

`import numpy`

`[png 檔案轉存成.npy, np.save(outfile, x)]`

把檔案存成 npy, 然後需要的時候再把它叫出來使用

<https://goo.gl/ivuxax>

`[numpy.concatenate]`

<https://goo.gl/BJHQUB>

`[增加維度: np.expand_dims(x, axis=0)]`

原本吃(1080, 1920, 3)的 nd.array, 將其轉換成(1, 1080, 1920, 3)

(1080, 1920, 3)->(1, 1080, 1920, 3)

<https://goo.gl/i8gHBs>

`from scipy import misc (scipy.misc.imread)`

`[image 讀檔, 並且自動轉變成 ndarray]`

`misc.imsave('face.png', face) # First we need to create the PNG file`

`face = misc.imread('face.png')`

<https://goo.gl/vHuVS5>

<https://docs.scipy.org/doc/scipy-0.18.1/reference/generated/scipy.misc.imread.html>

進階閱讀

Building powerful image classification models using very little data

<https://goo.gl/Zu2ttC>

備用資料 (本次沒有使用到, 也許之後用的到)

從多個 csv 檔案吃資料進來

<https://goo.gl/TCSusQ>

`tf.train.string_input_producer (官網資料)`

<https://goo.gl/YvWptR>

Image Processing with Numpy(附帶 convolution 圖示)

<https://goo.gl/52x1J8>

`scipy imresize`

<https://docs.scipy.org/doc/scipy-0.18.1/reference/generated/scipy.misc.imresize.html>

`numpy array load (.npy)`

<https://docs.scipy.org/doc/numpy-1.13.0/reference/generated/numpy.load.html>

TFRecords

<http://yesczen.github.io/2016/08/17/TensorFlow> 高效读取数据/

以 Python Imaging Library 進行影像資料處理(PIL)

https://yungyuc.github.io/oldtech/python/python_imaging.html

Convolutional neural networks

<https://read01.com/zh-tw/Na4e0.html#.WdOxDmhL9EY>

AlexNet

<http://arbu00.blogspot.tw/2017/07/5-tensorflowalexnet.html>

Keras AlexNet

<http://dandxy89.github.io/ImageModels/alexnet/>

Keras Convolutional Layers

<https://keras.io/layers/convolutional/>

batchnormalization-function

<https://stackoverflow.com/questions/34716454/where-do-i-call-the-batchnormalization-function-in-keras>

Code examples for training AlexNet using Keras and Theano

<https://github.com/duggalrahul/AlexNet-Experiments-Keras>

<https://github.com/heuritech/convnets-keras/tree/master/convnetskeras>

http://wiki.jikexueyuan.com/project/tensorflow-zh/how_tos/variables.html

<https://github.com/heuritech/convnets-keras/blob/master/convnetskeras/convnets.py#L222>

Shuffle two list with the same order

<https://stackoverflow.com/questions/13343347/randomizing-two-lists-and-maintaining-order-in-python>

from sklearn.utils import shuffle

<https://stackoverflow.com/questions/4601373/better-way-to-shuffle-two-numpy-arrays-in-unison>

Models for image classification with weights trained on ImageNet

<https://keras.io/applications/>

Keras による AlexNet を用いた犬猫分類モデル

<https://qiita.com/ornew/items/8ca914d222ce068158c4>

ImageNet Classification with Deep Convolutional Neural Networks (alexNet 論文)

<https://papers.nips.cc/paper/4824-imagenet-classification-with-deep-convolutional-neural-networks.pdf>

tf.variable

http://wiki.jikexueyuan.com/project/tensorflow-zh/how_tos/variables.html

from keras.layers.convolutional import Convolution2D (X)

from keras.layers.convolutional import Conv2D (O)

<http://blog.csdn.net/johinieli/article/details/69222956>

Batch size 對於學習的影響

<https://www.zhihu.com/question/32673260>

keras 实现常用深度学习模型 LeNet，AlexNet，ZFNet，VGGNet，GoogleNet，Resnet

<http://blog.csdn.net/wmy199216/article/details/71171401>

mnist cnn

https://github.com/fchollet/keras/blob/master/examples/mnist_cnn.py

其實應該要先看 data 的樣子

同一個 model，套用在不同 data 上面，其實會有著天壤之別的 accuracy，

因此如果要設計出好的 model，一定要對自己的 data 特性有所了解，

不然就只能不斷地嘗試(try and error)，在錯誤中學習。

指令：可以轉成黑白

```
from scipy import misc
```

```
from PIL import ImageOps
```

```
face = misc.imread(os.path.join(DATA_DIR, filename), flatten=True)
```

```
// flatten=True 這表示著將原本的彩色圖(RGB)，壓成灰階的黑白圖
```

```
// misc.imread 讀進來的資料格式會是 ndarray (這是一個很方便的指令!)
```