電腦視覺原理及應用簡介

Lab1

Read/Write Images and Videos

Course Information

- Lecture: Thursday 10:00~12:00
- Lab: 9 times (6:00pm~9:00pm)
- Reference books:
  - R. C. Gonzalez, R. E. Woods, Digital Image Processing, Prentice-Hall
  - Shapiro and Stockman, Computer Vision, Prentice-Hall
- TA:
  - 陳思穎 sihying1996@gmail.com
  - 姚雅馨 q121000777@gmail.com
  - **吳泰德 f0966066981@gmail.com(main contact)**
  - 黃宇睿 alucard6686@gmail.com

Lab Sessions

- Upload your file including code and result image after your work is checked by TA.
- If you can not finish your work in time, let the TA know your name and make sure you have attended the lab session.
- If you cannot finish the lab in time (before 9:00pm), we accept make-up results within one week and you can get 70% score.
  - Make-up time :
    - Tuseday 12:00 – 13:00, at ***A308***
- We do not accept make-up demos if you did not attend the lab sessions.

Development Environment

- OS: Windows 10
- Programming Language: Python3.5
- Library : OpenCV
  - How to install opencv library for python?
    - Open Command(or a PowerShell) window
    - Insert the command “pip install opencv-python”

Intro to OpenCV

- OpenCV is an image processing library
- Available on Mac, Windows, Linux
- Works in C, C++, and Python
- Open Source and free.
- Easy to use and install

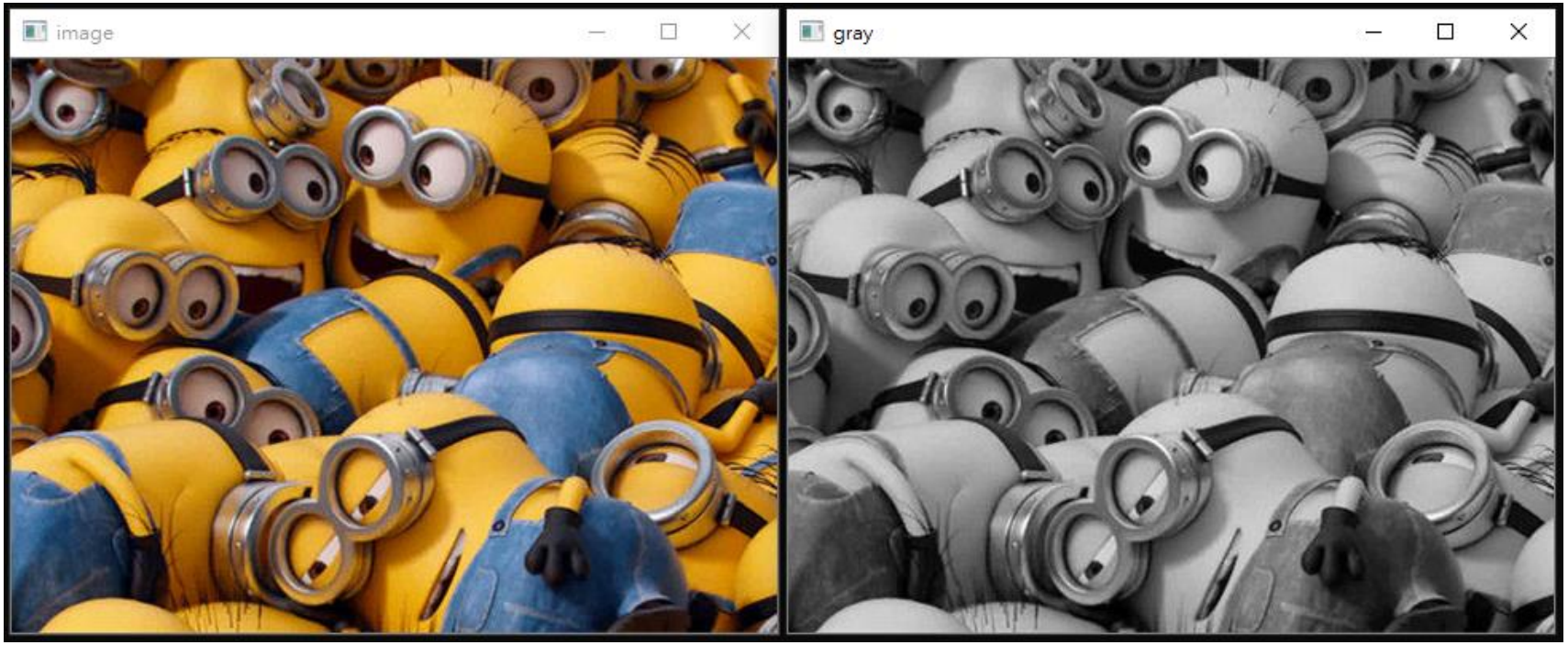
Images

How to Read/Write image

- Read
  - **cv2.imread(file_Name, flag)**
    - *filename:* the image should be in the working directory or a full path of image should be given
    - *flag:* the way image should be read, including ‘cv2.IMREAD_COLORD’, ‘cv2.IMREAD_GRAYSCALE’, ‘cv2.IMREAD_UNCHANGED’
- Display
  - **cv2.imshow(‘window_Name’, image)**
- Write
  - **cv2.imwrite('messigray.png',image)**

Demo

- RGB to Grayscale



How to convert RGB to Grayscale?

- Import main library
- Read the image
- Do the processing
- Show the image
- Close and exit

Cont.

```python
### Import library ###
import cv2
import numpy as np

### Read the image ###
img = cv2.imread('littleMINI.jpg')

### Do the processing ###
row, cols, channels = img.shape
b, g, r = cv2.split(img)
gray = 0.114 * b + 0.587 * g + 0.299 * r
gray = gray.astype(np.uint8)

### Show the image ###
cv2.imshow("gray", gray)
cv2.imshow('image',img)

### Close and exit ###
cv2.waitKey(0)
cv2.destroyAllWindows()
```

Videoes

How to Read/Display video

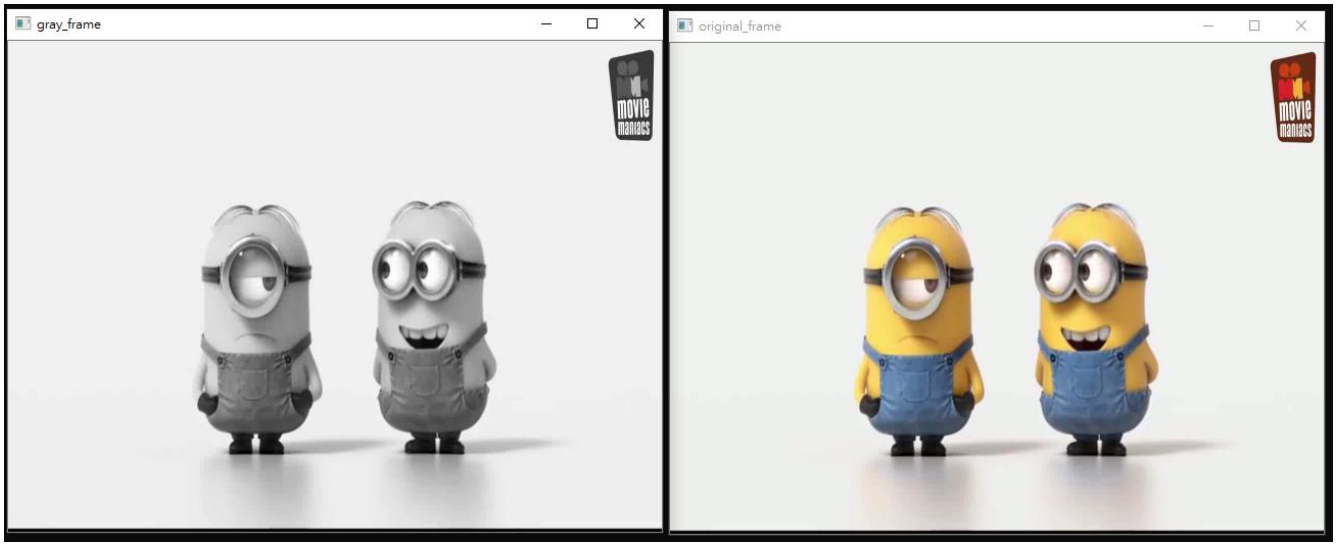
```python
### imoprt library ###
import numpy as np
import cv2

### Capture from camera or Read an video ###
cap = cv2.VideoCapture('CloudFormationVideo.avi')

### Display the frame ###
while(cap.isOpened()):
    ret, frame = cap.read()
    ### Do the processing (convert RGB to grayscale)###
    gray = cv2.cvtColor(frame, cv2.COLOR_BGR2GRAY)
    cv2.imshow('frame',gray)
    if cv2.waitKey(1) & 0xFF == ord('q'):
        break

### Close and Exit ###
cap.release()
cv2.destroyAllWindows()
```

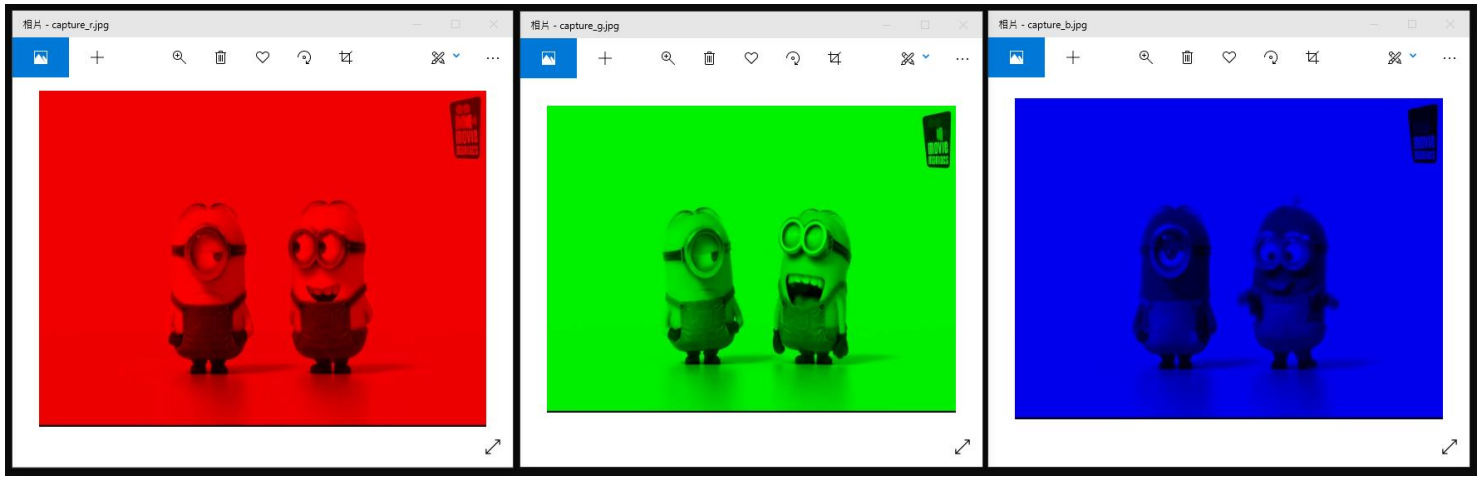
Assignment

- 請至LMS下載影片
- 利用 openCV 讀取影片，並將影片轉為灰階
- 在影片播放時，可以有以下四個功能：
  1. 按 r 的時候，可以將此刻的影片存成紅色圖片
  2. 按 g 的時候，可以將此刻的影片存成綠色圖片
  3. 按 b 的時候，可以將此刻的影片存成藍色圖片
  4. 按 q 的時候，關閉影片

p.s.播放影片時的window name 和存圖片的檔名請加上自己的姓名和學號
e.g. 107522091_陳思穎_Capture_r.png

Demo


gray_frame
original_frame


相片 - capture_r.jpg
相片 - capture_g.jpg
相片 - capture_b.jpg