

Donkey Car 小工具

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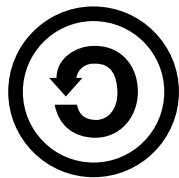
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關於我們

- Raspberry Pi 官方經銷商



about 台灣樹莓派

- 專注於 Raspberry Pi 應用與推廣
- 舉辦社群聚會 / 工作坊 / 讀書會 / 黑客松
- Website:
 - <https://www.raspberrypi.com.tw/>
- Facebook:
 - 搜尋 RaspberryPi.Taiwan
 - <https://www.facebook.com/RaspberryPi.Taiwan>



分享 x 教學

- COSCUP, MakerConf, PyCon, HKOSCon 講者
- 投影片
 - <http://www.slideshare.net/raspberrypi-tw/presentations>
- 程式碼
 - <https://github.com/raspberrypi-tw>



學習路徑



Pi選購指南



Pi設定安裝



Linux系統管理



Python程式設計

I/O硬體控制

GPIO學習套件

初

感測器學習套件
(基礎/進階)

中

空氣盒子套件
(PiM25)

初

Win10開發套件

初

智慧開關套件

初

Linux Driver
學習套件

進

無線/IoT

RFID/NFC
門禁系統

初

LoRa IoT
閘道器套件

初

生理資訊
監控IoT(藍牙)

初

毫米波人流/熱點監控
(mmWave)

初

相機/影像處理

特色相機改裝套件

初

寵物小車套件

初

自控機器手臂套件

中

小鴨車套件
(Duckietown)

進

人工智慧

驢車套件
(DonkeyCar)

初

AIY Vision Kit

中

Intel神經運算棒

中

Google Coral
USB加速器

中

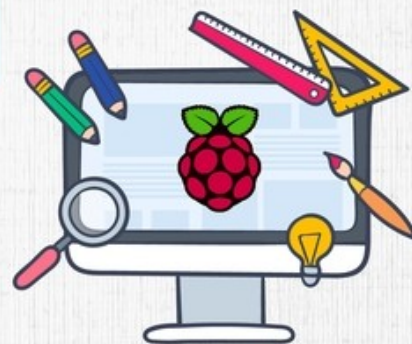
語音/訊號處理

智慧音箱套件

初

AIY Voice Kit

初



初 初階課程

中 中階課程

進 進階課程

大綱

- 實驗 1：移除不需要的影像
- 實驗 2：視覺化 CNN Filter Activations
- 實驗 3：遷移學習 Transfer Learning

實驗 1：移除不需要的影像

目的：使用 Web 界面移除影像

Clean data in Tub

- `$ cd ~/mycar/data`
- `$ du -a | cut -d/ -f2 | sort | uniq -c`
- `$ donkey tubclean .`



這邊有一個點

列出每個目錄下的檔案總和

```
pi@donkeypi4: ~/mycar/data
File Edit Tabs Help
(env) pi@donkeypi4:~ $ cd ~/mycar/data/
(env) pi@donkeypi4:~/mycar/data $ du -a | cut -d/ -f2 | sort | uniq -c
  1 44992 .
2404 tub_1_19-09-18
3036 tub_3_19-09-18
 120 tub_4_19-09-18
   2 tub_5_19-09-20
2404 tub_6_19-09-20
(env) pi@donkeypi4:~/mycar/data $
```

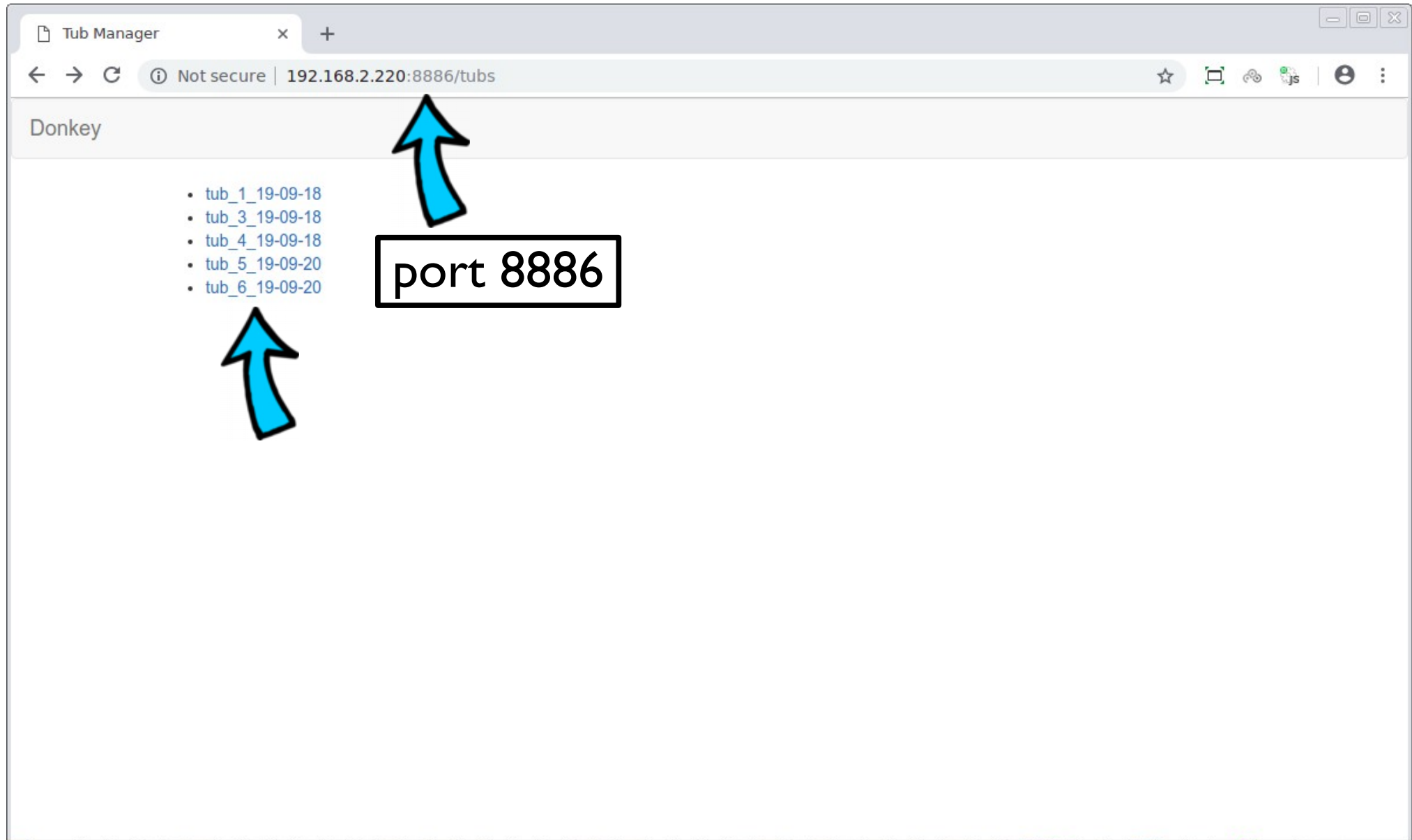
\$ du -a | cut -d/ -f2 | sort | uniq -c

啟動 Web Server

```
pi@donkeypi4: ~/mycar/data
File Edit Tabs Help
(env) pi@donkeypi4:~ $ cd ~/mycar/data/
(env) pi@donkeypi4:~/mycar/data $ du -a | cut -d/ -f2 | sort | uniq -c
  1 44992 .
2404 tub_1_19-09-18
3036 tub_3_19-09-18
 120 tub_4_19-09-18
   2 tub_5_19-09-20
2404 tub_6_19-09-20
(env) pi@donkeypi4:~/mycar/data $ donkey tubclean .
using donkey v3.1.0 ...
Listening on 8886...
█
```

\$ donkey tubclean .

選擇影像目錄 (Tub)



開始播放

The screenshot shows the Tub Manager web interface. At the top, the browser tab is labeled 'Tub Manager'. The address bar shows the URL '0:8886/tubs/tub_6_19-09-20'. The main content area displays a video player for a 'Donkey' environment. The video shows a first-person view of a car driving on a road. A blue arrow points from the '方向資料' (Direction Data) label to the video player. Another blue arrow points from the '影像編號' (Image Number) label to the number '19' next to the video player. A third blue arrow points from the '目前播放的影像' (Currently Playing Image) label to the video player. Below the video player, there is a timeline of small image thumbnails. A blue arrow points from the '開始播放' (Start Playback) label to the play button icon on the left of the timeline. To the right of the video player, there are playback controls: a dropdown menu set to '1x playback', a 'Play' button, a 'Rewind 1s (b)' button, a 'Fast-forward 10s' button, and a 'Split (c)' button. At the bottom right, there is a red button labeled 'Save and Delete Checked Training Data!'.

方向資料

影像編號

Donkey

19

1x playback

Play

Rewind 1s (b)

Fast-forward 10s

Split (c)

目前播放的影像

開始播放

Save and Delete Checked Training Data!

開始播放

Tub Manager x +

← → ↻ ⓘ Not secure | 192.168.2.220:8886/tubs/tub_6_19-09-20 ☆ 🔍 🌐 📄 ⚙️

Donkey

1.00

34

1x playback ▾

▶ Play

⏮ Rewind 1s (b)

⏭ Fast-forward 10s

🔗 Split (c)

▶ [16 frames] ▶

Save and Delete Checked Training Data!

共分為 16 份

移除不需要的影像流程

- 先將大份切分 (Split) 成小份
- 檢查小份內容，如果不需要則移除整段
- ...
- 或者再將小份內容切分成小小份後檢查
- 檢查小小份內容，如果不需要則移除整段

選擇要切分的地方

Tub Manager x +

Not secure | 192.168.2.220:8886/tubs/tub_6_19-09-20

Donkey

-1.00

76

1x playback

Play (—)

◀◀ Rewind 1s (b)

▶▶ Fast-forward 10s

✂ Split (c)

選擇第一個切份

一個切份有 76 張影像

Split

Save and Delete Checked Training Data!

The image shows a web browser window with the 'Tub Manager' interface. The address bar shows '192.168.2.220:8886/tubs/tub_6_19-09-20'. The main content area displays a video player for a 'Donkey' camera feed. The video is at the -1.00 second mark. To the right of the video player, there is a frame counter showing '76'. Below the video player is a timeline with a series of small video frames. A blue arrow points from the first frame of the timeline to a box labeled '選擇第一個切份'. Another blue arrow points from the '76' frame counter to a box labeled '一個切份有 76 張影像'. A third blue arrow points from the 'Split (c)' button to a yellow box labeled 'Split'. The 'Split (c)' button is located below the video player and above the timeline. At the bottom right, there is a red button labeled 'Save and Delete Checked Training Data!'.

切分結果

Tub Manager x +

Not secure | 192.168.2.220:8886/tubs/tub_6_19-09-20

Donkey

1-75

75

1x playback

Play

Rewind 1s (b)

Fast-forward 10s

Split (c)

新的切份

Save and Delete Checked Training Data!

The screenshot displays the Tub Manager web interface. At the top, the browser tab is labeled 'Tub Manager' and the address bar shows '192.168.2.220:8886/tubs/tub_6_19-09-20'. The main content area is titled 'Donkey'. A video player is centered, showing a first-person view of a car on a track. Above the video, a progress bar indicates '-1.00'. To the right of the video, the number '75' is displayed. Below the video, there are playback controls: a '1x playback' dropdown, a 'Play' button, a 'Rewind 1s (b)' button, a 'Fast-forward 10s' button, and a 'Split (c)' button. A large blue arrow points from the '1-75' label to the video player. Another large blue arrow points from the '新的切份' (New split) label to the timeline. The timeline at the bottom shows a sequence of video frames, with a play button on the left and a stop button on the right. A red button at the bottom right says 'Save and Delete Checked Training Data!'.

再選擇要切分的地方

Tub Manager x +

← → ↻ ⓘ Not secure | 192.168.2.220:8886/tubs/tub_6_19-09-20

Donkey

6

1x playback

▶ Play (—)

⏮ Rewind 1s (b)

⏭ Fast-forward 10s

✂ Split (c)

選擇第一個切份

切分點

Split

Save and Delete Checked Training Data!

The screenshot shows the Tub Manager web interface. At the top, there's a browser tab labeled 'Tub Manager' and a URL bar showing '192.168.2.220:8886/tubs/tub_6_19-09-20'. Below the browser window, the main content area displays a video player. The video shows a first-person view of a car driving on a track. A red vertical line is positioned on the video, indicating a split point. To the right of the video, there's a control panel with a '1x playback' dropdown, a 'Play (—)' button, a 'Rewind 1s (b)' button, a 'Fast-forward 10s' button, and a 'Split (c)' button. A blue arrow points from the 'Split (c)' button to a yellow box labeled 'Split'. Another blue arrow points from the 'Split (c)' button to the first segment of the timeline. Below the video player, there's a timeline showing a sequence of frames. The first segment is highlighted with a blue box and labeled '選擇第一個切份'. A red button at the bottom right says 'Save and Delete Checked Training Data!'.

切分結果

Tub Manager x +

← → ↻ ⓘ Not secure | 192.168.2.220:8886/tubs/tub_6_19-09-20 ☆ 🔍 🌐 📄 ⓘ ⋮

Donkey

1-5

5

1x playback ▾

▶ Play

⏮ Rewind 1s (b)

⏭ Fast-forward 10s

✂ Split (c)

新的切份

Save and Delete Checked Training Data!

The screenshot displays the Tub Manager web interface. At the top, the browser tab is labeled 'Tub Manager' and the address bar shows '192.168.2.220:8886/tubs/tub_6_19-09-20'. The main content area is titled 'Donkey'. A video player shows a first-person view of a car driving on a track. To the right of the video are playback controls: a '1x playback' dropdown, 'Play', 'Rewind 1s (b)', 'Fast-forward 10s', and 'Split (c)' buttons. A blue arrow points from a box labeled '1-5' to the video player. Below the video player is a timeline showing a sequence of video frames. A yellow box labeled '新的切份' (New split) with a blue arrow points to the timeline. At the bottom right, there is a red button labeled 'Save and Delete Checked Training Data!'.

選擇要刪除的影像列

Tub Manager x +

← → ↻ ⓘ Not secure | 192.168.2.220:8886/tubs/tub_6_19-09-20

Donkey

1-5

5

1x playback

▶ Play

⏮ Rewind 1s (b)

⏭ Fast-forward 10s

⚙ Split (c)

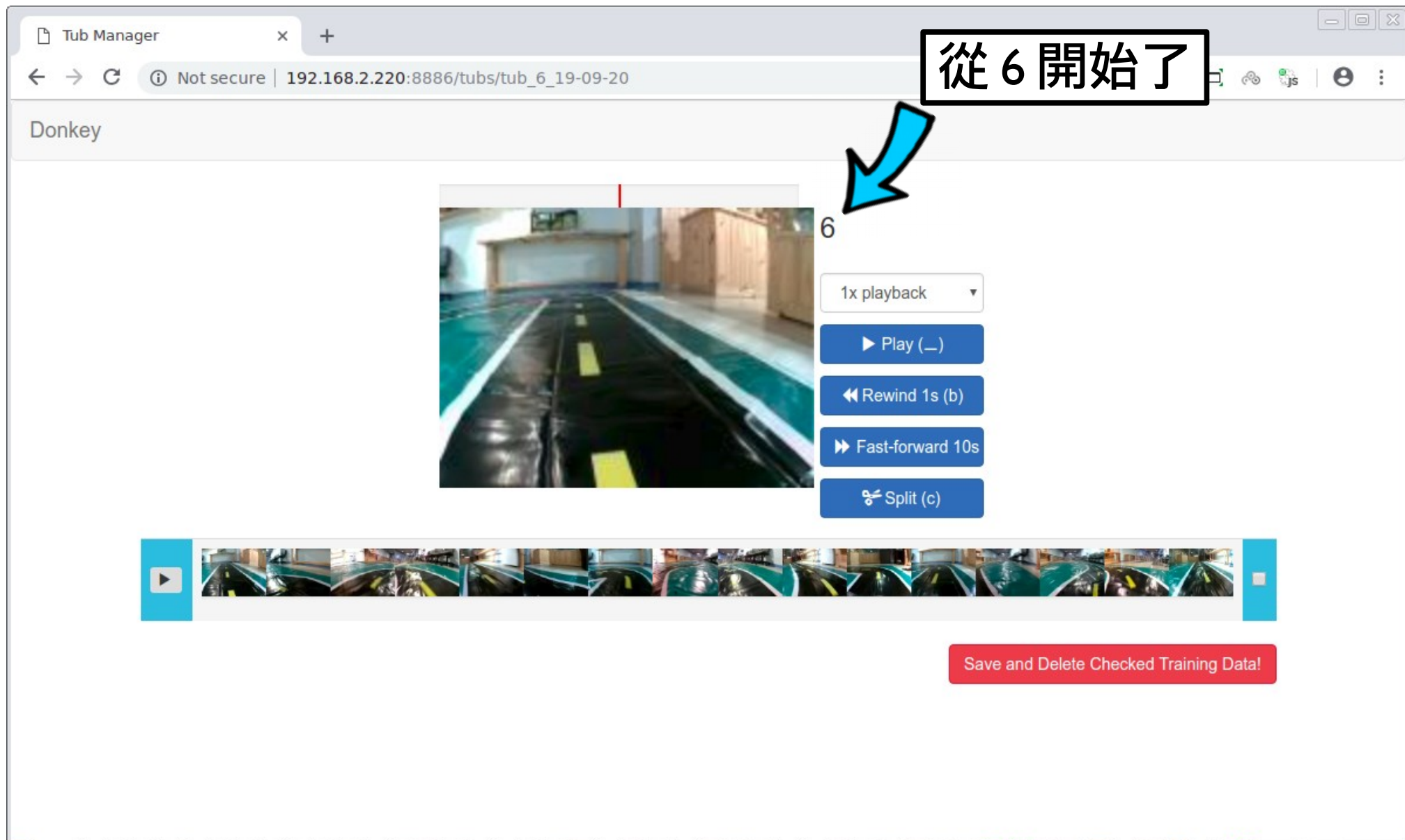
選擇

刪除

Save and Delete Checked Training Data

The screenshot shows the Tub Manager web interface. At the top, there's a browser tab labeled 'Tub Manager' and a URL bar showing '192.168.2.220:8886/tubs/tub_6_19-09-20'. Below the browser window, the page title is 'Donkey'. The main content area features a video player showing a first-person view of a robot on a track. To the right of the video player are playback controls: a '1x playback' dropdown, a 'Play' button, a 'Rewind 1s (b)' button, a 'Fast-forward 10s' button, and a 'Split (c)' button. Below the video player is a list of video frames. The first frame is highlighted with a blue selection box. To the right of the frame list, there's a vertical toolbar with a checkmark icon. At the bottom right, there's a red button labeled 'Save and Delete Checked Training Data'. Annotations include a box labeled '1-5' with a blue arrow pointing to the video player, a box labeled '選擇' (Select) with a blue arrow pointing to the first frame in the list, and a box labeled '刪除' (Delete) with a blue arrow pointing to the 'Save and Delete Checked Training Data' button.

結果



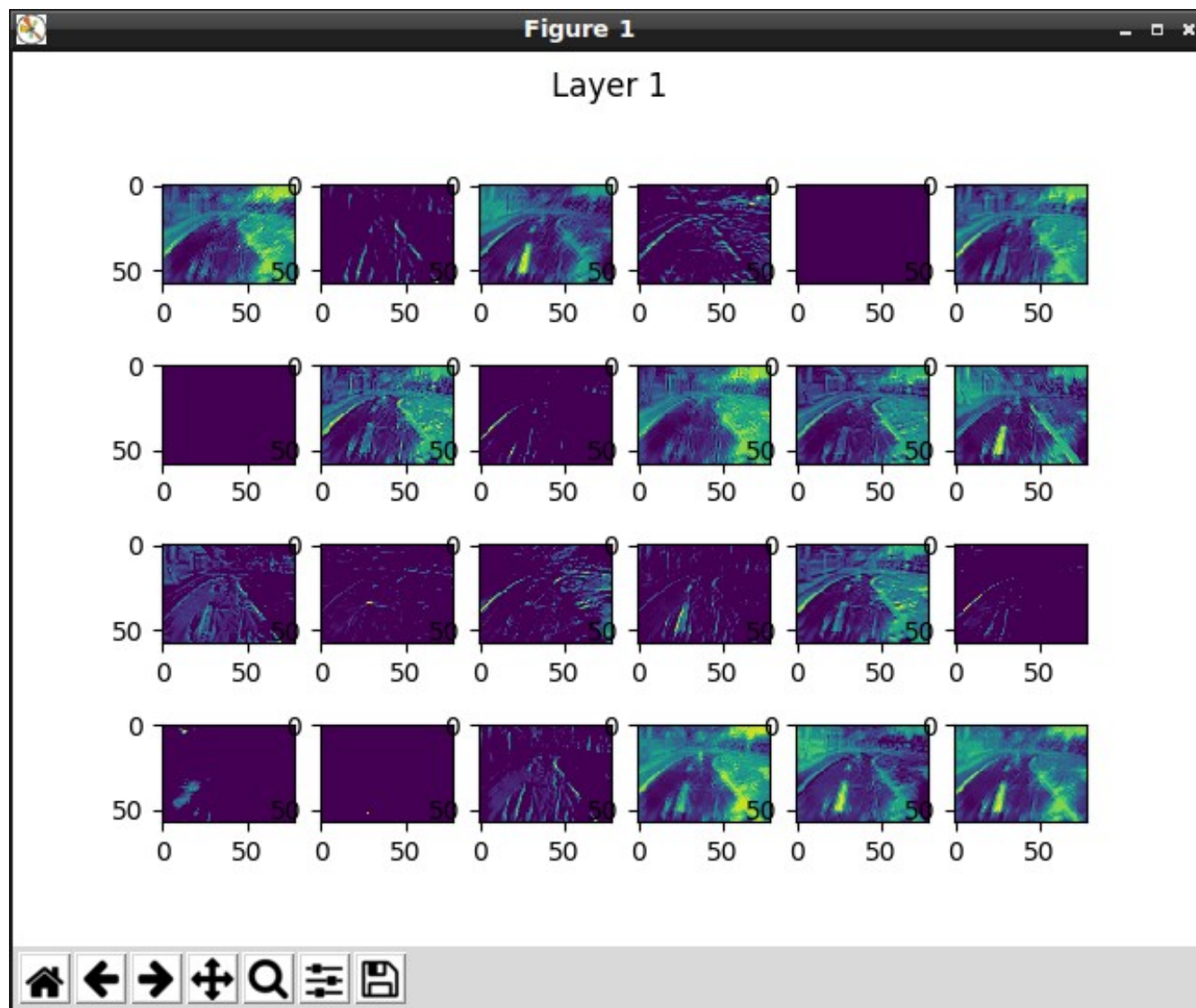
實驗 2: 視覺化 CNN Filter Activations

目的：觀察 CNN 各層輸出的變化

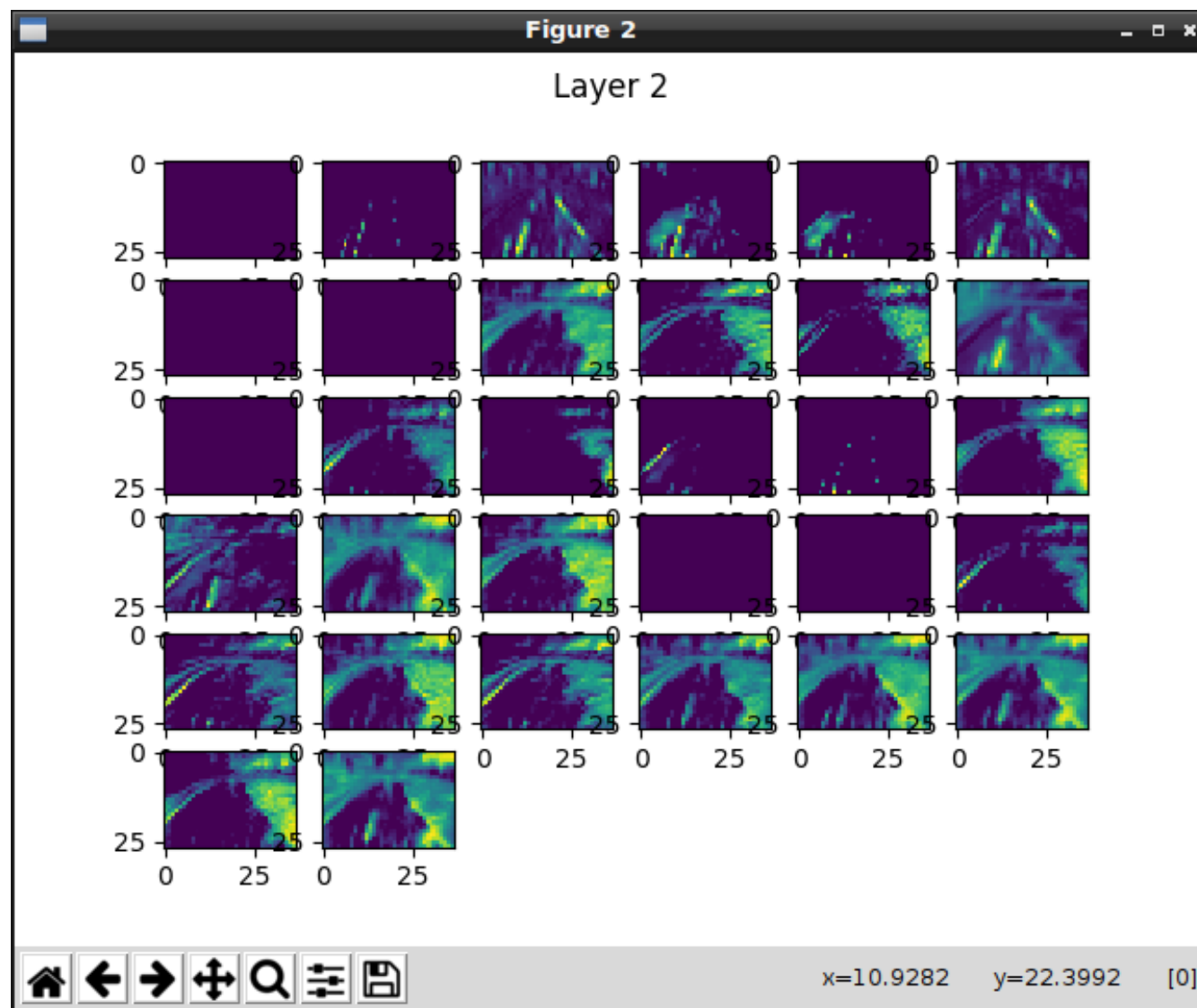
視覺化中間層輸出

- `$ cd ~/mycar/data`
- 使用方法
- `$ donkey cnnactivations --model
models/<MODEL>.h5 --image data/<TUB>/1_cam-
image_array_.jpg`
- 範例
- `$ donkey cnnactivations --model
models/CAT_1.h5 --image data/tub_4_19-11-
21/1_cam-image_array_.jpg`

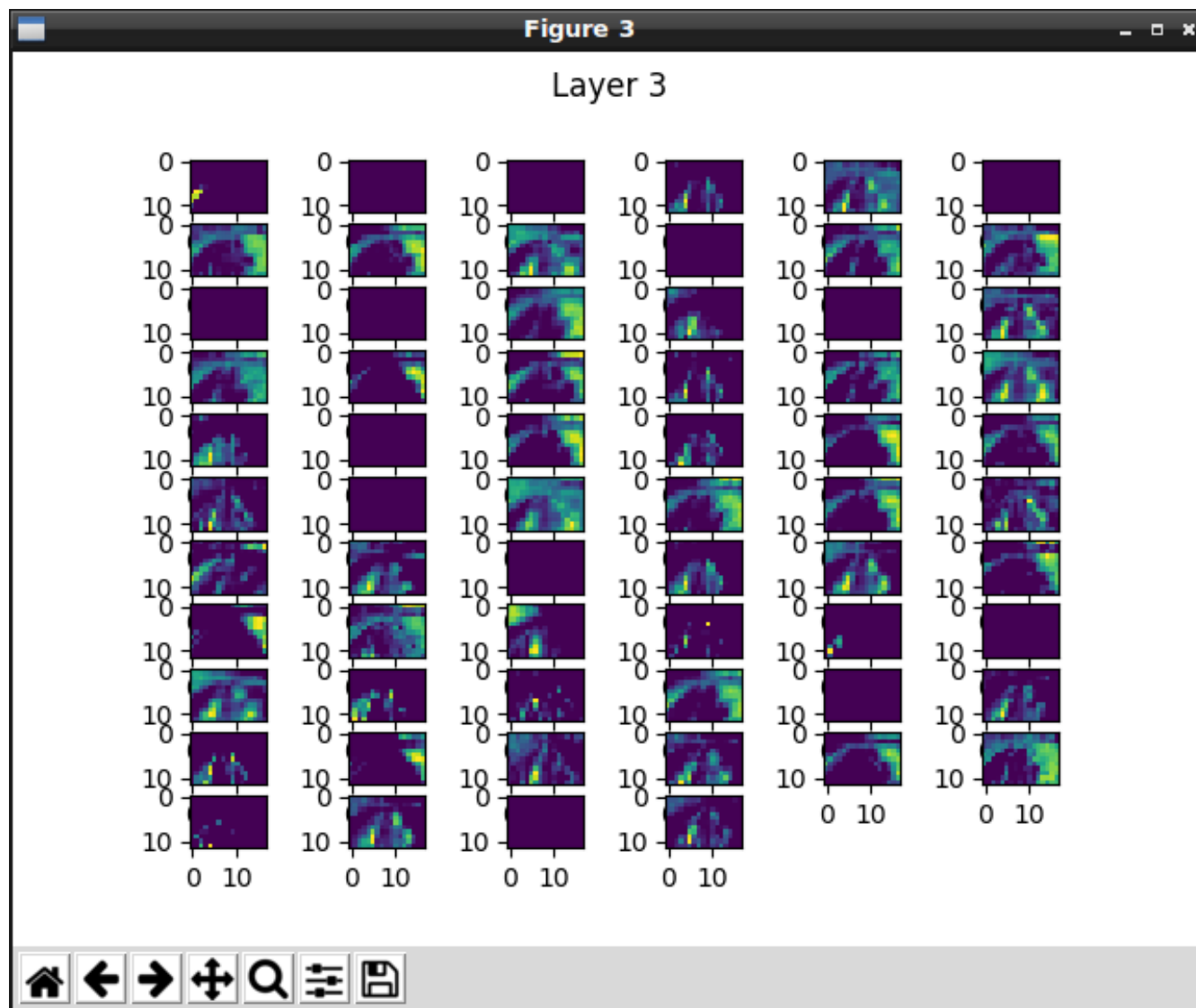
視覺化中間層輸出



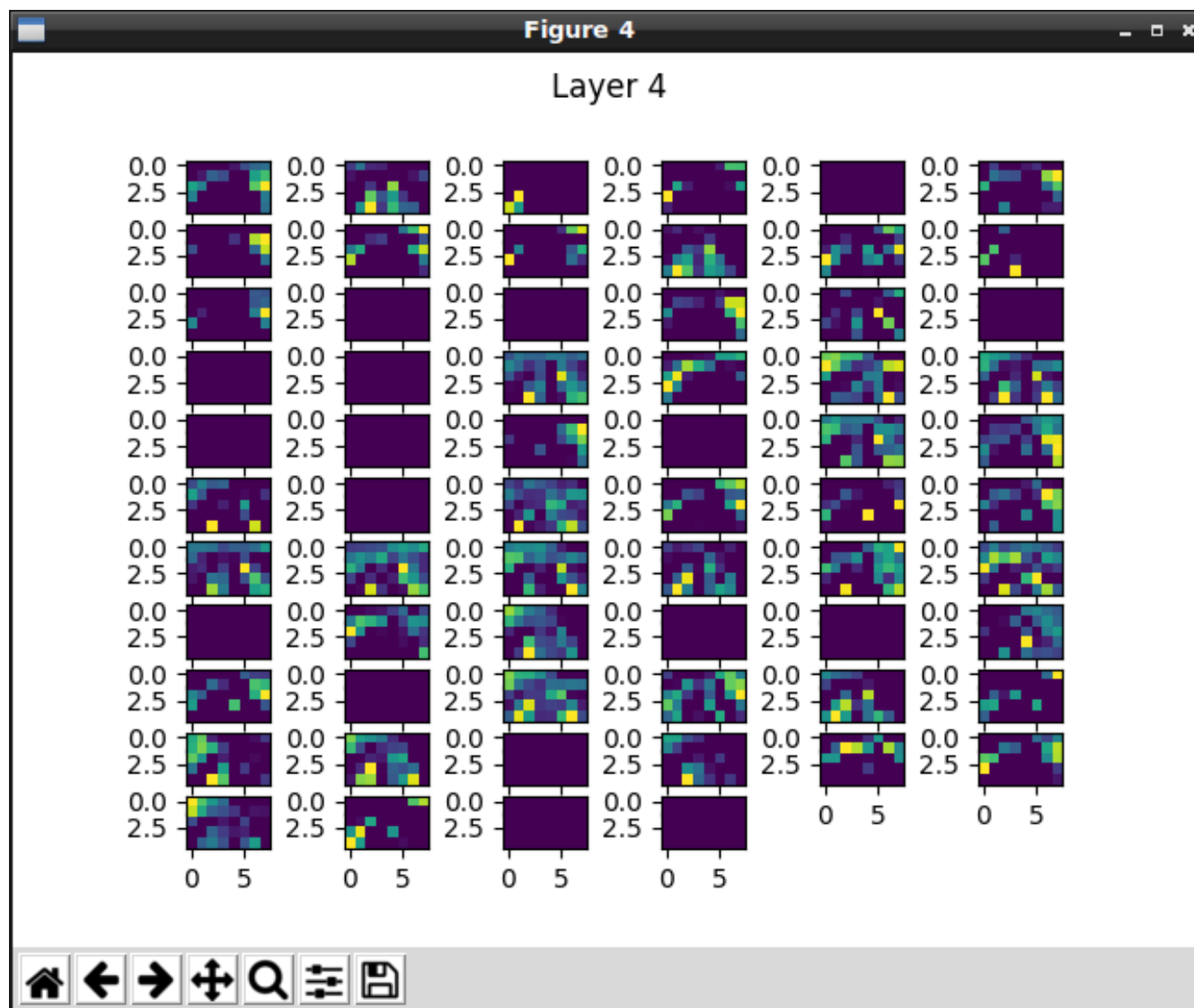
視覺化中間層輸出



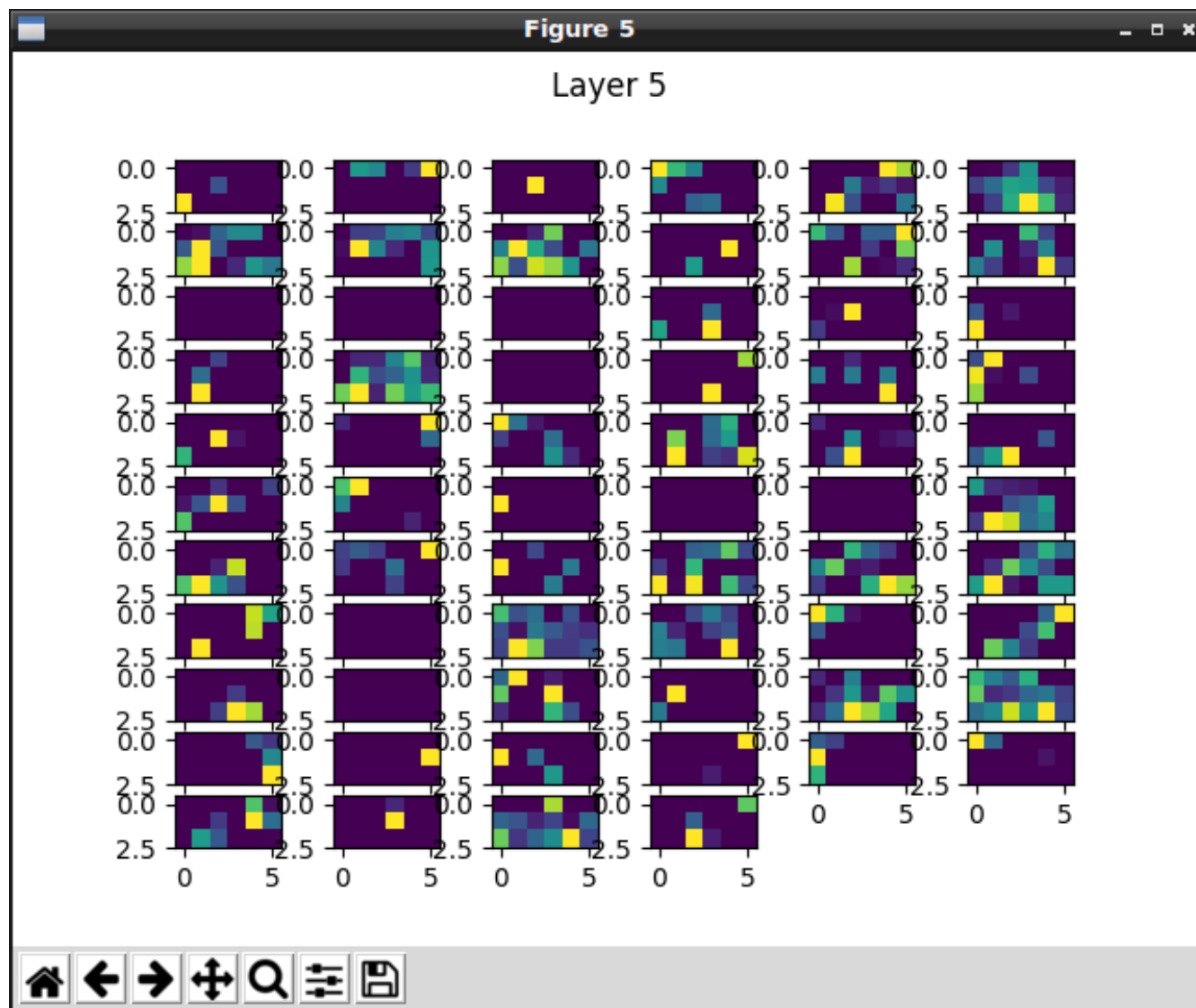
視覺化中間層輸出



視覺化中間層輸出



視覺化中間層輸出




實驗 3: 遷移學習

目的：轉移所學技能

遷移學習 (Transfer Learning)

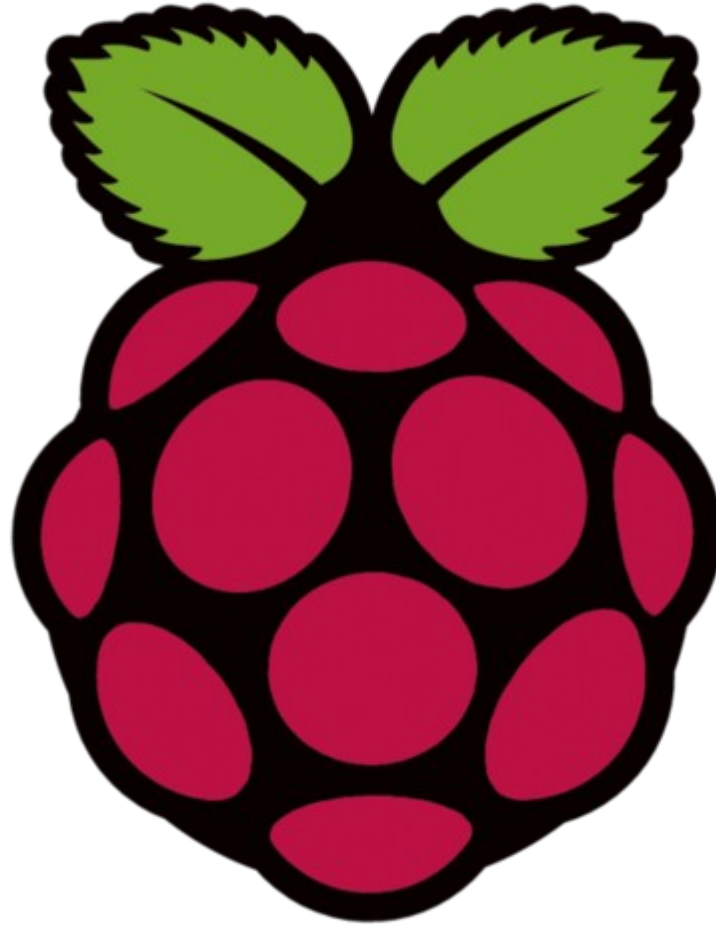
- 將已存在的知識應用在要學習的領域

Task Considered		Data not directly related
Speech Recognition	 Taiwanese	 English Chinese
Image Recognition	 Medical Images	   
Text Analysis	 Specific domain	 Webpages

在訓練時加上遷移學習

- `$ cd ~/mycar`
- 使用方法
- `$ python sample_manage.py train --transfer models/<SRC.H5> --model models/<TARGET.H5> --type <TYPE>`
- 範例
- `$ python sample_manage.py train --transfer models/rnn_1.h5 --model models/rnn_2.h5 --type rnn`

Raspberry Pi Rocks the World



Thanks