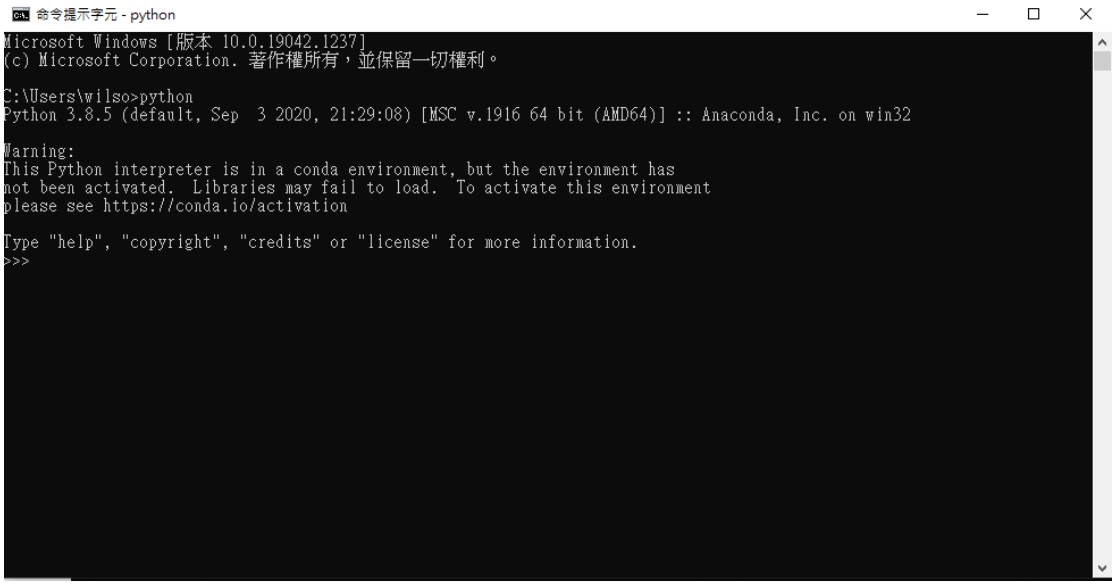
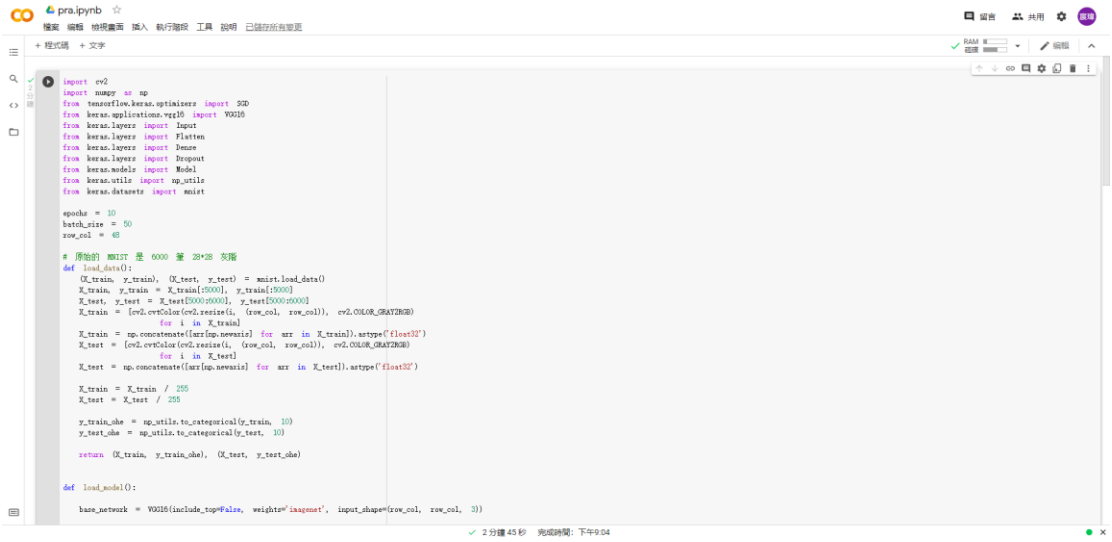
Tensorflow 確認安裝

python 確認安裝



Colab 執行 MNIST 範例程式



```
import cv2
import numpy as np
from tensorflow.keras.optimizers import SGD
from keras.applications.vgg16 import VGG16
from keras.layers import Input
from keras.layers import Flatten
from keras.layers import Dense
from keras.layers import Dropout
from keras.models import Model
from keras.utils import np_utils
from keras.datasets import mnist

epochs = 10
batch_size = 50
row_col = 48

# 原始的 MNIST 是 6000 筆 28*28 灰階
def load_data():
    (X_train, y_train), (X_test, y_test) = mnist.load_data()
    X_train, y_train = X_train[:5000], y_train[:5000]
    X_test, y_test = X_test[5000:6000], y_test[5000:6000]
    X_train = [cv2.cvtColor(cv2.resize(i, (row_col, row_col)), cv2.COLOR_GRAY2RGB)
                    for i in X_train]
    X_train = np.concatenate([arr[np.newaxis] for arr in X_train]).astype('float32')
    X_test = [cv2.cvtColor(cv2.resize(i, (row_col, row_col)), cv2.COLOR_GRAY2RGB)
                    for i in X_test]
    X_test = np.concatenate([arr[np.newaxis] for arr in X_test]).astype('float32')

    X_train = X_train / 255
    X_test = X_test / 255

    y_train_ohe = np_utils.to_categorical(y_train, 10)
    y_test_ohe = np_utils.to_categorical(y_test, 10)

    return (X_train, y_train_ohe), (X_test, y_test_ohe)


def load_model():

    base_network = VGG16(include_top=False, weights='imagenet', input_shape=(row_col, row_col, 3))
```

2 分鐘 45 秒 完成時間：下午9:04

```
full_connect_1 (Dense)       (None, 4096)              2101248
_________________________________________________________________
full_connect_2 (Dense)       (None, 4096)              16781312
_________________________________________________________________
dropout (Dropout)            (None, 4096)              0
_________________________________________________________________
prediction (Dense)           (None, 10)                40970
=================================================================
Total params: 33,638,218
Trainable params: 18,923,530
Non-trainable params: 14,714,688
_________________________________________________________________

Downloading data from https://storage.googleapis.com/tensorflow/tf-keras-datasets/mnist.npz
11493376/11490434 [==============================] - 0s 0us/step
11501568/11490434 [==============================] - 0s 0us/step
Train Size: (5000, 48, 48, 3)
Test Size: (1000, 48, 48, 3)
/usr/local/lib/python3.7/dist-packages/keras/optimizer_v2/optimizer_v2.py:356: UserWarning: The `lr` argument is deprecated, use `learning_rate` instead.
  `The `lr` argument is deprecated, use `learning_rate` instead.')
Epoch 1/10
100/100 [==============================] - 35s 56ms/step - loss: 1.3541 - accuracy: 0.5692 - val_loss: 0.7435 - val_accuracy: 0.7710
Epoch 2/10
100/100 [==============================] - 5s 53ms/step - loss: 0.7203 - accuracy: 0.7680 - val_loss: 0.5116 - val_accuracy: 0.8440
Epoch 3/10
100/100 [==============================] - 6s 58ms/step - loss: 0.5584 - accuracy: 0.8154 - val_loss: 0.5136 - val_accuracy: 0.8500
Epoch 4/10
100/100 [==============================] - 5s 54ms/step - loss: 0.4537 - accuracy: 0.8560 - val_loss: 0.4277 - val_accuracy: 0.8720
Epoch 5/10
100/100 [==============================] - 6s 58ms/step - loss: 0.4355 - accuracy: 0.8572 - val_loss: 0.3233 - val_accuracy: 0.9000
Epoch 6/10
100/100 [==============================] - 6s 58ms/step - loss: 0.3670 - accuracy: 0.8836 - val_loss: 0.3254 - val_accuracy: 0.8830
Epoch 7/10
100/100 [==============================] - 5s 53ms/step - loss: 0.3376 - accuracy: 0.8854 - val_loss: 0.2330 - val_accuracy: 0.9300
Epoch 8/10
100/100 [==============================] - 5s 53ms/step - loss: 0.3186 - accuracy: 0.8948 - val_loss: 0.2198 - val_accuracy: 0.9420
Epoch 9/10
100/100 [==============================] - 6s 58ms/step - loss: 0.2962 - accuracy: 0.9038 - val_loss: 0.2418 - val_accuracy: 0.9220
Epoch 10/10
100/100 [==============================] - 6s 58ms/step - loss: 0.2740 - accuracy: 0.9114 - val_loss: 0.4621 - val_accuracy: 0.8580
157/157 [==============================] - 6s 32ms/step - loss: 0.4250 - accuracy: 0.8590
Train Acc: 0.8590000271797180
32/32 [==============================] - 1s 31ms/step - loss: 0.4621 - accuracy: 0.8580
Test Acc: 0.8579999804496765
```

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