

Tensorflow 確認安裝

```
命令提示字元
urlib3 1.25.11
shlex 0.99.1
wcwidth 0.2.5
webencodings 0.5.1
websocket-client 1.1.0
werkzeug 2.0.1
wheel 0.35.1
win-inet-pton 1.1.0
winertstore 0.2
wrapt 1.12.1
zipp 3.5.0
zope.interface 5.4.0

C:\Users\wilso>pip install tensorflow
Requirement already satisfied: tensorflow in c:\users\wilso\miniconda3\lib\site-packages (2.6.0)
Requirement already satisfied: keras<=2.6 in c:\users\wilso\miniconda3\lib\site-packages (from tensorflow) (2.6.0)
Requirement already satisfied: gast==0.4.0 in c:\users\wilso\miniconda3\lib\site-packages (from tensorflow) (0.4.0)
Requirement already satisfied: opt-einsum<=3.3.0 in c:\users\wilso\miniconda3\lib\site-packages (from tensorflow) (3.3.0)
Requirement already satisfied: flatbuffers<=1.12.0 in c:\users\wilso\miniconda3\lib\site-packages (from tensorflow) (1.12.0)
Requirement already satisfied: astunparse<=1.6.3 in c:\users\wilso\miniconda3\lib\site-packages (from tensorflow) (1.6.3)
Requirement already satisfied: protobuf<=3.9.2 in c:\users\wilso\miniconda3\lib\site-packages (from tensorflow) (3.18.1)
Requirement already satisfied: termcolor<=1.1.0 in c:\users\wilso\miniconda3\lib\site-packages (from tensorflow) (1.1.0)
Requirement already satisfied: wrapt<=1.12.1 in c:\users\wilso\miniconda3\lib\site-packages (from tensorflow) (1.12.1)
Requirement already satisfied: grpcio<2.0.0,>=1.37.0 in c:\users\wilso\miniconda3\lib\site-packages (from tensorflow) (1.41.0)
Requirement already satisfied: numpy<=1.19.2 in c:\users\wilso\miniconda3\lib\site-packages (from tensorflow) (1.19.5)
Requirement already satisfied: clang<=5.0 in c:\users\wilso\miniconda3\lib\site-packages (from tensorflow) (5.0)
Requirement already satisfied: six<=1.15.0 in c:\users\wilso\miniconda3\lib\site-packages (from tensorflow) (1.15.0)
Requirement already satisfied: wheel<=0.35 in c:\users\wilso\miniconda3\lib\site-packages (from tensorflow) (0.35.1)
Requirement already satisfied: absl-py<=0.10 in c:\users\wilso\miniconda3\lib\site-packages (from tensorflow) (0.14.1)
Requirement already satisfied: google-pasta<=0.2 in c:\users\wilso\miniconda3\lib\site-packages (from tensorflow) (0.2.0)
Requirement already satisfied: tensorboard<=2.6 in c:\users\wilso\miniconda3\lib\site-packages (from tensorflow) (2.6.0)
Requirement already satisfied: typing-extensions<=3.7.4 in c:\users\wilso\miniconda3\lib\site-packages (from tensorflow) (3.7.4.3)
Requirement already satisfied: tensorflow-estimator<=2.6 in c:\users\wilso\miniconda3\lib\site-packages (from tensorflow) (2.6.0)
Requirement already satisfied: h5py<=3.1.0 in c:\users\wilso\miniconda3\lib\site-packages (from tensorflow) (3.1.0)
Requirement already satisfied: keras-preprocessing<=1.1.2 in c:\users\wilso\miniconda3\lib\site-packages (from tensorflow) (1.1.2)
Requirement already satisfied: markdown<=2.6.8 in c:\users\wilso\miniconda3\lib\site-packages (from tensorflow) (3.3.4)
```

python 確認安裝

```
命令提示字元 - python
Microsoft Windows [版本 10.0.19042.1237]
(c) Microsoft Corporation. 著作權所有，並保留一切權利。

C:\Users\wilso>python
Python 3.8.5 (default, Sep 3 2020, 21:29:08) [MSC v.1916 64 bit (AMD64)] :: Anaconda, Inc. on win32

Warning:
This Python interpreter is in a conda environment, but the environment has
not been activated. Libraries may fail to load. To activate this environment
please see https://conda.io/activation

Type "help", "copyright", "credits" or "license" for more information.
>>>
```

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 = 40

# 原始的 MNIST 是 6000 筆 28x28 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_GRAY2BGR)
               for i in X_train]
    X_test = [cv2.cvtColor(cv2.resize(i, (row_col, row_col)), cv2.COLOR_GRAY2BGR)
              for i in X_test]
    X_train = np.concatenate([arr for arr in X_train]).astype('float32')
    X_test = np.concatenate([arr for arr in X_test]).astype('float32')
    X_train = X_train / 255
    X_test = X_test / 255
    y_train_one = np_utils.to_categorical(y_train, 10)
    y_test_one = np_utils.to_categorical(y_test, 10)
    return (X_train, y_train_one), (X_test, y_test_one)

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

```
full_connect_1 (Dense) (None, 4096) 2101148
full_connect_2 (Dense) (None, 4096) 16781312
dropout_dropout (Dense) (None, 4096) 0
prediction (Dense) (None, 10) 40970

Total params: 33,638,218
Trainable params: 16,925,530
Nontrainable params: 16,714,688

Downloading data from https://storage.googleapis.com/tensorflow/tf-keras-datasets/mnist.npz
11493376/11494344 [=====] - 0s 0us/step
11501592/11494344 [=====] - 0s 0us/step
Train Size: (5000, 48, 48, 3)
Test Size: (1000, 48, 48, 3)
/usr/local/lib/python7.7/dist-packages/keras/optimizers_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 [=====] - 35s 50ms/step - loss: 1.3541 - accuracy: 0.5092 - val_loss: 0.7435 - val_accuracy: 0.7710
Epoch 2/10 [=====] - 3s 50ms/step - loss: 0.7203 - accuracy: 0.7680 - val_loss: 0.5116 - val_accuracy: 0.8440
Epoch 3/10 [=====] - 3s 50ms/step - loss: 0.5584 - accuracy: 0.8154 - val_loss: 0.5136 - val_accuracy: 0.8590
Epoch 4/10 [=====] - 3s 54ms/step - loss: 0.4537 - accuracy: 0.8560 - val_loss: 0.4277 - val_accuracy: 0.8720
Epoch 5/10 [=====] - 3s 50ms/step - loss: 0.4355 - accuracy: 0.8572 - val_loss: 0.3233 - val_accuracy: 0.9000
Epoch 6/10 [=====] - 3s 50ms/step - loss: 0.3670 - accuracy: 0.8836 - val_loss: 0.3254 - val_accuracy: 0.8830
Epoch 7/10 [=====] - 3s 52ms/step - loss: 0.3376 - accuracy: 0.8854 - val_loss: 0.2330 - val_accuracy: 0.9300
Epoch 8/10 [=====] - 3s 53ms/step - loss: 0.3186 - accuracy: 0.8948 - val_loss: 0.2196 - val_accuracy: 0.9420
Epoch 9/10 [=====] - 3s 50ms/step - loss: 0.2962 - accuracy: 0.9038 - val_loss: 0.2418 - val_accuracy: 0.9220
Epoch 10/10 [=====] - 3s 50ms/step - loss: 0.2740 - accuracy: 0.9114 - val_loss: 0.4021 - val_accuracy: 0.8590
157/157 [=====] - 3s 32ms/step - loss: 0.4250 - accuracy: 0.8590
Test Acc: 0.857999980466765
```