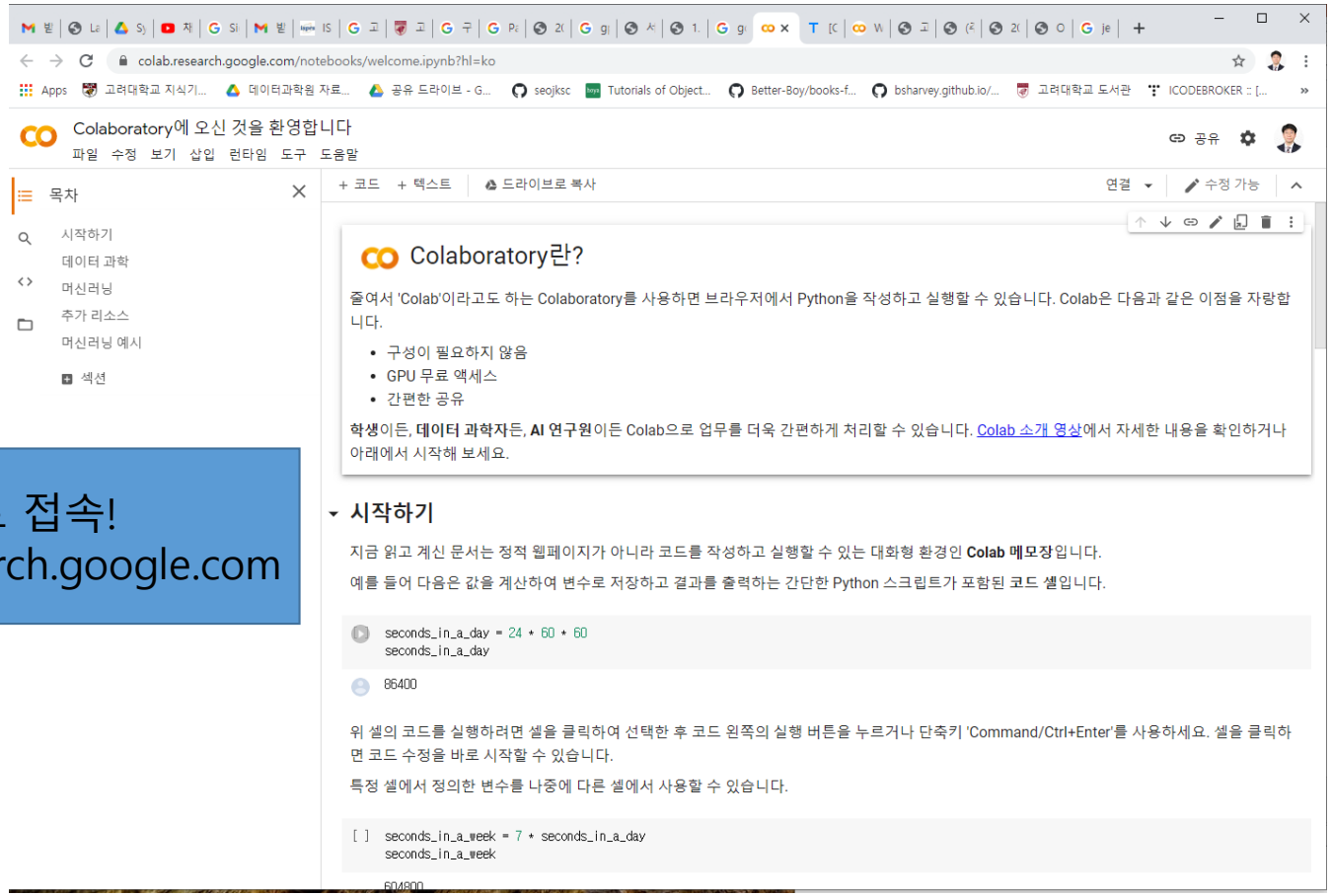
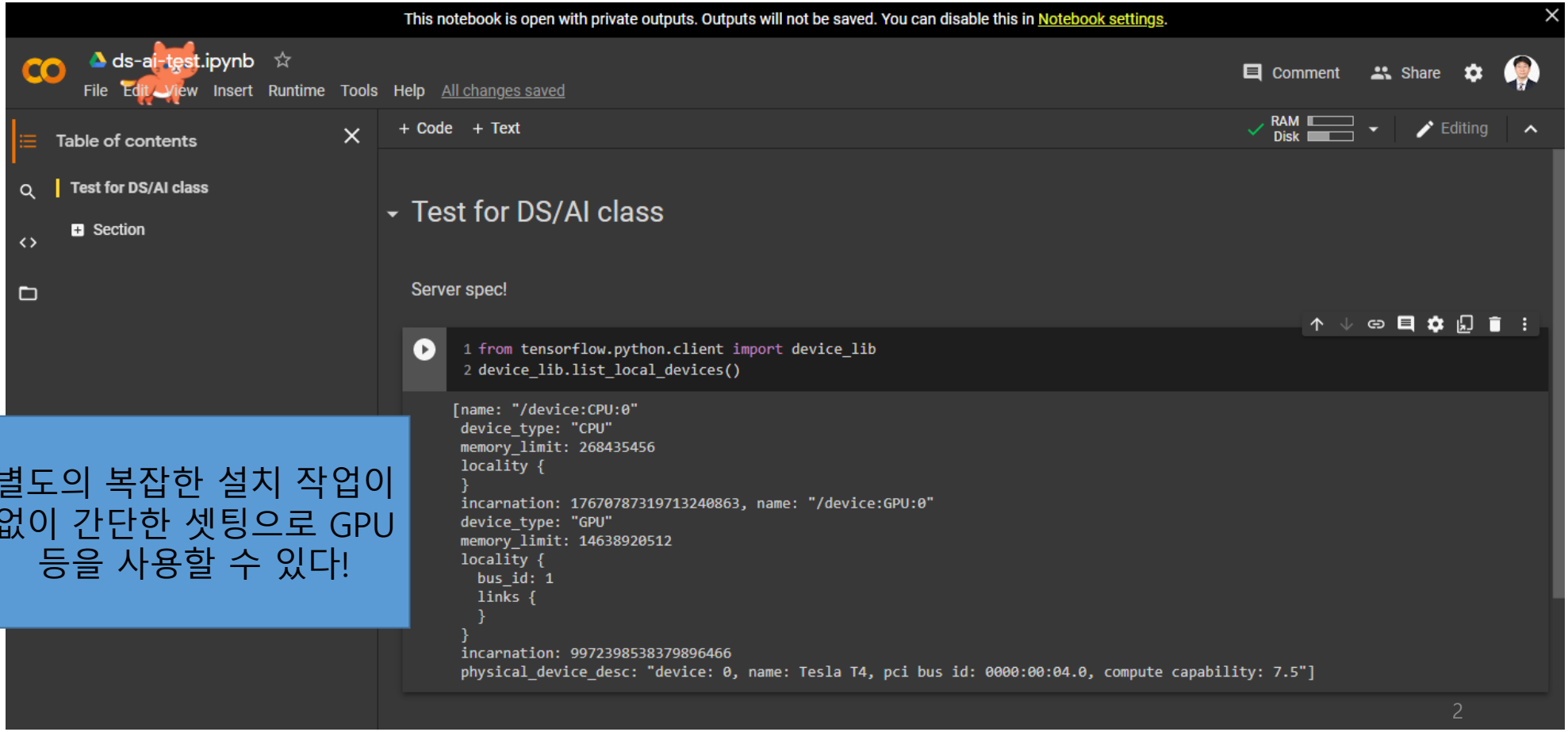
Google colaboratory (Cloud computing)



웹 사이트 접속!
http://colab.research.google.com



별도의 복잡한 설치 작업이 없이 간단한 셋팅으로 GPU 등을 사용할 수 있다!

무엇을 찾으시나요? 검색 로그인 장바구니 KOR

제품 솔루션 서비스 지원 추천할인

대한민국 > 업무용 > 액세서리 > 전원 및 누전 방지 > 그래픽 및 비디오 카드 > Dell 16GB NVIDIA Tesla T4 GPU 그래픽 카드

Dell 16GB NVIDIA Tesla T4 GPU 그래픽 카드

NVIDIA Tesla GPU 가속기로 요구 사양이 높은 HPC, 하이퍼스케일, 엔터프라이즈 데이터 센터 작업을 가속화하세요.

이제 에너지 탐사에서 머신 러닝에 이르기까지, 다양한 분야의 과학자들이 CPU를 사용하는 것보다 빠른 속도로 페타바이트 단위의 데이터를 조사할 수 있습니다. 또한 Tesla 가속기는 대형 시뮬레이션을 이전보다 빠른 속도로 실행할 수 있는 성능을 제공합니다. VDI를 배포한 기업에게 있어 Tesla 가속기는 모든 사용자에게 어디서 ... 더 보기

3,969,636 원 ~~7,783,600 원~~

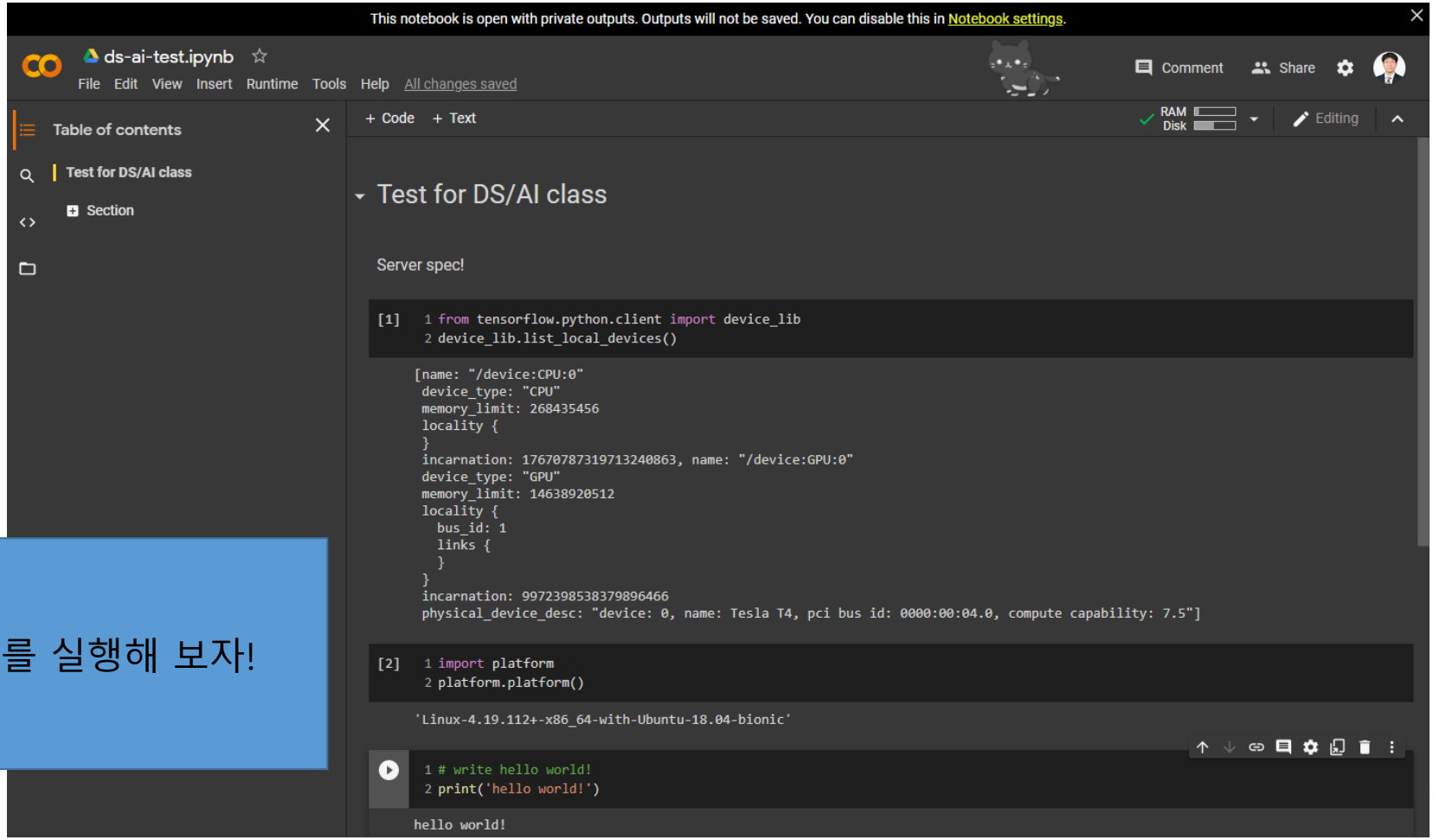
할인 **3,813,964 원**

10% 부가세 포함

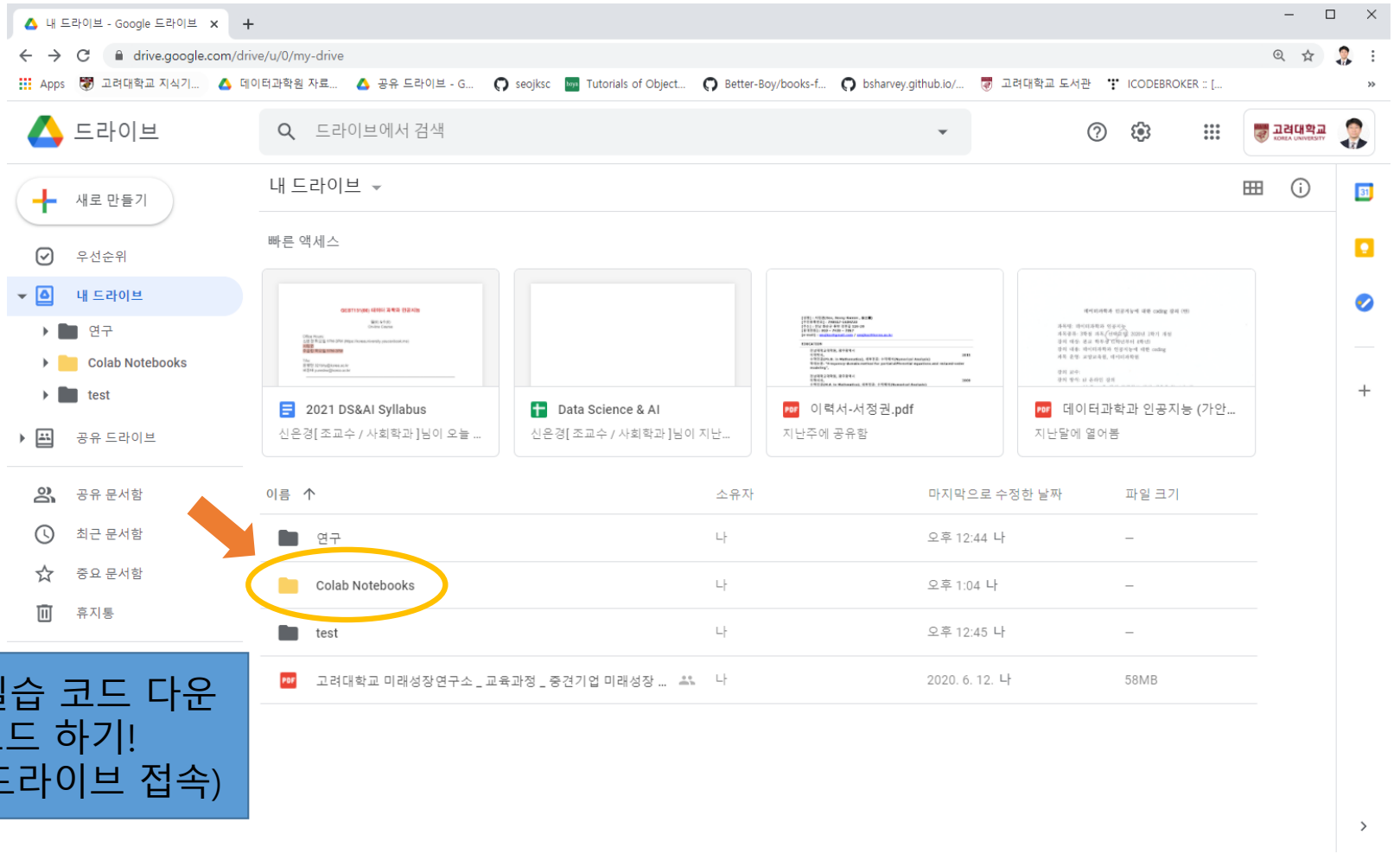
장바구니에 담기

제조업체 부품 F9PH5 | Dell 부품 490-BEYM | 주문 코드 490-Beym | Dell

사용 GPU: T4 Tesla GPU


This notebook is open with private outputs. Outputs will not be saved. You can disable this in Notebook settings.
ds-ai-test.ipynb
File Edit View Insert Runtime Tools Help All changes saved
Comment
Share
Table of contents
Test for DS/AI class
Section
+ Code + Text
RAM
Disk
Editing
Test for DS/AI class
Server spec!
[1] 1 from tensorflow.python.client import device_lib
2 device_lib.list_local_devices()
[name: "/device:CPU:0"
device_type: "CPU"
memory_limit: 268435456
locality {
}
incarnation: 17670787319713240863, name: "/device:GPU:0"
device_type: "GPU"
memory_limit: 14638920512
locality {
bus_id: 1
links {
}
}
incarnation: 9972398538379896466
physical_device_desc: "device: 0, name: Tesla T4, pci bus id: 0000:00:04.0, compute capability: 7.5"]
[2] 1 import platform
2 platform.platform()
'Linux-4.19.112+-x86_64-with-Ubuntu-18.04-bionic'
1 # write hello world!
2 print('hello world!')
hello world!

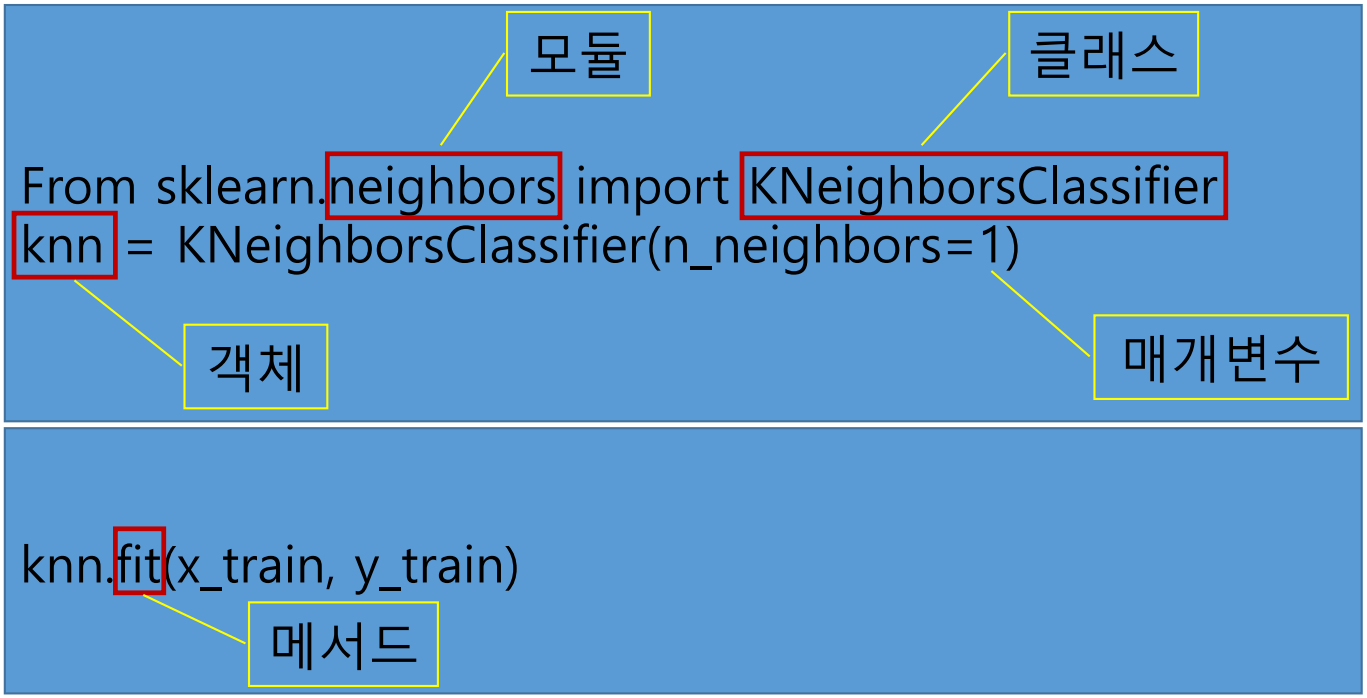
코드를 실행해 보자!



수업 실습 코드 다운 로드 하기!
(구글 드라이브 접속)

Python 패키지, 모듈, 클래스

- 패키지(라이브러리): scikit-learn, NumPy, Scipy, matplotlib, pandas



NumPy

- 파이썬 과학 계산 필수 패키지
- 다차원 배열과 선형 대수 연산과 푸리에 변환 등 수학 함수
- scikit-learn에서 NumPy 배열은 기본 데이터 구조
  - scikit-learn은 NumPy 배열 형태의 데이터를 입력으로 받음
- (http://www.numpy.org/) 참조

```
>>>import numpy as np
>>>x = np.array([[1,2,3], [4,5,6]])
>>>print("x=₩n{}".format(x))
x=
[[1 2 3]
 [4 5 6]]
```

SciPy

- 과학 계산용 함수를 모아놓은 파이썬 패키지
- 고성능 선형대수, 함수 최적화, 신호처리, 통계 분포 등 기능 제공
- (https://www.scipy.org/scipylib) 참조

```
>>>import numpy as np
>>>from scipy import sparse
>>>eye = np.eye(4)
>>>print(eye)
[[ 1.  0.  0.  0.]
 [ 0.  1.  0.  0.]
 [ 0.  0.  1.  0.]
 [ 0.  0.  0.  1.]]
```

```
>>>spmat = sparse.csr_matrix(eye)
>>>print(spmat)
  (0, 0) 1.0
  (1, 1) 1.0
  (2, 2) 1.0
  (3, 3) 1.0
```

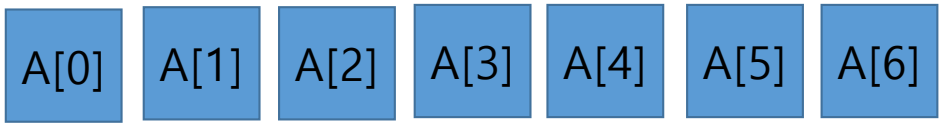
Scikit-learn

- 오픈소스(자유롭게 사용 및 배포 가능)
- 산업, 학계에서 널리 사용
- NumPy와 SciPy를 기반으로 개발됨
- 알고리즘을 설명한 풍부한 문서제공
  - http://scikit-learn.org/stable/documentation
- 설치 (무료 배포판)
  - Anaconda (https://www.anaconda.com) : 윈도우, 리눅스, 맥
  - Python(x,y) (https://python-xy.github.io/) : 윈도우

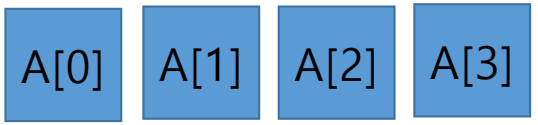
Python 자료 구조 - array

입력치 VECTOR: A = [1, 2, 3, 4, 5, 6, 7]

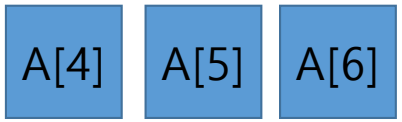
메모리 ADRESS:



A[:4] = [1, 2, 3, 4]



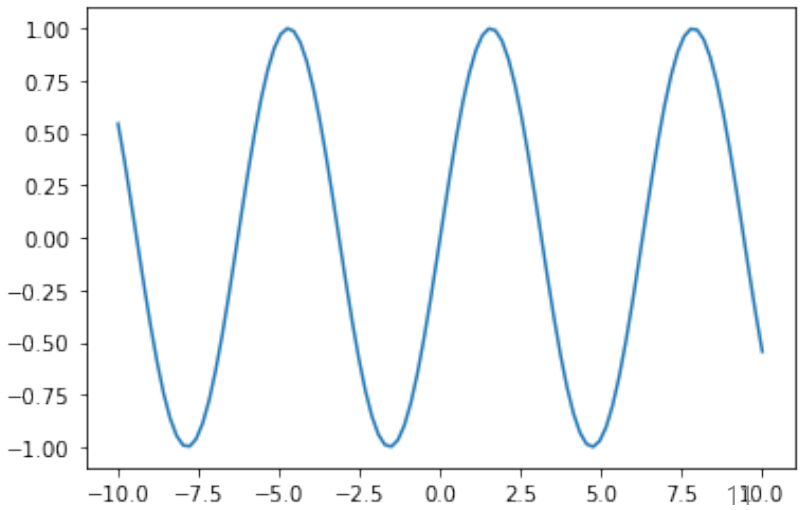
A[4:] = [5, 6, 7]



matplotlib

- 파이썬 과학 계산용 그래프 패키지
- 선 그래프, 히스토그램, 산점도 등을 지원
- 데이터과 분석 결과를 다양한 관점에서 시각화하는 것은 매우 중요
- 주피터 노트북에서 사용 시 %matplotlib inline 명령을 사용
  (또는 %matplotlib notebook)

```
%matplotlib inline
import matplotlib.pyplot as plt
x = np.linspace(-10, 10, 100)
y = np.sin(x)
plt.plot(x, y, marker="x")
```



pandas

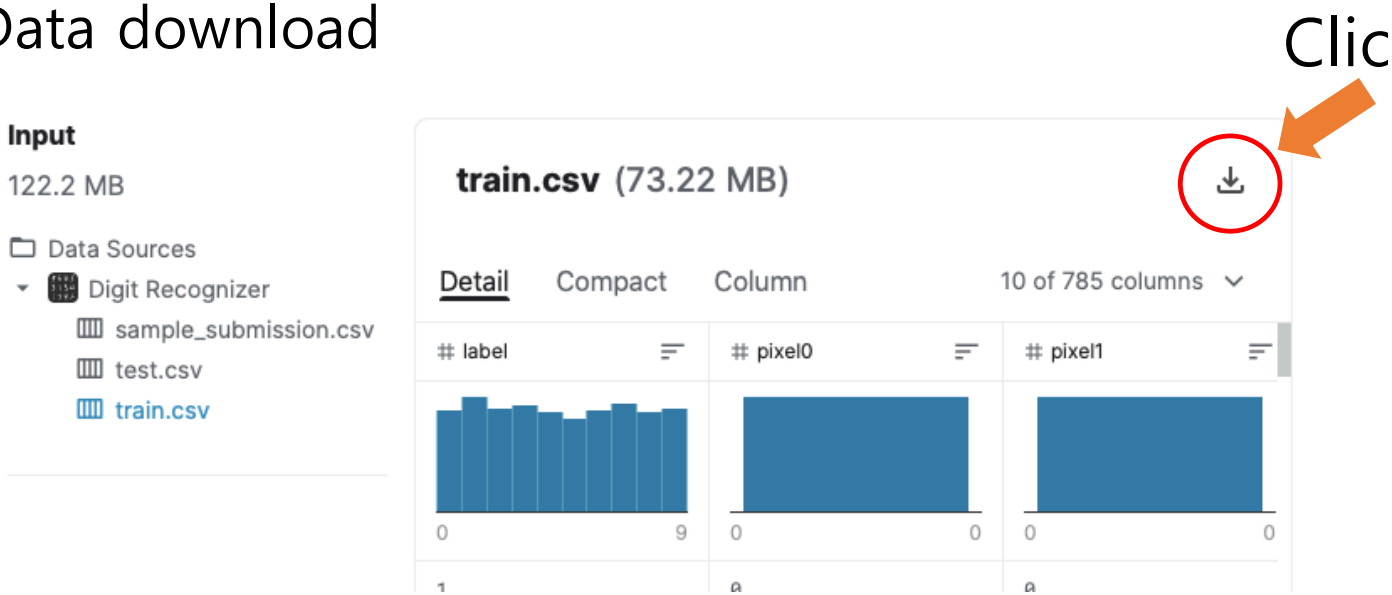
- 파이썬 데이터 처리와 분석을 위한 패키지
- R의 data.frame을 본떠서 설계한 DataFrame이라는 데이터 구조를 기반으로 개발됨
- pandas의 DataFrame은 엑셀의 스프레드시트와 비슷한 테이블 형태
- SQL, 엑셀 파일, CSV 파일 등 다양한 데이터를 읽을 수 있음

```
import pandas as pd
data = {"Name" : ['Kim', 'Lee', 'Park'],
        "Location" : ['Seoul', 'Busan', 'Deagu'],
        "Age" : [24, 13, 50,]}
data_pandas = pd.DataFrame(data)
display(data_pandas)
```

	Name	Location	Age
0	Kim	Seoul	24
1	Lee	Busan	13
2	Park	Deagu	50

Scikit learn – MLP for MNIST

- Kaggle example
- URL site: https://www.kaggle.com/icinnamon/mnist-scikit-learn-tutorial?select=test.csv
- Data download



Explore data by Pandas – head()

```
1 import csv as csv
2 import numpy as np
3 import pandas as pd
4 from sklearn.neural_network import MLPClassifier
5 from sklearn.metrics import accuracy_score
6 from sklearn.model_selection import train_test_split
7
8 train_df = pd.read_csv("../content/train.csv",header=0)
9 train_df.head()
```

	label	pixel0	pixel1	pixel2	pixel3	pixel4	pixel5	pixel6	pixel7	pixel8	pixel9	pixel10	pixel11	pixel12	pixel13	pixel780	pixel781	pixel782	pixel783
0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

5 rows × 785 columns

Create Test/Train Data¶

```
import csv as csv
import numpy as np
import pandas as pd
from sklearn.neural_network import MLPClassifier
from sklearn.metrics import accuracy_score
from sklearn.model_selection import train_test_split

train_df = pd.read_csv("../input/train.csv",header=0)

train_data = train_df.values X_train, X_test, y_train, y_test = train_test_split(train_data[0::,1::], train_data[0::,0],
test_size=0.2, random_state=0)
```

MLP Classifier¶

```
def __init__(hidden_layer_sizes=(100,), activation='relu', solver='adam',
alpha=0.0001, batch_size='auto', learning_rate='constant',
learning_rate_init=0.001, power_t=0.5, max_iter=200, shuffle=True,
random_state=None, tol=0.0001, verbose=False, warm_start=False, momentum=0.9,
nesterovs_momentum=True, early_stopping=False, validation_fraction=0.1,
beta_1=0.9, beta_2=0.999, epsilon=1e-08, n_iter_no_change=10, max_fun=15000)
```

```
clf = MLPClassifier(solver='sgd')
clf.fit(X_train, y_train)
neural_output = clf.predict(X_test)
print("sgd")
print(accuracy_score(y_test, neural_output))
```

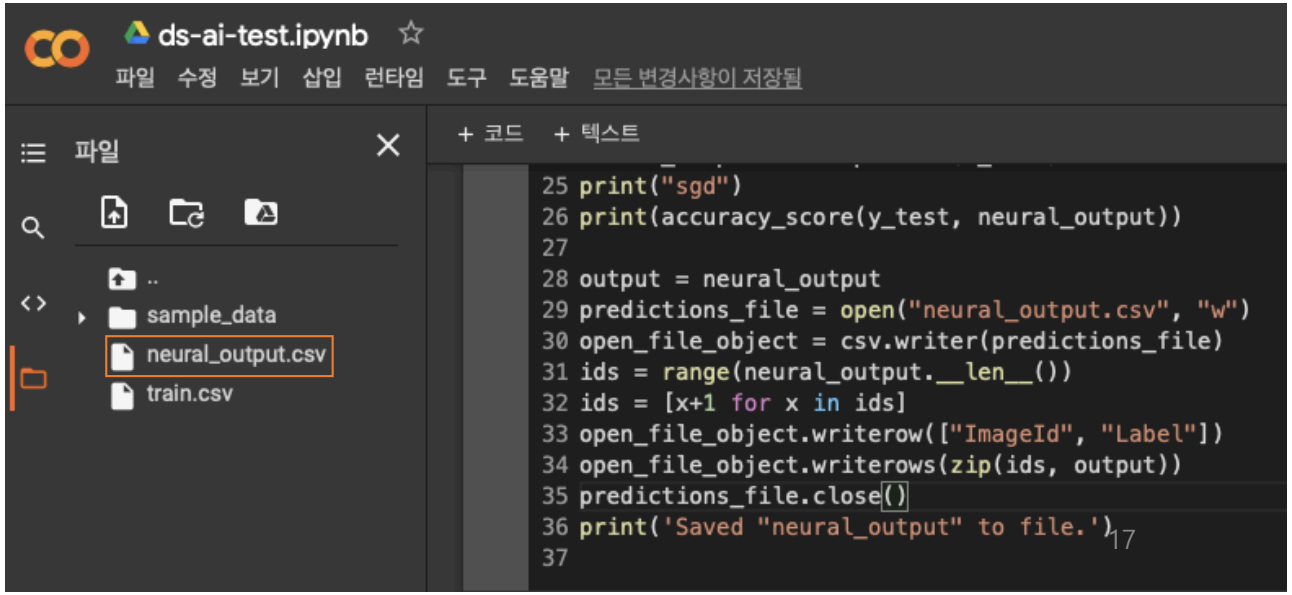
Default setting

clf = MLPClassifier(solver='lbfgs') ...

Saving the Output¶

```
output = forest_output
predictions_file = open("forest_output.csv", "w")
open_file_object = csv.writer(predictions_file)
ids = range(forest_output.__len__())
ids = [x+1 for x in ids]
open_file_object.writerow(["ImageId", "Label"])
open_file_object.writerows(zip(ids, output))
predictions_file.close()
print('Saved "forest_output" to file.')
```

```
sgd 0.9226190476190477
Saved "neural_output" to file.
```

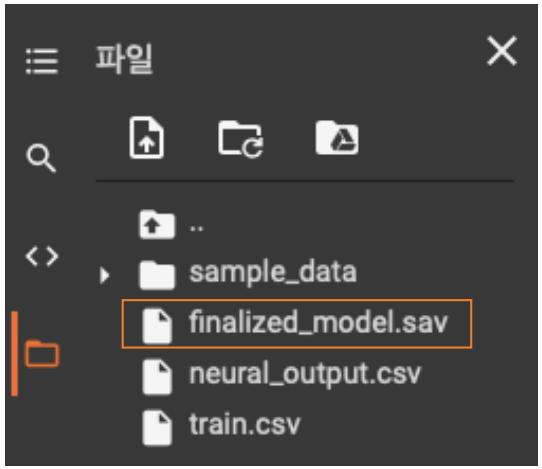


Save the Model

```
import pickle
```

```
# save the model to disk
filename = 'finalized_model.sav'
pickle.dump(clf, open(filename, 'wb'))
```

Some time later!




```
# load the model from disk
filename = 'finalized_model.sav'
loaded_model = pickle.load(open(filename, 'rb'))
neural_output = loaded_model.predict(X_test)
print("sgd_from_saved_model")
print(accuracy_score(y_test, neural_output))
```

Load the Model and Run

```
import csv as csv
import numpy as np
import pandas as pd
from sklearn.neural_network import MLPClassifier
from sklearn.metrics import accuracy_score
from sklearn.model_selection import train_test_split
import pickle

train_df = pd.read_csv("../content/train.csv",header=0)
train_data = train_df.values

X_train, X_test, y_train, y_test = train_test_split(train_data[0::,1::], train_data[0::,0], test_size=0.2, random_state=0)


# load the model from disk
filename = 'finalized_model.sav'
loaded_model = pickle.load(open(filename, 'rb'))
neural_output = loaded_model.predict(X_test)
print("sgd_from_saved_model")
print(accuracy_score(y_test, neural_output))


```

```
sgd_from_saved_model
0.9070238095238096
```

References

- https://colab.research.google.com/notebooks/intro.ipynb#scrollTo=5fCEDCU_qrC0
- https://theorydb.github.io/dev/2019/08/23/dev-ml-colab/
- https://roboreport.co.kr/%EC%9B%B9%EC%97%90%EC%84%9C-%EA%B0%84%EB%8B%A8%ED%95%98%EA%B2%8C-%EB%94%A5%EB%9F%AC%EB%8B%9D-%EC%8B%A4%EC%8A%B5%ED%95%98%EA%B8%B0-%EA%B5%AC%EA%B8%80-colab-%EC%82%AC%EC%9A%A9%EB%B0%A9%EB%B2%95/

Thank you

APPENDIX.

[Python modules for Machine Learning]

Normalization `StandardScaler`

MNIST dataset `from sklearn.datasets import fetch_openml`

Shuffling `numpy.random.permutation`

Data split `train_test_split`
`test_size=0.3`

Data Import

```
from sklearn.datasets import fetch_openml
mnist = fetch_openml('mnist_784')
mnist.data.shape, mnist.target.shape
# (70000, 784)
```

Data Split 1

```
split_ratio = 0.9
n_train = int(mnist.data.shape[0] * split_ratio)
print(n_train)
 # 63000
n_test = mnist.data.shape[0] - n_train
print(n_test)
#7000
X_train = mnist.data[:n_train] y_train = mnist.target[:n_train]
print(X_train.shape, y_train.shape)
# ((63000, 784), (63000,))
X_test = mnist.data[n_train:] y_test = mnist.target[n_train:]
print(X_test.shape, y_test.shape)
# ((7000, 784), (7000,))
```

Data Split 2

```
import numpy as np from sklearn.model_selection import train_test_split

# generate samples
sample = np.arange(100)
print(sample)
# array([ 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, # 17, 18, 19, 20, 21,
22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, # 34, 35, 36, 37, 38, 39, 40, 41, 42,
43, 44, 45, 46, 47, 48, 49, 50, # 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63,
64, 65, 66, 67, # 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84,
# 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99])
print(train_test_split(sample))
 #[array([46, 66, 42, 54, 58, 90, 11, 93, 28, 97, 17, 31, 55, 27, 74, 25, 91, # 8, 57,
9, 86, 39, 53, 73, 98, 44, 60, 43, 12, 82, 69, 2, 89, 83, # 10, 61, 0, 59, 99, 16, 88,
71, 68, 36, 20, 80, 76, 41, 30, 18, 22, # 75, 34, 50, 79, 37, 78, 52, 32, 14, 63, 92,
87, 5, 21, 24, 38, 72, # 96, 35, 51, 33, 94, 4, 65]), # array([84, 26, 6, 1, 62, 81, 1
5, 19, 29, 23, 7, 56, 77, 45, 49, 95, 3, # 85, 67, 13, 70, 40, 48, 64, 47])]
X_train, X_test = train_test_split(sample)
print(X_train.shape, X_test.shape)
# ((75,), (25,))
```

RandomForest

```
from sklearn.ensemble import RandomForestClassifier
# module loading
clf = RandomForestClassifier()
# train data!
clf.fit(X_train, y_train)
 # make predicition
prediction = clf.predict(X_test)
print(prediction.shape)
# 7000 # accuracy
result = (prediction == y_test).mean()
print(result)
# 0.9617142857142857
```

Visualization

```
import matplotlib.pyplot as plt
%matplotlib inline
# 랜덤하게 몇 가지 data 가져오기
random_pick = np.random.randint(low=0, high=n_test, size=10)
random_pick
# array([3898, 6815, 6640, 2924, 451, 2688, 633, 6563, 5993, 4024])
figure = plt.figure()
figure.set_size_inches(12, 5)
axes = []
for i in range(1, 11):
axes.append(figure.add_subplot(2, 5, i))
tmp_list = []
for i in range(10):
tmp = mnist.data[n_train + random_pick[i]]
tmp = tmp.reshape(-1, 28)
tmp_list.append(tmp)
print(y_test[random_pick])
for i in range(10):
axes[i].matshow(tmp_list[i])
```

```
# ['8' '6' '7' '2' '7' '7' '8' '8' '4' '3']
```