

Lab05

Marker(測距離) & Tello EDU

1. Marker Detection (50%)

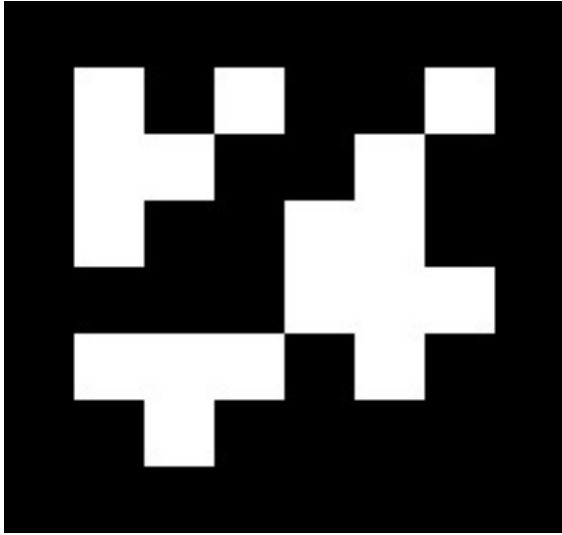
a. calibration

b. marker detection

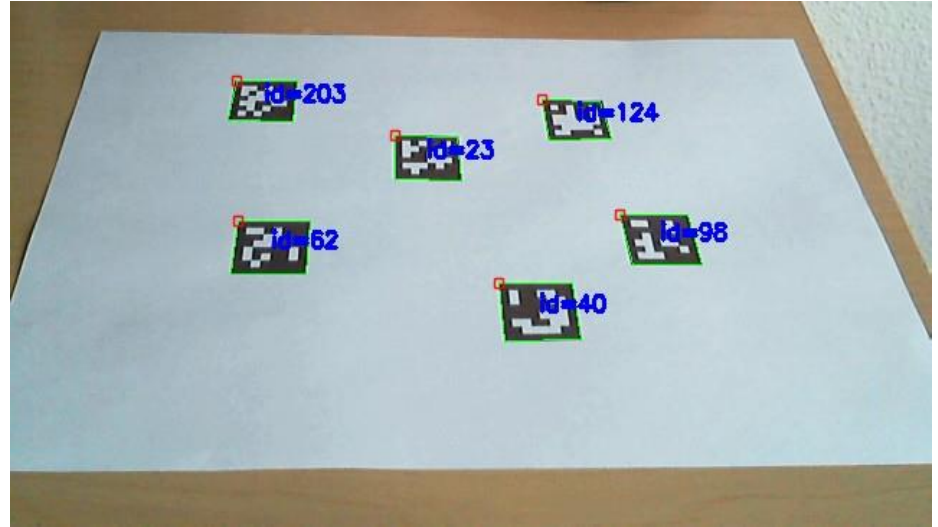
c. pose estimation

d. controlling

1. Marker Detection (50%)



aruco marker



marker
detection

1. Marker Detection (50%)

Load the predefined dictionary

```
dictionary = cv2.aruco.Dictionary_get(cv.aruco.DICT_6X6_250)
```

Initialize the detector parameters using default values

```
parameters = cv2.aruco.DetectorParameters_create()
```

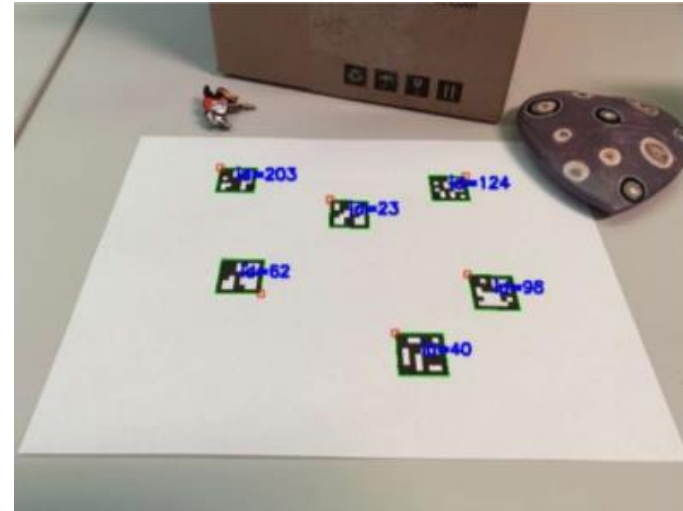
The list of parameters that can be adjusted including the adaptive threshold values can be found **here**

1. Marker Detection (50%)

Detect the markers in the image

```
markerCorners, markerIds, rejectedCandidates =  
cv2.aruco.detectMarkers(frame, dictionary, parameters=parameters)
```

```
frame = cv2.aruco.drawDetectedMarkers(frame,  
markerCorners, markerIds)
```

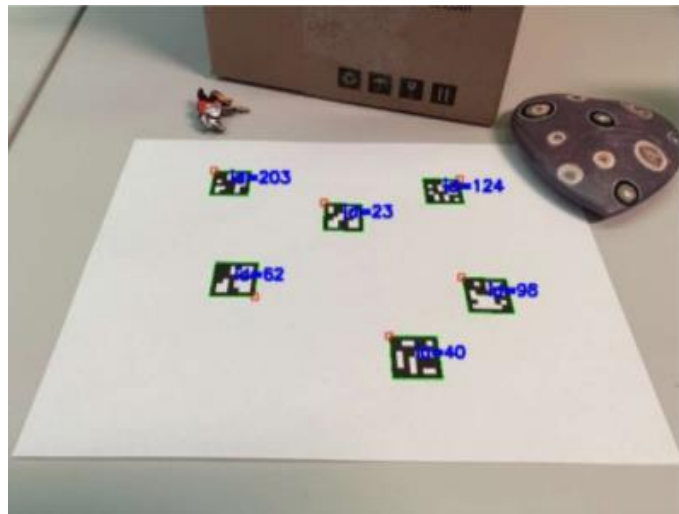


1. Marker Detection (50%)

#Pose estimation for single markers.

```
rvec, tvec, _objPoints =  
cv2.aruco.estimatePoseSingleMarkers(markerCorners,  
15, intrinsic, distortion)
```

```
frame = cv2.aruco.drawAxis(frame, intrinsic,  
distortion, rvec, tvec, 0.1)
```

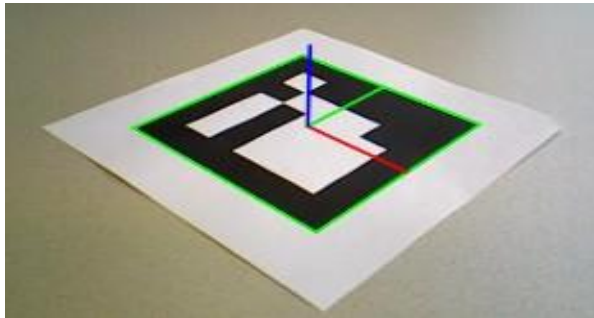


1. Marker Detection (50%)

a. calibrate the drone camera

b. marker detection by drone camera

c. pose estimation



x: 10.3478

y: 21.5618

z: 3.9908

2. Tello EDU (50%)

設備介紹

| 配件 | | 數量 |
|---|---------------|-----|
|  | 飛行器 | × 1 |
|  | 螺旋槳（對） | × 4 |
|  | 槳葉保護罩（套） | × 1 |
|  | 電池 | × 1 |
|  | Micro USB 傳輸線 | × 1 |
|  | 螺旋槳拆卸工具 | × 1 |
|  | 挑戰卡 | × 4 |

電池管家



官方範例程式

- <https://github.com/dji-sdk/Tello-Python>

github.com/dji-sdk/Tello-Python

13 commits 1 branch 0 packages 0 releases 2 contributors View license

Branch: master New pull request Create new file Upload files Find file Clone or download

hanker-lu 1 · Add FAQ file(EN&CH) according recent questions asked by users;2 · Ren... Latest commit 693776d on 15 Feb

| | | |
|-----------------------------------|--|--------------|
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| Tello_Video_With_Pose_Recognition | 1 · add the vcrist_x64.exe into tello_video_dll.zip;2 · remove the manu... | 9 months ago |
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| tello_state.py | Tello-Python SampleCode v1.0.0 | last year |
| tello_video_dll(ForWin64).zip | 1 · Add FAQ file(EN&CH) according recent questions asked by users;2 · Ren... | 9 months ago |

官方範例程式：Tello-Video

- https://github.com/dji-sdk/Tello-Python/tree/master/Tello_Video

- Written in Python 2.7

- 安裝：

- Windows

Go to the "install\Windows" folder, select and run the correct "windows_install.bat" according to your computer operating system bits.

- Linux (Ubuntu 14.04 and above)

Go to the "install\Linux" folder in command line, run

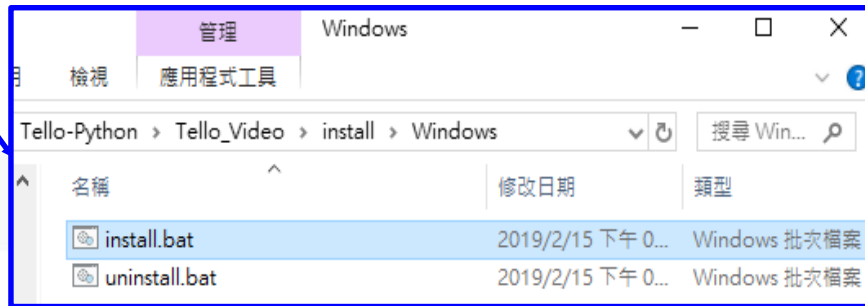
```
chmod +x linux_install.sh
./linux_install.sh
```

- Mac

i. Make sure you have the latest Xcode command line tools installed. If not, you might need to update your OS X and XCode to the latest version in order to compile the h264 decoder module

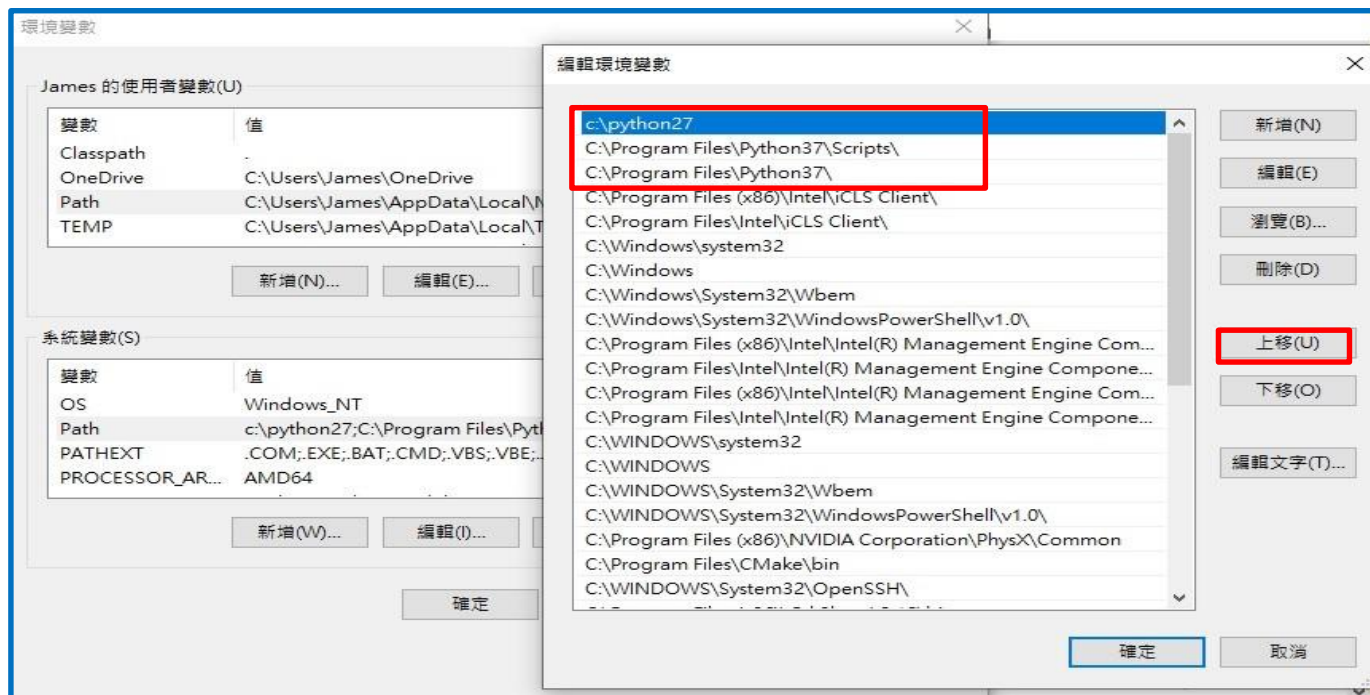
ii. Go to the "install\Mac" folder in command line, run

```
chmod a+x ./mac_install.sh
./mac_install.sh
```



官方範例程式：Tello-Video

- 不同版本的Python



官方範例程式：Tello-Video

- 第一步。打開Tello無人機，並透過Wi-Fi將筆電連接到Tello



官方範例程式：執行 Tello-Video

- 第一步。打開Tello無人機，並透過Wi-Fi將筆電連接到Tello

Branch: master Tello-Python / Tello_Video /

Create new fileFind fileHistory

hanker-lu 1 · add the vcredist_x64.exe into tello_video_dll.zip;2 · remove the manu... Latest commit 4d98487 on 13 Feb 2019

..

h264decoder

adding missing include

16 months ago

img

add the 'img'file

17 months ago

install

1 · add the vcredist_x64.exe into tello_video_dll.zip;2 · remove the manu...

14 months ago

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README.md

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main.py

Tello-Python SampleCode v1.0.0

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tello.py

Tello-Python SampleCode v1.0.0

17 months ago

tello_control_ui.py

Tello-Python SampleCode v1.0.0

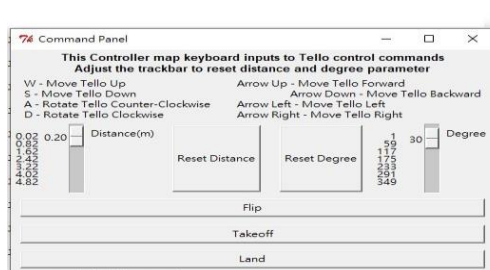
17 months ago

官方範例程式：執行 Tello-Video

- 在命令列打開程式所在資料夾，並輸入 `python main.py`，將顯示一個使用者界面。



```
D:\CodingArea\Tello-Python\Tello_Video>python main.py
```



官方範例程式：執行 Tello-Video

- 第一步。打開Tello無人機，並透過Wi-Fi將筆電連接到Tello



Branch: master ▾

Tello-Python / Tello_Video /

Create new file


Find file

History

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1 · add the vc_redist_x64.exe into tello_video_dll.zip;2 · remove the manu...

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 main.py


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 tello.py

Tello-Python SampleCode v1.0.0

17 months ago

 tello_control_ui.py

Tello-Python SampleCode v1.0.0

17 months ago

放入lab05.py

修改 tello.py

```
5  # import libh264decoder
25      # self.decoder = libh264decoder.H264Decoder()
51      # self.socket_video.bind((local_ip, self.local_video_port))
```

註解掉def _h264_decode 跟 def _receive_video_thread

增加 import cv2

修改 tello.py

```
def _receive_video_thread(self):  
    video_ip = "udp://{}:{ {}".format("0.0.0.0", 11111)  
    video_capture = cv2.VideoCapture(video_ip)  
    retval, self.frame = video_capture.read()  
    while retval:  
        retval, frame = video_capture.read()  
        self.frame = frame[..., ::-1] # From BGR to RGB
```

修改 tello.py

```
def keyboard(self, key):  
    print("key:", key)  
    distance = 0.2  
    degree = 30  
    if key == ord('1'):  
        self.takeoff()  
    if key == ord('2'):  
        self.land()  
    if key == ord('i'): ...  
    if key == ord('k'): ...  
    if key == ord('j'): ...  
    if key == ord('l'): ...  
    if key == ord('s'): ...
```

- 將keyboard加入 tello.py 中的Tello物件
- Note:
 往後撰寫自動飛行的程式碼時,
 一定也要有 keyboard control 功能,
 且要有最高優先權,
 確保自動飛行狀況不佳時仍能手動控制。

Tello API

```
self.tello.takeoff()  
  
self.tello.land()  
  
self.tello.flip('l')  
self.tello.flip('r')  
self.tello.flip('f')  
self.tello.flip('b')  
  
self.tello.rotate_cw(degree)  
self.tello.rotate_ccw(degree)  
  
self.tello.move_forward(distance)  
self.tello.move_backward(distance)  
self.tello.move_left(distance)  
self.tello.move_right(distance)  
self.tello.move_up(dist)  
self.tello.move_down(dist)
```

distance和dist的單位為公尺！

所以在測試時，建議distance和dist的數字不要設超過"1"！

修改 tello_control_ui.py

```
import Tkinter as tki
```

```
from Tkinter import Toplevel, Scale
```

改成

```
import tkinter as tki
```

```
from tkinter import Toplevel, Scale
```

修改 tello_control_ui.py

except RuntimeError, e:

改成

```
100         except RuntimeError as e:
```

所有的print全部加括號

```
print('reset distance to %.1f' % self.distance)
```

取像控制

在Tello_Video資料夾內

放入lab05.py

```
import tello
import cv2
import time

def main():
    drone = tello.Tello('', 8889)

    time.sleep(10)

    while(True):
        frame = drone.read()
        frame = cv2.cvtColor(frame, cv2.COLOR_RGB2BGR)

        cv2.imshow("drone", frame)
        key = cv2.waitKey(1)

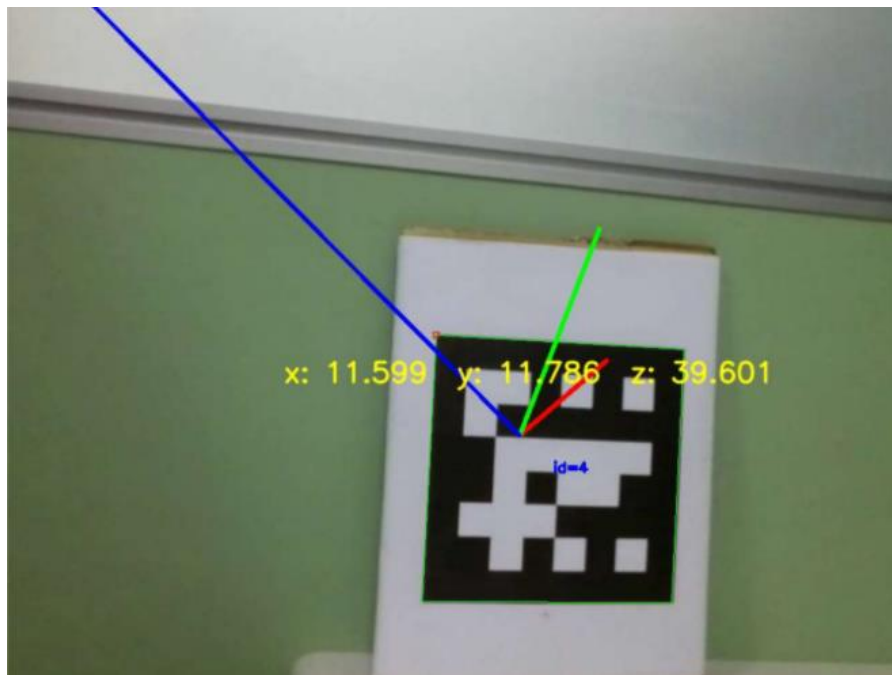
        if key!= -1:
            drone.keyboard(key)

    cv2.destroyAllWindows()

if __name__ == "__main__":
    main()
```

測距離

利用cv2.putText()



測距離

若找不到aruco module

pip install opencv-contrib-python

```
(TWJ_HW2) C:\Users\Raymond\Downloads\Tello-Python-master\Tello-Python-master\Tello_Video>pip list |findstr opencv
opencv-contrib-python 4.5.1.48
opencv-python         4.5.1.48
```

若無人機無法取像，嘗試關閉防火牆 飛完記得打開

