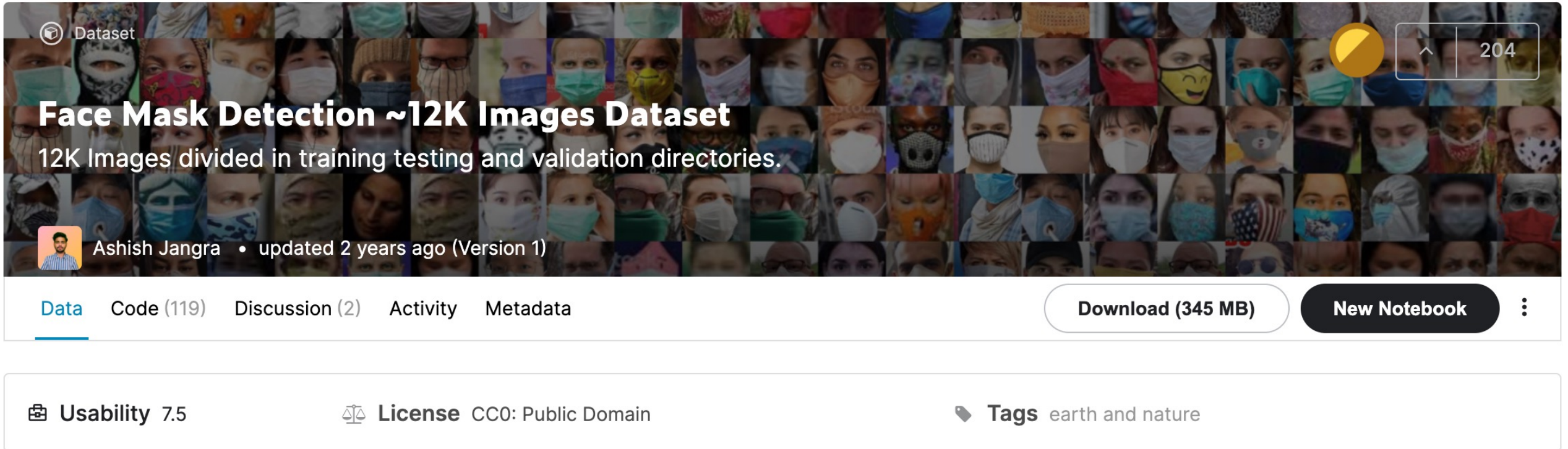
zero-base /

Life Changing Education

Chapter 44. Mask man을 찾아라

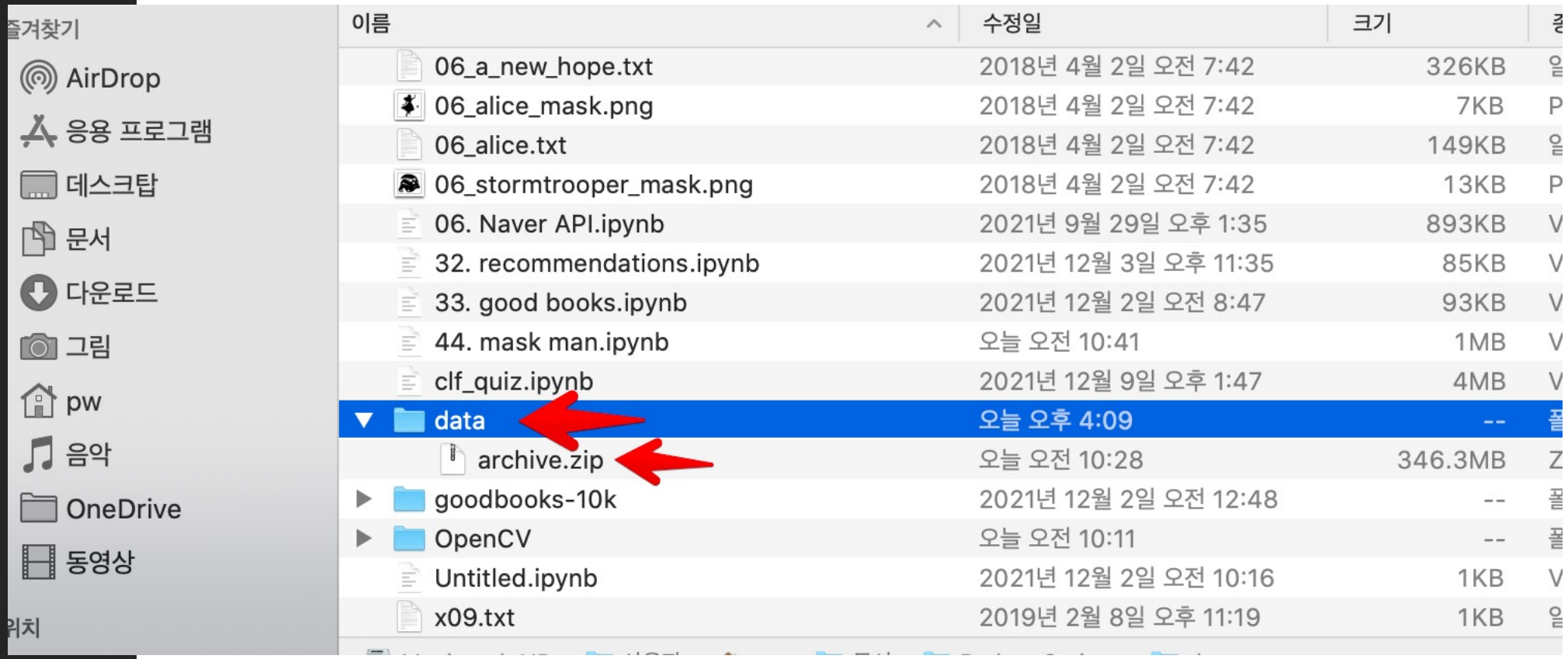
그럼 LeNET으로
뭘 얼마나 해볼 수 있을까?

마스크 쓴 사람 안쓴사람 데이터~



https://www.kaggle.com/ashishjangra27/face-mask-12k-images-dataset

난 코드와 같은 위치에 data라는 폴더를 두고 그 안에 다운 받은 파일을 위치시킴



그러니까 경로를 확인하고~


```
ls
```

```
 06. Naver API.ipynb*        44. mask man.ipynb
 06_a_new_hope.txt*          OpenCV/
 06_alice.txt*               Untitled.ipynb
 06_alice_mask.png*          clf_quiz.ipynb
 06_stormtrooper_mask.png*   data/
 32. recommendations.ipynb   goodbooks-10k/
 33. good books.ipynb        x09.txt*
```

```
ls './data/'
```

```
 archive.zip
```

파이썬도 압축파일을 관리하는 툴이 있다


```python
import zipfile

content_zip = zipfile.ZipFile("./data/archive.zip")
content_zip.extractall("./data")

content_zip.close()
```

결과~


```
ls './data/'
```

```
Face Mask Dataset/ archive.zip
```

```
ls './data/Face Mask Dataset/'
```

```
Test/       Train/      Validation/
```

사용할 모듈이 좀 많다...


```
import numpy as np
import pandas as pd
import os
import glob
import matplotlib.pyplot as plt
import seaborn as sns
```

```
import tensorflow as tf
from tensorflow.keras import Sequential, models
from tensorflow.keras.layers import Flatten, Dense, Conv2D, MaxPool2D
from sklearn.model_selection import train_test_split
from sklearn.metrics import classification_report, confusion_matrix
```

```
ls './data/Face Mask Dataset/'
```

```
Test/       Train/      Validation/
```

```
ls './data/Face Mask Dataset/Train'
```

```
WithMask/    WithoutMask/
```

생소할 수 있지만 파일을 이렇게 정리하기도 한다


```
path = "./data/Face Mask Dataset/"
dataset = {"image_path": [], "mask_status": [], "where": []}

for where in os.listdir(path):
    for status in os.listdir(path + "/" + where):
        for image in glob.glob(path + where + "/" + status + "/" + "*.png"):
            dataset["image_path"].append(image)
            dataset["mask_status"].append(status)
            dataset["where"].append(where)
```

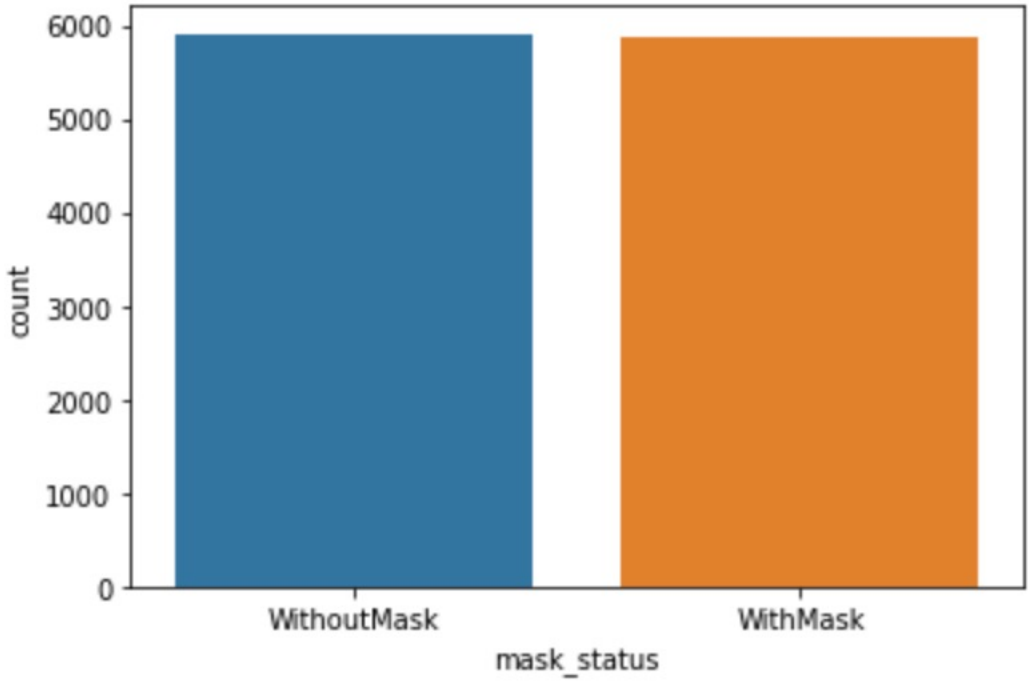
경로와 목록의 정리~


```
dataset = pd.DataFrame(dataset)
dataset.head()
```

	image_path	mask_status	where
0	./data/Face Mask Dataset/Test/WithoutMask/2734...	WithoutMask	Test
1	./data/Face Mask Dataset/Test/WithoutMask/4345...	WithoutMask	Test
2	./data/Face Mask Dataset/Test/WithoutMask/4423...	WithoutMask	Test
3	./data/Face Mask Dataset/Test/WithoutMask/2052...	WithoutMask	Test
4	./data/Face Mask Dataset/Test/WithoutMask/3364...	WithoutMask	Test

```
print("With Mask:", dataset.value_counts("mask_status")[0])
print("Without Mask:", dataset.value_counts("mask_status")[1])

sns.countplot(x=dataset["mask_status"]);
```

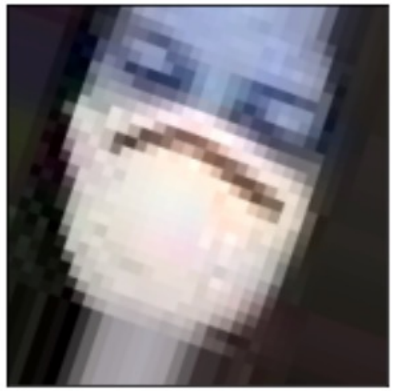
```
With Mask: 5909
Without Mask: 5883
```



랜덤하게 어떤 그림들이 있는지 보자


```
import cv2

plt.figure(figsize=(15, 10))
for i in range(9):
    random = np.random.randint(1, len(dataset))
    plt.subplot(3, 3, i + 1)
    plt.imshow(cv2.imread(dataset.loc[random, "image_path"]))
    plt.title(dataset.loc[random, "mask_status"], size=15)
    plt.xticks([])
    plt.yticks([])
plt.show()
```

WithMask

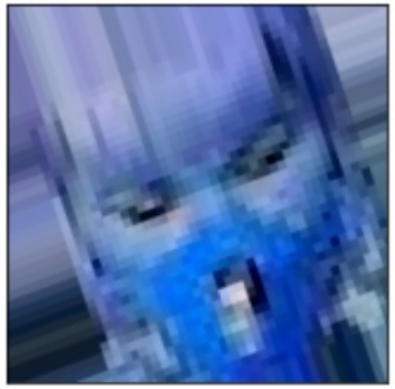


WithMask

WithoutMask

WithMask

WithMask



WithoutMask

WithMask

WithoutMask

WithoutMask

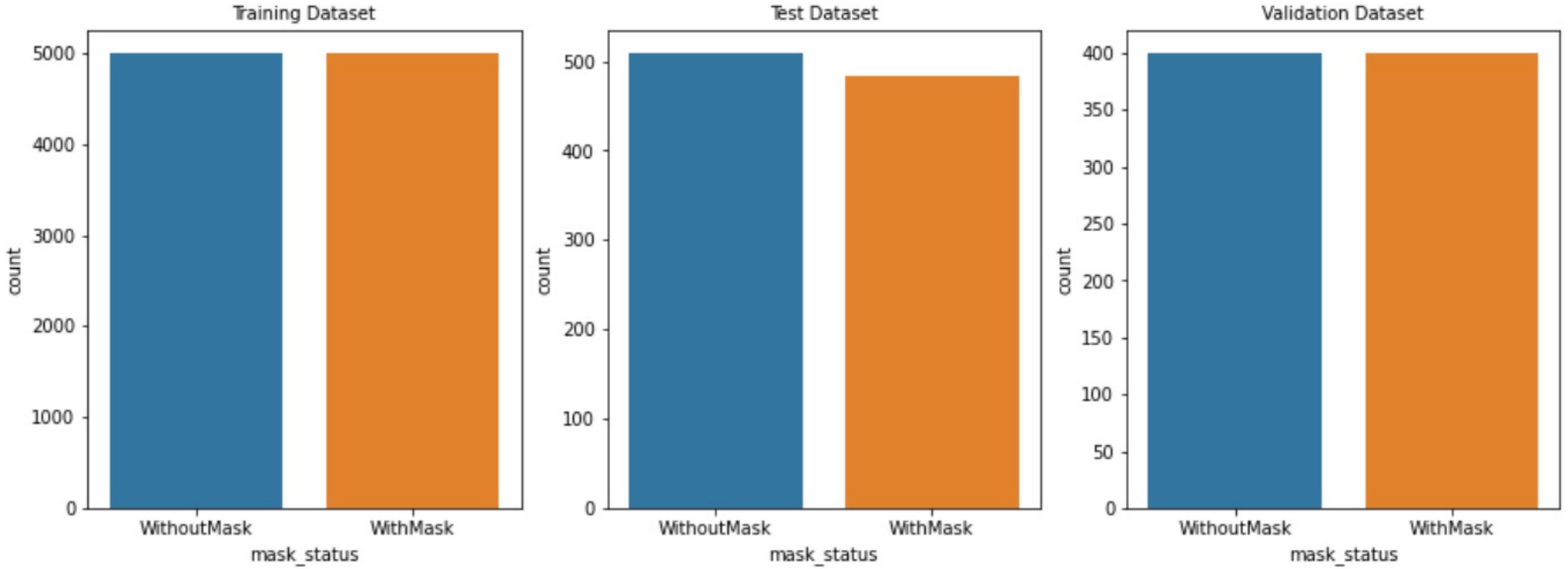
Train / test / validation으로 나눌 필요는 없다. (되어있으니까)

```
train_df = dataset[dataset["where"] == "Train"]
test_df = dataset[dataset["where"] == "Test"]
valid_df = dataset[dataset["where"] == "Validation"]

train_df.head(5)
```

	image_path	mask_status	where
992	./data/Face Mask Dataset/Train/WithoutMask/397...	WithoutMask	Train
993	./data/Face Mask Dataset/Train/WithoutMask/348...	WithoutMask	Train
994	./data/Face Mask Dataset/Train/WithoutMask/180...	WithoutMask	Train
995	./data/Face Mask Dataset/Train/WithoutMask/496...	WithoutMask	Train
996	./data/Face Mask Dataset/Train/WithoutMask/181...	WithoutMask	Train

Train / test / validation 데이터의 분포 확인

```
plt.figure(figsize=(15, 5))
plt.subplot(1, 3, 1)
sns.countplot(x=train_df["mask_status"])
plt.title("Training Dataset", size=10)

plt.subplot(1, 3, 2)
sns.countplot(x=test_df["mask_status"])
plt.title("Test Dataset", size=10)

plt.subplot(1, 3, 3)
sns.countplot(x=valid_df["mask_status"])
plt.title("Validation Dataset", size=10)

plt.show()
```



Index를 다시 정리


```
train_df = train_df.reset_index().drop("index", axis=1)
train_df.head()
```

	image_path	mask_status	where
0	./data/Face Mask Dataset/Train/WithoutMask/397...	WithoutMask	Train
1	./data/Face Mask Dataset/Train/WithoutMask/348...	WithoutMask	Train
2	./data/Face Mask Dataset/Train/WithoutMask/180...	WithoutMask	Train
3	./data/Face Mask Dataset/Train/WithoutMask/496...	WithoutMask	Train
4	./data/Face Mask Dataset/Train/WithoutMask/181...	WithoutMask	Train

드디어 데이터 전처리


```
data = []
image_size = 150

for i in range(len(train_df)):
    # Converting the image into grayscale
    img_array = cv2.imread(train_df["image_path"][i], cv2.IMREAD_GRAYSCALE)

    # Resizing the array
    new_image_array = cv2.resize(img_array, (image_size, image_size))

    # Encoding the image with the label
    if train_df["mask_status"][i] == "WithMask":
        data.append([new_image_array, 1])
    else:
        data.append([new_image_array, 0])
```

Data 하나는 이렇게 생겼다

```
data[0]
```

```
[array([[19, 20, 21, ..., 28, 29, 28],
        [19, 20, 21, ..., 25, 24, 21],
        [20, 20, 21, ..., 22, 21, 19],
        ...,
        [18, 18, 18, ..., 24, 26, 24],
        [16, 17, 18, ..., 25, 29, 33],
        [16, 18, 20, ..., 24, 33, 46]], dtype=uint8),
 0]
```

Data를 좀 흔들고~


```
np.random.shuffle(data)
```

```
data[0]
```

```
[array([[24, 27, 28, ..., 67, 67, 67],
        [24, 27, 28, ..., 68, 68, 68],
        [24, 27, 28, ..., 68, 68, 68],
        ...,
        [80, 81, 82, ..., 90, 90, 90],
        [80, 81, 82, ..., 90, 90, 90],
        [80, 81, 82, ..., 90, 90, 90]], dtype=uint8),
 1]
```

```
fig, ax = plt.subplots(2, 3, figsize=(10, 6))

for row in range(2):
    for col in range(3):
        image_index = row * 100 + col

        ax[row, col].axis("off")
        ax[row, col].imshow(data[image_index][0], cmap="gray")

        if data[image_index][1] == 0:
            ax[row, col].set_title("Without Mask")
        else:
            ax[row, col].set_title("With Mask")
```

X, y 데이터로 저장하고


```
X = []
y = []

for image in data:
    X.append(image[0])
    y.append(image[1])

X = np.array(X)
y = np.array(y)
```

트레인 데이터를 다시 나누자~ (이유는 딱히 없음)


```
X_train, X_val, y_train, y_val = train_test_split(X, y,
                                                  test_size=0.2,
                                                  random_state=13)
```

```
from tensorflow.keras import layers, models

model = models.Sequential(
    [
        layers.Conv2D(
            32, kernel_size=(5, 5), strides=(1, 1), padding="same",
            activation="relu", input_shape=(150, 150, 1) ),
        layers.MaxPooling2D(pool_size=(2, 2), strides=(2, 2)),
        layers.Conv2D(64, (2, 2), activation="relu", padding="same"),
        layers.MaxPooling2D(pool_size=(2, 2)),
        layers.Dropout(0.25),
        layers.Flatten(),
        layers.Dense(1000, activation="relu"),
        layers.Dense(1, activation="sigmoid"),
    ]
)
```

Compile~


```
model.compile(
    optimizer="adam", loss=tf.keras.losses.BinaryCrossentropy(),
    metrics=["accuracy"]
)
```

휴~ 느리다.ㅠㅠ.


```
X_train = X_train.reshape(len(X_train), X_train.shape[1], X_train.shape[2], 1)
X_val = X_val.reshape(len(X_val), X_val.shape[1], X_val.shape[2], 1)
history = model.fit(X_train, y_train, epochs=4, batch_size=32)
```

```
Epoch 1/4
250/250 [==============================] - 109s 436ms/step - loss: 0.12
85 - accuracy: 0.9519
Epoch 2/4
 34/250 [===>..........................] - ETA: 1:48 - loss: 0.0742 - a
ccuracy: 0.9733
```

Validation accuracy가 나쁘지 않다

```
model.evaluate(X_val, y_val)
```

```
63/63 [==============================] - 4s 68ms/step - loss: 0.1026 -
accuracy: 0.9700

[0.10262694209814072, 0.9700000286102295]
```

상대적으로 0에 대한 recall이 조금 떨어지지만 ..

```
prediction = (model.predict(X_val) > 0.5).astype("int32")

print(classification_report(y_val, prediction))
print(confusion_matrix(y_val, prediction))
```

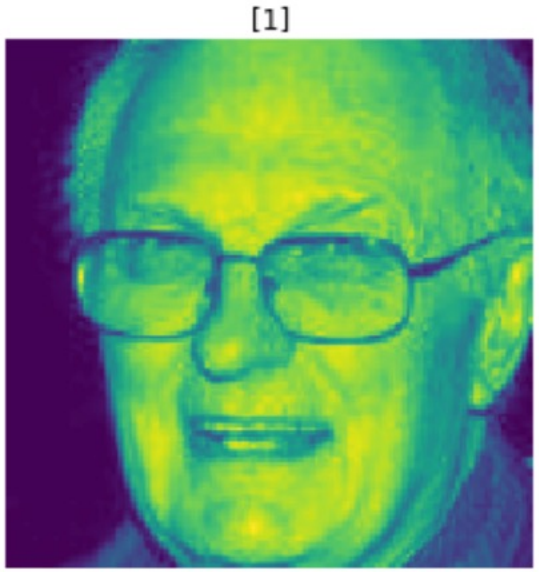
```
              precision    recall  f1-score   support

           0       0.99      0.95      0.97      1046
           1       0.95      0.99      0.97       954

    accuracy                           0.97      2000
   macro avg       0.97      0.97      0.97      2000
weighted avg       0.97      0.97      0.97      2000

[[991  55]
 [  5 949]]
```

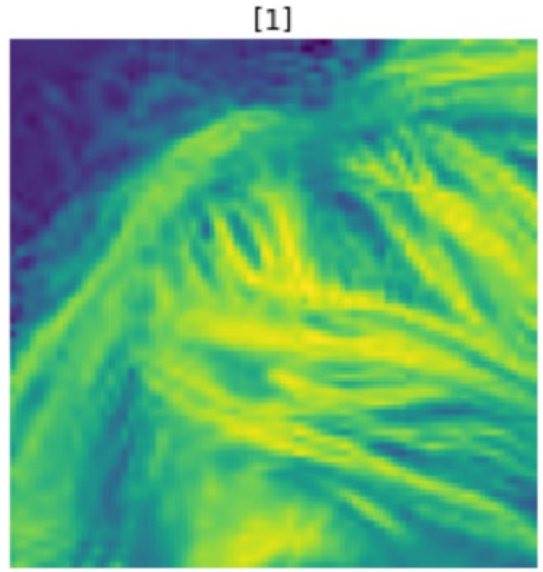
틀린것만 추리고~

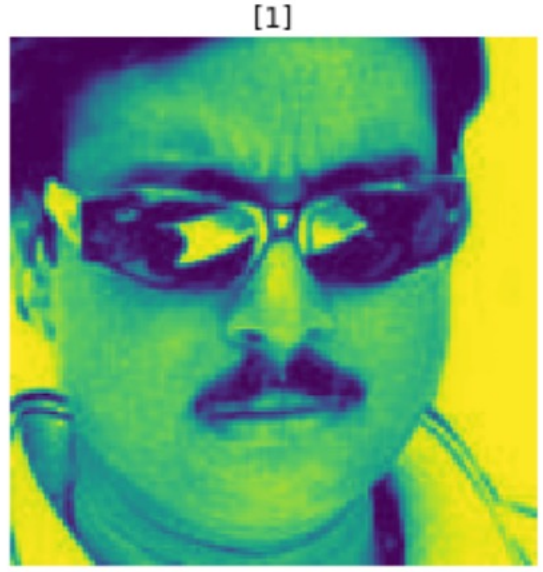

```
wrong_result = []

for n in range(0, len(y_val)):
    if prediction[n] != y_val[n]:
        wrong_result.append(n)

len(wrong_result)
```

```
60
```

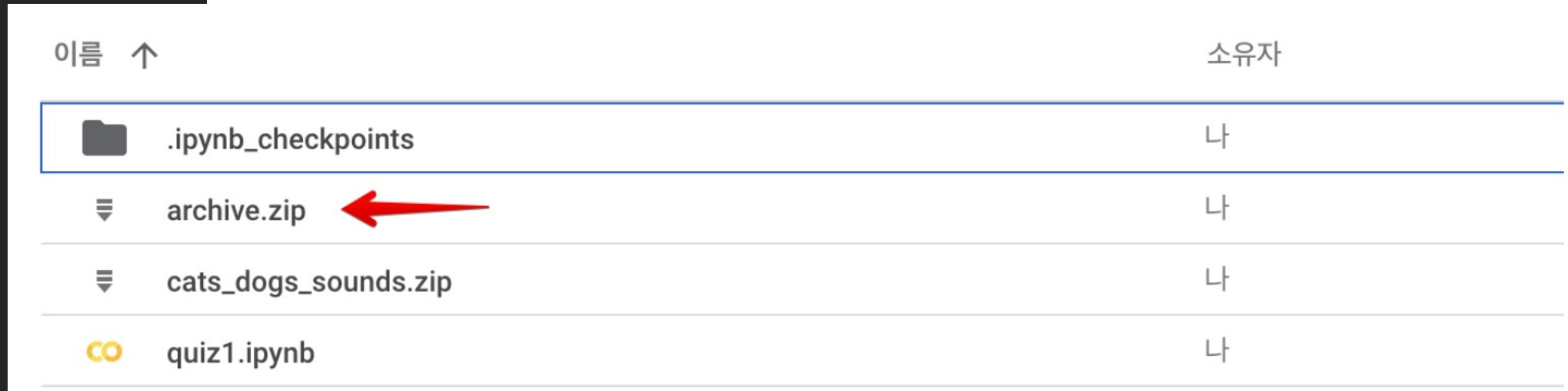
```
import random

samples = random.choices(population=wrong_result, k=6)

plt.figure(figsize=(14, 12))

for idx, n in enumerate(samples):
    plt.subplot(3, 2, idx + 1)
    plt.imshow(X_val[n].reshape(150, 150), interpolation="nearest")
    plt.title(prediction[n])
    plt.axis("off")

plt.show()
```

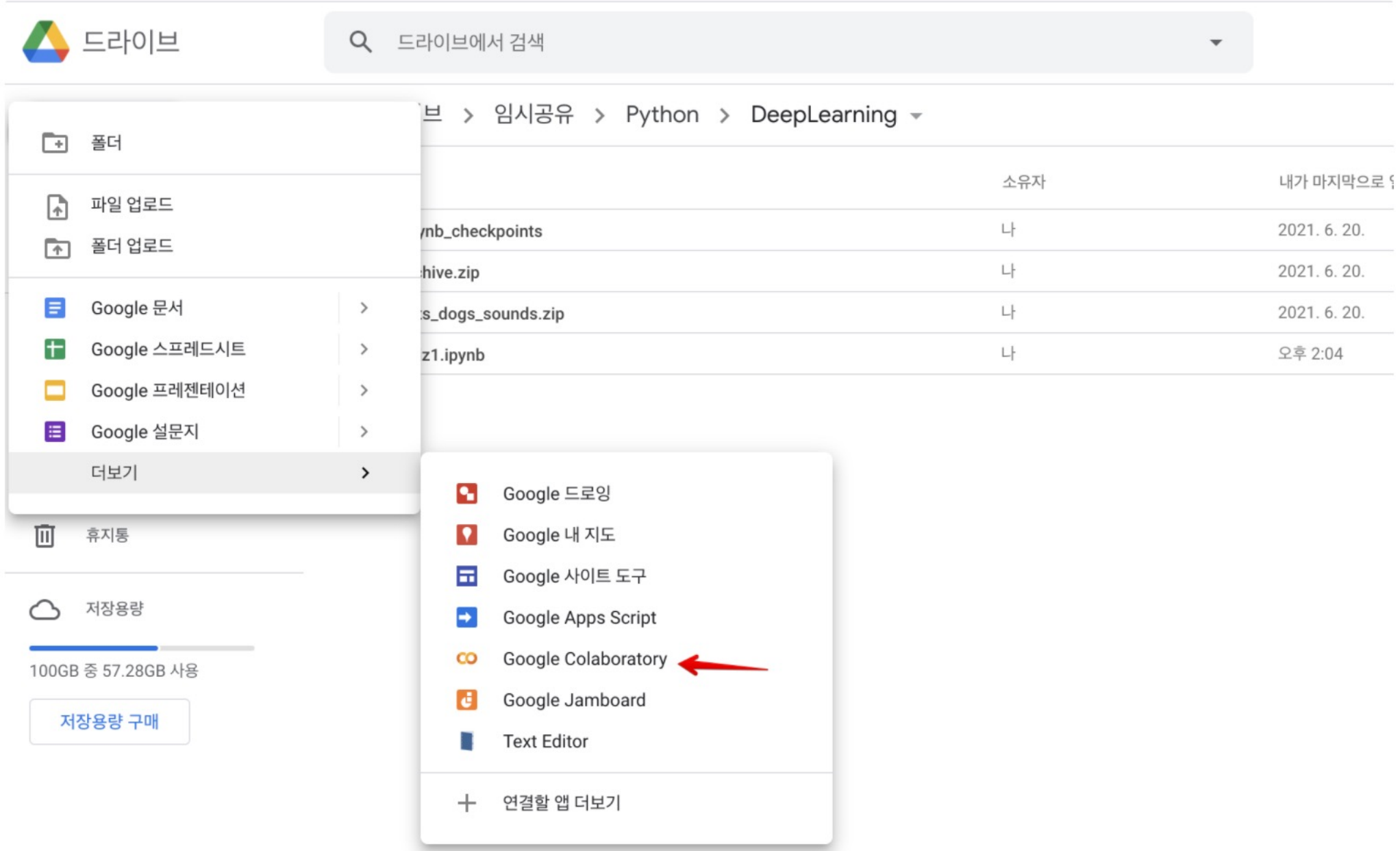




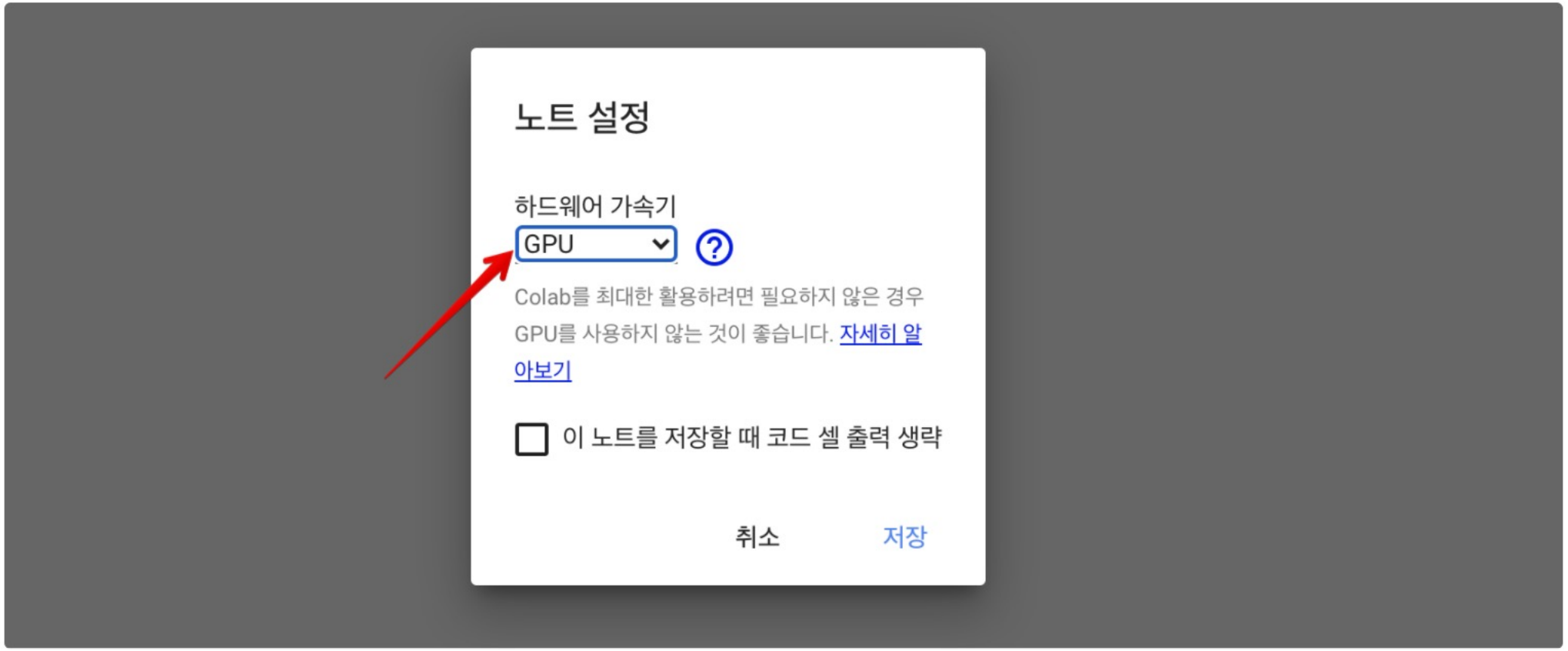


너무 느리다면 colab으로 해보자





런타임 유형변경



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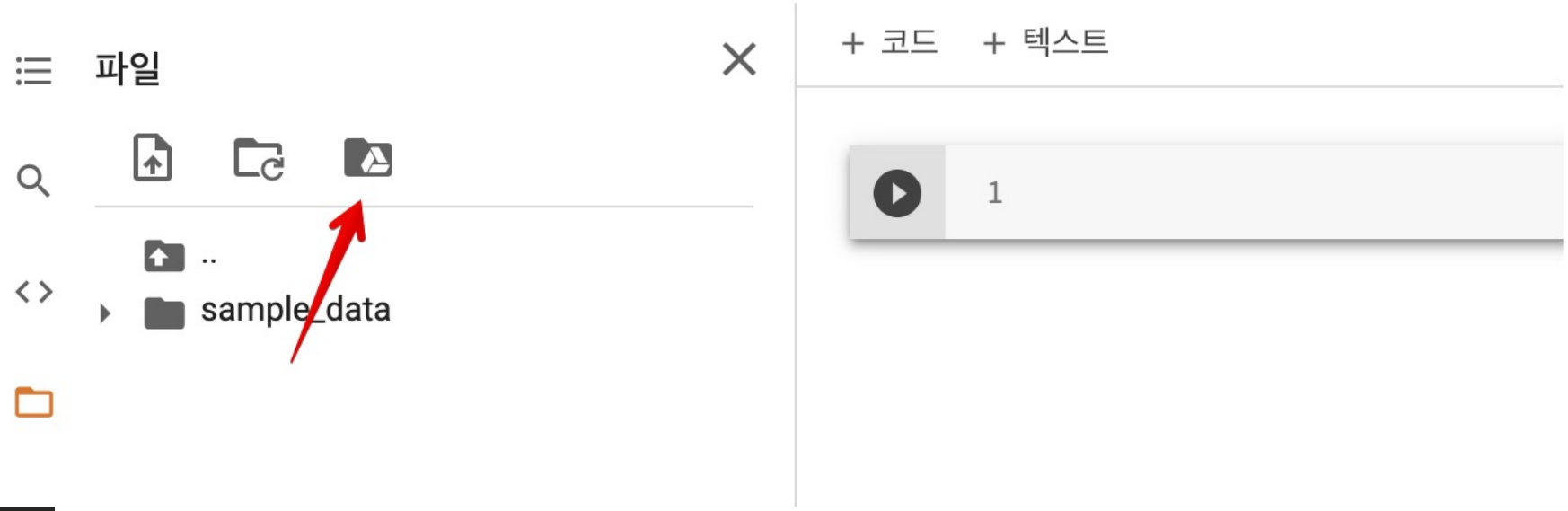
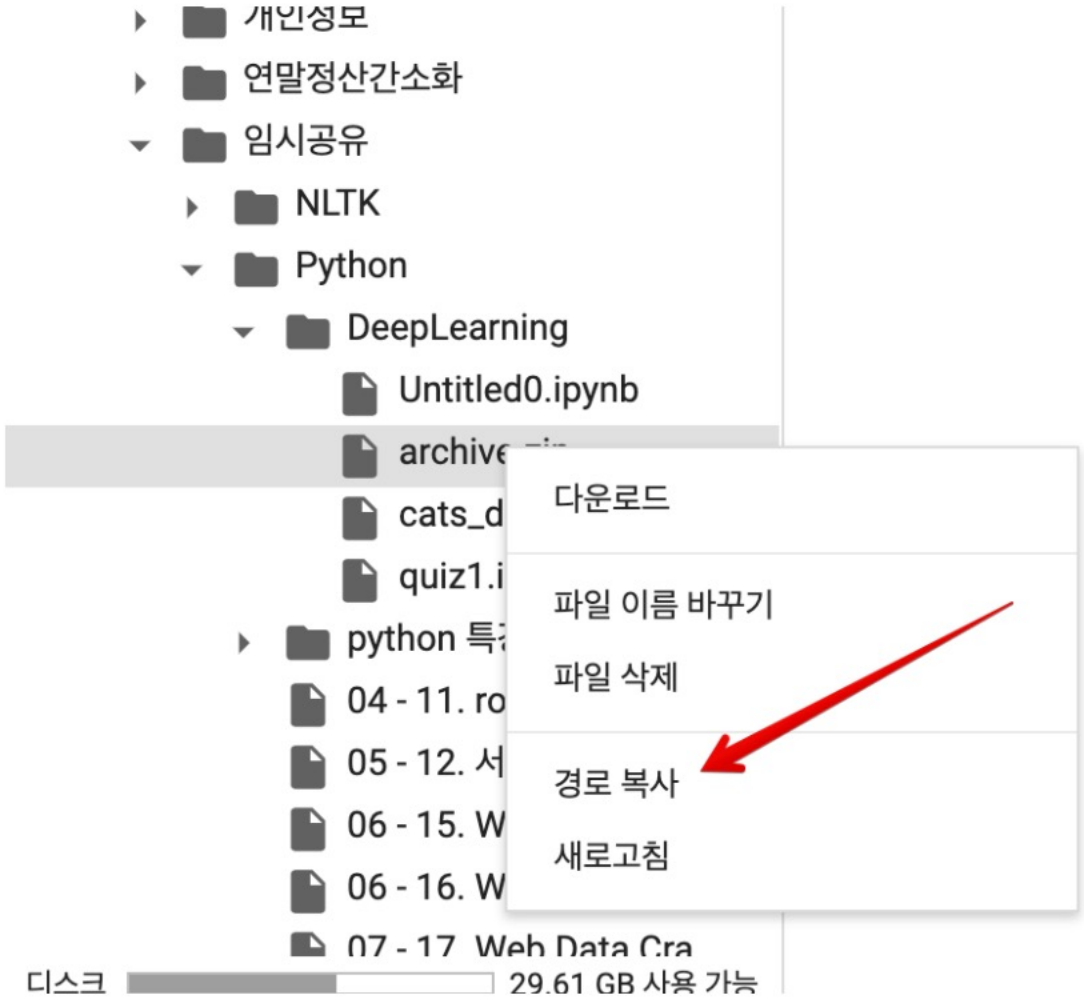
구글 드라이브 연결



압축파일 경로를 찾아서 복사



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현재 경로가 Content인게 중요

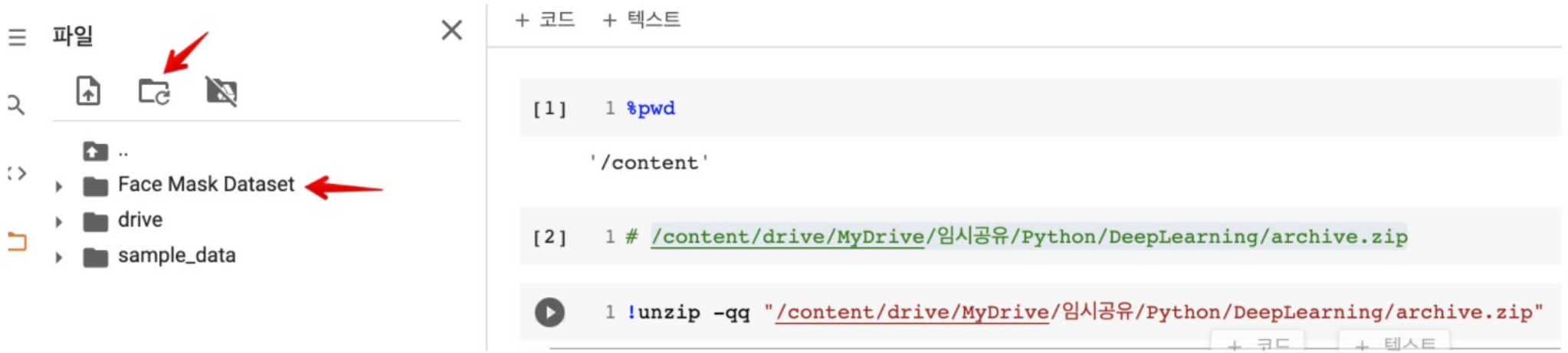
```
[1]   1 %pwd
```

```
'/content'
```

```
   1 # /content/drive/MyDrive/임시공유/Python/DeepLearning/archive.zip
```

+ 코드 + 텍스트

압축을 풀고 새로 고침을 하면 나타남



이후 코드 동일~

단 학습 시간만 놓고 보면 좋음~~~


```
1 X_train = X_train.reshape(len(X_train), X_train.shape[1], X_train.shape[2], 1)
2 X_val = X_val.reshape(len(X_val), X_val.shape[1], X_val.shape[2], 1)
3
4 history = model.fit(X_train, y_train, epochs=5, batch_size = 32)
```

```
Epoch 1/5
250/250 [==============================] - 40s 35ms/step - loss: 41.0547 - accuracy: 0.9001
Epoch 2/5
250/250 [==============================] - 9s 35ms/step - loss: 0.0519 - accuracy: 0.9816
Epoch 3/5
250/250 [==============================] - 9s 35ms/step - loss: 0.0353 - accuracy: 0.9860
Epoch 4/5
250/250 [==============================] - 9s 35ms/step - loss: 0.0191 - accuracy: 0.9936
Epoch 5/5
250/250 [==============================] - 9s 35ms/step - loss: 0.0160 - accuracy: 0.9941
```