Tutorials

Anaconda / Jupyter notebook / Tensorflow

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Contents

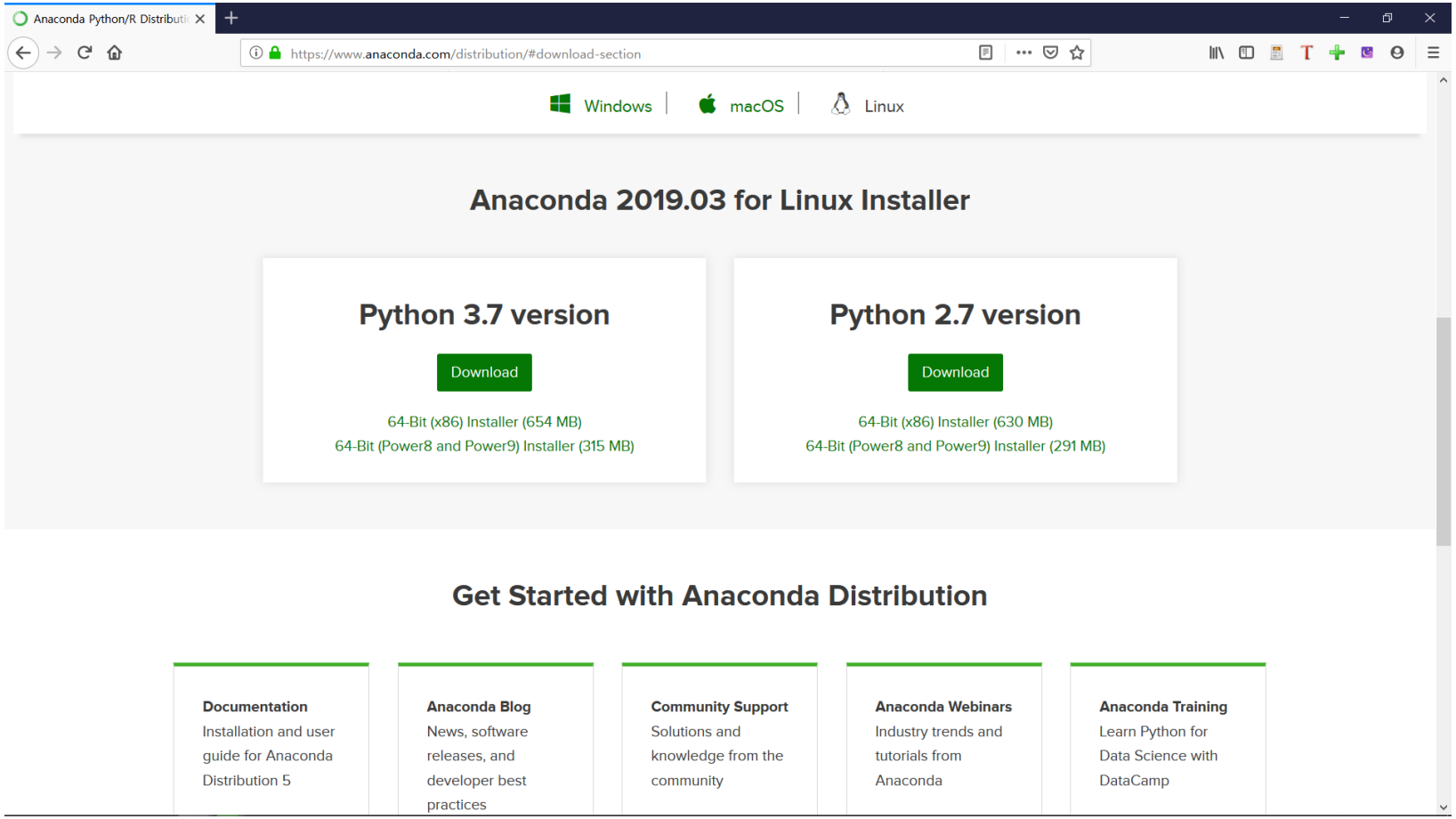
- Anaconda
  - Install virtual environment (Tensorflow, Jupyter notebook, matplotlib)
- Jupyter notebook tutorial
  - .ipynb files and python
  - Anaconda virtual environment and kernel
- Tensorflow tutorials
  - Model and Session
- Matplotlib tutorials

Anaconda

- Anaconda 란?
  - 통계관련 프로그램인 Python 및 R 을 보다 편리하게 사용할 수 있도록 도와주는 프로그램
  - Conda 를 통해 다양한 언어들의 package, dependency, environment 를 관리할 수 있다.

- 수업에서의 사용 방향:
  - 가상환경 만들기
  - 수업에 필요한 프로그램을 명령어만으로 설치 (jupyter notebook, tensorflow, matplotlib 등)
  - Jupyternotebook 을 실행하여 실습 수업 진행

Anaconda


Anaconda Python/R Distributi
https://www.anaconda.com/distribution/#download-section
Windows
macOS
Linux
Anaconda 2019.03 for Linux Installer
Python 3.7 version
Download
64-Bit (x86) Installer (654 MB)
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Industry trends and tutorials from Anaconda
Anaconda Training
Learn Python for Data Science with DataCamp

Anaconda

- 설치 후에…
- Ubuntu: terminal 실행
- Window: Anaconda prompt 실행

- 가상환경 설치 명령어 입력
  - conda create –n [가상환경이름] [설치할 패키지들]
  - conda create –n tensorflow tensorflow jupyter notebook matplotlib
- 가상환경 삭제 명령어
  - conda remove –n [가상환경이름] --all

Anaconda

- 설치된 가상환경 확인 명령어
  - conda env list
- 설치된 가상환경 실행 명령어
  - codna activate [가상환경이름]

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  - Model and Session
- Matplotlib tutorials

Jupyter notebook tutorial

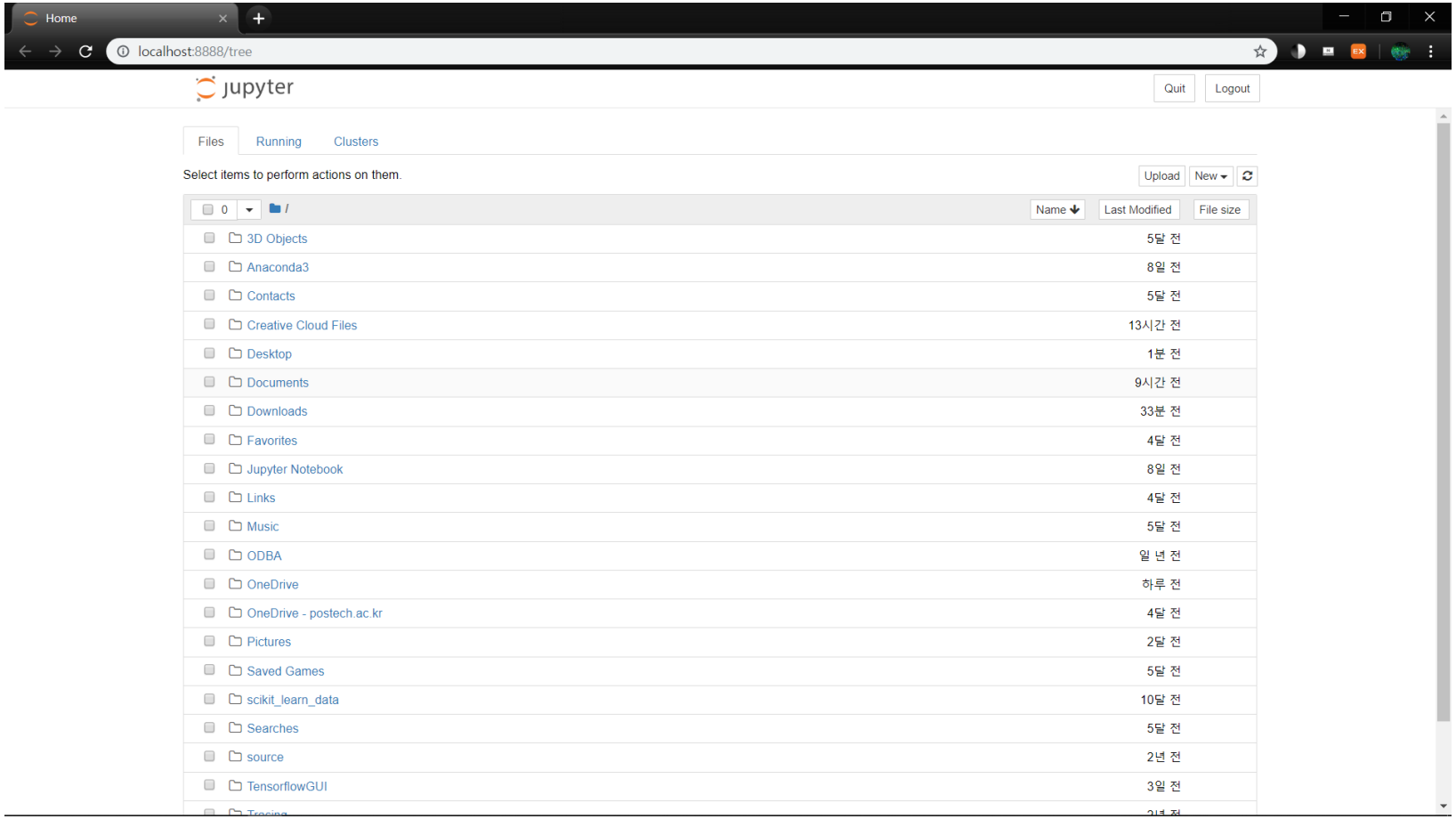
- Jupyter notebook 이란?
  - 대화형 프로그래밍을 지원하는 웹 어플리케이션
  - Jupyter 를 통해 웹에서 프로그래밍을 실시간으로 할 수 있다.

- 수업에서의 사용 방향:
  - 웹(인터넷) 브라우저에서 대화형 프로그래밍을 진행
    - 중간중간 결과 확인 및 검색을 쉽게 진행 가능

Jupyter notebook tutorial

- Anaconda 에서 Jupyter notebook 을 설치하였다면…
  (jupyter notebook 이 설치된 가상환경을 실행하였다면)
- Jupyter notebook 실행 명령어
  - Jupyter notebook
  - 인터넷 창이 켜지며, *명령어를 입력했던 폴더*의 내용을 보여줌

Jupyter notebook tutorial



Jupyter notebook tutorial

- .ipynb
  - 우리가 실습할 코드의 확장자 (ipython notebook 의 약자)
  - python 코드를 실시간으로 실행시켜가며 확인할 수 있게 해준다.

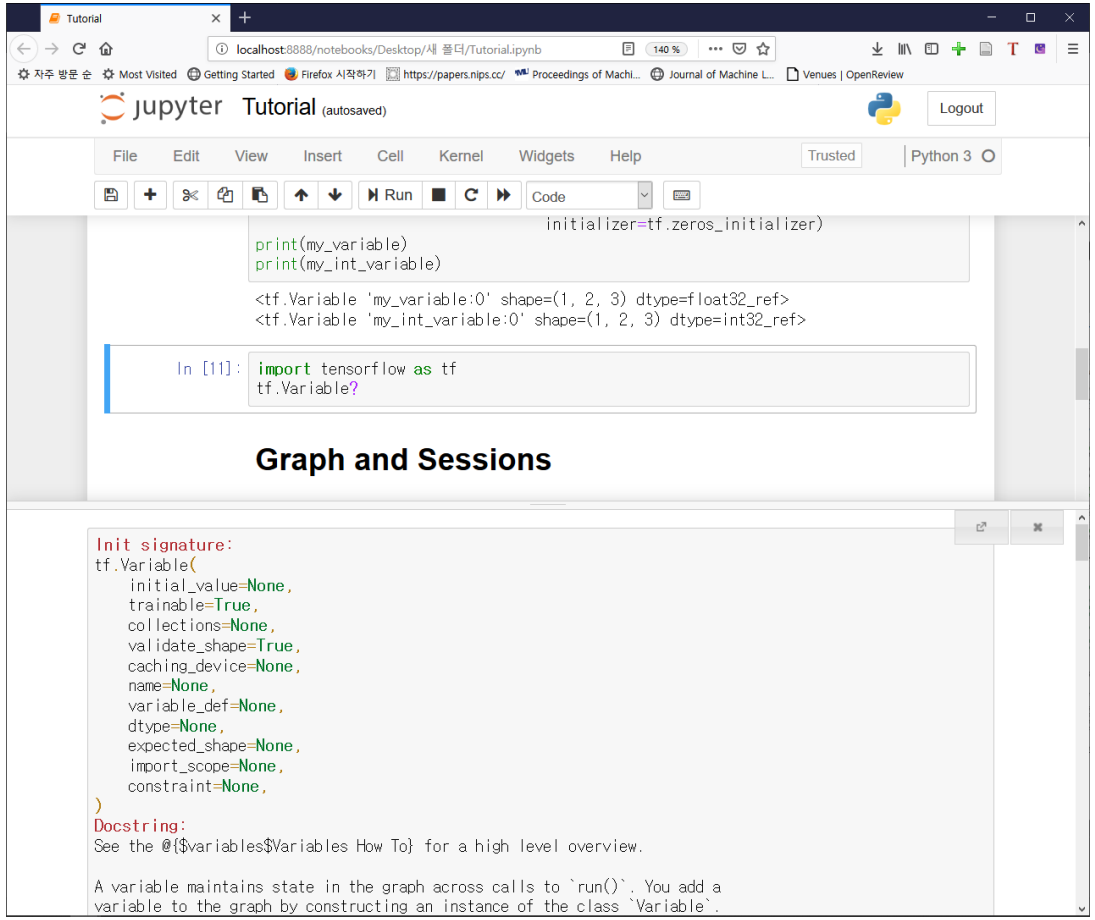
- Kerenl 설정
  - Anaconda environment 설정을 jupyter notebook 내부에서도 설정 가능
  - 가끔 실행이 안될 시, jupyter notebook 을 적절한 conda environment 에서 실행한 것이 아니므로, 재시작 혹은 kernel 설정 필요

Jupyter notebook tutorial

- .ipynb
  - 우리가 실습할 코드의 확장자 (ipython notebook 의 약자)
  - python 코드를 실시간으로 실행시켜가며 확인할 수 있게 해준다.
  - [함수?] 를 이용하여 라이브러리 함수 바로 확인 가능

- Kerenl 설정
  - Anaconda environment 설정을 jupyter notebook 내부에서도 설정 가능
  - 만약 실행이 안될 시, jupyter notebook 을 적절한 conda 환경에서 실행한 것이 아닐 수 있음 – 적절한 conda 환경에서 재진입

Jupyter notebook tutorial



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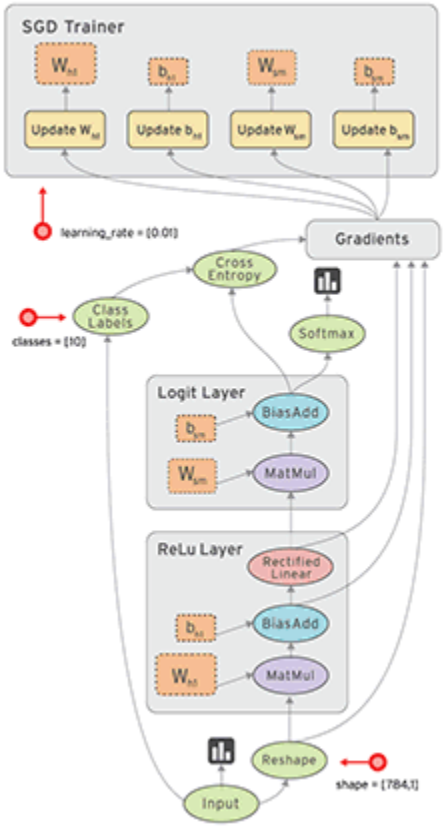
Tensorflow tutorials

- Tensorflow 란?
  - Neural Network 모델 학습을 위한 framework
  - Tensor 와 Flow (Session) 으로 이루어져 있음
  - 여러 종류의 Tensor 를 통해,
    모델을 세우고 또 학습할 수 있음

- Contents
  - Tensors
  - Graph and Sessions
  - Examples



Tensors

```
import tensorflow as tf

a = tf.constant(3.0, dtype=tf.float32)
b = tf.constant(4.0) # also tf.float32 implicitly
total = a + b
print(a)
print(b)
print(total)
```

```
Tensor("Const:0", shape=(), dtype=float32)
Tensor("Const_1:0", shape=(), dtype=float32)
Tensor("add:0", shape=(), dtype=float32)
```

```
import tensorflow as tf

a = tf.constant([3.0, 4.0], dtype=tf.float32)
print(a)
```

```
Tensor("Const:0", shape=(2, ), dtype=float32)
```

Tensors

```
import tensorflow as tf

x = tf.placeholder(tf.float32)
y = tf.placeholder(tf.float32)
z = x + y
print(x)
print(y)
print(z)
```

```
Tensor("Placeholder:0", dtype=float32)
Tensor("Placeholder_1:0", dtype=float32)
Tensor("add:0", dtype=float32)
```

```
import tensorflow as tf

x1 = tf.placeholder(tf.float32, shape=[2])
y1 = tf.placeholder(tf.float32, shape=[2])
z1 = x1 + y1
print(x)
print(y)
print(z)
```

```
Tensor("Placeholder:0", shape=(2,), dtype=float32)
Tensor("Placeholder_1:0", shape=(2,), dtype=float32)
Tensor("add:0", shape=(2,), dtype=float32)
```

Tensors

```
import tensorflow as tf

my_variable = tf.Variable("my_variable", [1, 2, 3])
print(my_variable)
```

```
<tf.Variable 'my_variable:0' shape=(1, 2, 3) dtype=float32_ref>
<tf.Variable 'my_int_variable:0' shape=(1, 2, 3) dtype=int32_ref>
```

Tensors

```
import tensorflow as tf

my_variable = tf.get_variable("my_variable", [1, 2, 3])
my_int_variable = tf.get_variable("my_int_variable", [1, 2, 3], dtype=tf.int32,
  initializer=tf.zeros_initializer)
print(my_variable)
print(my_int_variable)
```

```
<tf.Variable 'my_variable:0' shape=(1, 2, 3) dtype=float32_ref>
<tf.Variable 'my_int_variable:0' shape=(1, 2, 3) dtype=int32_ref>
```

Graph and Session

```
import tensorflow as tf

a = tf.constant(3.0, dtype=tf.float32)
b = tf.constant(4.0) # also tf.float32 implicitly
total = a + b

sess = tf.Session()
print(sess.run(total))
print(sess.run([a, b]))
sess.close()
```

```
7.0
[3.0 4.0]
```

```
import tensorflow as tf

a = tf.constant([3.0, 4.0], dtype=tf.float32)
sess = tf.Session()
print(sess.run(a))
sess.close()
```

```
[3.0 4.0]
```

Graph and Session

```
import tensorflow as tf

x = tf.placeholder(tf.float32)
y = tf.placeholder(tf.float32)
z = x + y

sess = tf.Session()
print(sess.run(z, feed_dict={x: 3, y: 4.5}))
sess.close()
```

```
7
```

```
import tensorflow as tf

x1 = tf.placeholder(tf.float32, shape=[2])
y1 = tf.placeholder(tf.float32, shape=[2])
z1 = x1 + y1

sess = tf.Session()
print(sess.run(z1, feed_dict={x1: [1, 3], y1: [2, 4]}))
sess.close()
```

```
[3. 7. ]
```

Graph and Session

```
import tensorflow as tf

my_variable = tf.get_variable("my_variable", [1, 2, 3])
my_int_variable = tf.get_variable("my_int_variable", [1, 2, 3], dtype=tf.int32,
  initializer=tf.zeros_initializer)

sess = tf.Session()
sess.run(tf.global_variables_initializer())
v, w = sess.run([my_variable, my_int_variable])
print(v)
print(w)
sess.close()
```

```
[[[ 0.7382598  -0.4009663  -0.20311093]
  [-0.666464   -0.4459092   0.7911737 ]]]
[[[0 0 0]
  [0 0 0]]]
```

Graph and Session

```
import tensorflow as tf

my_variable = tf.get_variable("my_variable", [1])
dup = tf.get_variable("my_variable", [1])
```

```
ValueError: Variable my_variable already exists, disallowed.
Did you mean to set reuse=True or reuse=tf.AUTO_REUSE in VarScope?
```

Graph and Session

```
import tensorflow as tf

my_variable = tf.get_variable("my_variable", [1])
tf.reset_default_graph()
dup = tf.get_variable("my_variable", [1])

print(my_variable)
print(dup)

with tf.Session() as sess:
    sess.run(tf.global_variables_initializer())
    print(sess.run(my_variable))
    print(sess.run(dup))
```

```
/_variable:0' shape=(1, 2, 3) dtype=float32_ref>
/_variable:0' shape=(1, 2, 3) dtype=float32_ref>
```

```
ValueError
[1.1196495]
```

Graph and Session

```
import tensorflow as tf

with tf.variable_scope("foo"):
    my_variable = tf.get_variable("my_variable", [1])
with tf.variable_scope("bar"):
    dup = tf.get_variable("my_variable", [1])

print(my_variable)
print(dup)

with tf.Session() as sess:
    sess.run(tf.global_variables_initializer())
    print(sess.run(my_variable))
    print(sess.run(dup))
```

```
_variable:0' shape=(1,) dtype=float32_ref>
_variable:0' shape=(1,) dtype=float32_ref>
```

```
[0.8239702]
[0.43597305]
```

Graph and Session

```
import tensorflow as tf

with tf.variable_scope("foo"):
    my_variable = tf.get_variable("my_variable", [1])
with tf.variable_scope("foo", reuse=True) :
    dup = tf.get_variable("my_variable", [1])

print(my_variable)
print(dup)

with tf.Session() as sess:
    sess.run(tf.global_variables_initializer())
    print(sess.run(my_variable))
    print(sess.run(dup))
```

```
_variable:0' shape=(1,) dtype=float32_ref>
_variable:0' shape=(1,) dtype=float32_ref>
```

```
[1.260512]
[1.260512]
```

Graph and Sessions

```
import tensorflow as tf

v = tf.get_variable("v", [1, 2, 3], dtype=tf.float32)

sess = tf.Session()
sess.run(tf.global_variables_initializer())
print(sess.run(v))
```

```
[[[-0.61995244  0.6097648  -0.23456109]
  [-0.7480066   0.2547065  -0.39186072]]]
```

Graph and Sessions

```
import tensorflow as tf

v1 = tf.get_variable("v1", [1, 2, 3], dtype=tf.int32,
            initializer=tf.zeros_initializer)
v2 = tf.get_variable("v2", [1, 2, 3], dtype=tf.float32,
                        initializer=tf.constant_initializer(1.0))
sess = tf.Session()
sess.run(tf.global_variables_initializer())
o1, o2 = sess.run([v1, v2])

print(o1)
print(o2)
```

```
[[[0. 0. 0.]
  [0. 0. 0.]]]
[[[1. 1. 1.]
  [1. 1. 1.]]]
```

Graph and Sessions

```
import tensorflow as tf

v3 = tf.get_variable("v3", [1, 2, 3], dtype=tf.float32,
                     initializer=tf.random_normal_initializer())
v4 = tf.get_variable("v4", [1, 2, 3], dtype=tf.float32,
                     initializer=tf.random_uniform_initializer())
sess = tf.Session()
sess.run(tf.global_variables_initializer())
o3, o4 = sess.run([v3, v4])

print(o3)
print(o4)
```

```
[[[-0.42939642  0.6930299   1.1907268 ]
  [ 1.5753491   0.7039551  -0.3378837]]]
[[[0.08607972 0.8290528  0.74907434]
  [0.9640163  0.650851   0.33157504]]]
```

Examples

```
import tensorflow as tf

x = tf.placeholder(tf.float32)
w = tf.get_variable("w",
          initializer=tf.constant([2.]))
b = tf.constant(4.0)
y= x*w + b

print(x)
print(w)
print(b)
print(y)

sess = tf.Session()
sess.run(tf.global_variables_initializer())
print(sess.run(y, feed_dict={x: 1}))
```

```
Tensor("Placeholder:0", dtype=float32)
<tf.Variable 'w:0' shape=(1,) dtype=float32_ref>
Tensor("Const_1:0", shape=(), dtype=float32)
Tensor("add:0", dtype=float32)
```

```
[6.0]
```

Examples

```
import tensorflow as tf

x = tf.placeholder(tf.float32, shape=[1])
w = tf.get_variable("w", shape=[1],
            initializer=tf.zeros_initializer)
b = tf.constant([4.0])
y= x*w + b

print(x)
print(w)
print(b)
print(y)

sess = tf.Session()
sess.run(tf.global_variables_initializer())
print(sess.run(y, feed_dict={x: [1]}))
```

```
Tensor("Placeholder:0", shape=(1,), dtype=float32)
<tf.Variable 'w:0' shape=(1,) dtype=float32_ref>
Tensor("Const:0", shape=(1,), dtype=float32)
Tensor("add:0", shape=(1,), dtype=float32
```

```
[4.0]
```

Examples

```
import numpy as np
import tensorflow as tf

x = tf.placeholder(tf.float32, shape=[None, 2])
w = tf.get_variable("w", shape=[2],
          initializer=tf.random_normal_initializer())
y= x*w

print(x)
print(w)
print(y)

sess = tf.Session()
sess.run(tf.global_variables_initializer())
print(sess.run(y, feed_dict={x: np.random.rand(3, 2)}))
```

```
Tensor("Placeholder:0", shape=(?, 2), dtype=float32)
<tf.Variable 'w:0' shape=(2) dtype=float32_ref>
Tensor("add:0", shape=(?, 2), dtype=float32
```

```
[[0.47765136 0.8566245 ]
 [0.5623522  0.26835   ]
 [0.39336765 0.13821977]]
```

References

- https://www.anaconda.com/
- https://jupyter.org/
- https://www.tensorflow.org/guide/
- https://github.com/golbin/TensorFlow-Tutorials