = np.random.rand(100).astype(np.float32)
```

```
y_data = x_data*0.1 + 0.3
```

```
Weights = tf.Variable(tf.random_uniform([1], -1.0, 1.0))
```

```
biases = tf.Variable(tf.zeros([1]))
```

```
y = Weights*x_data + biases
```

```
loss = tf.reduce_mean(tf.square(y-y_data))
```

```
optimizer = tf.train.GradientDescentOptimizer(0.5)
```

```
train = optimizer.minimize(loss)
```

1. 變異數最小
2. 梯度下降
- 3.

```
init = tf.global_variables_initializer()
```

```
sess = tf.Session()
```

```
sess.run(init)      # Very important
```

```
for step in range(201):
```

```
    sess.run(train)
```

```
    if step % 20 == 0:
```

```
        print(step, sess.run(Weights), sess.run(biases))
```

1. Variable init
2. Session 介紹
- 3.

Reference

- https://www.tensorflow.org/install/install_mac
- <https://hub.docker.com/r/tensorflow/tensorflow/>
- <https://fgc.stpi.narl.org.tw/activity/videoDetail/4b1141305d9cd231015d9d0852c5002b>
- <https://morvanzhou.github.io/tutorials/machine-learning/tensorflow/2-2-example2/>
- 圖片來源：
- <https://www.neural-networks.io/en/single-layer/gradient-descent.php>
- https://www.researchgate.net/figure/Local-minimum-encountered-in-3-dimension-space-in-single-objective-optimization-based_fig2_225279543
- Blair 精心製作