

School of Computing
National University of Singapore
CS4243 Computer Vision and Pattern Recognition
Semester 1, AY 2014/15

Lab 4: Background Foreground Separation

Objectives:

- Continue to practice OpenCV, and experiment with the averaging technique that we learned in class and use it to do background/foreground separation.

Preparation:

- Download the zip file backgroundForeground.zip into your working directory. Unzip the file and you should find the following: backgroundForeground.pdf, traffic.avi.

Part 0. Initialisation

- Create a python script file called bgfg.py. Follow the rest of this lab instruction sheet to develop the script.
- Set the working directory, e.g., `d:/myname`, and import relevant modules.

```
import os
os.chdir("d:/myname")
import cv2
import cv2.cv as cv
import numpy as np
```

Part 1. Background-Foreground Separation in Video

Write a program to do background-foreground separation in video using the following hints:

- Step 1: read the .avi video using the OpenCV Python API `cv2.VideoCapture`
- Step 2: print the frame width, frame height, frames per second and frame count of the input video using `cap.get`
- Step 3: convert frame width, frame height, frames per second and frame count into integers using `int()`
- Step 4: get the background object by averaging away the foreground (i.e. moving) objects using the following suggested codes:

```
_,img = cap.read()
avgImg = np.float32(img)
```

```

for fr in range(1,frameCount):
    _,img = cap.read()
    alpha = 1/float(fr+1)
    cv2.accumulateWeighted(img,avgImg,alpha)
    normImg = cv2.convertScaleAbs(avgImg) # convert into uint8 image
    cv2.imshow('img',img)
    cv2.imshow('normImg', normImg)
    print "fr = ", fr, " alpha = ", alpha
cv2.waitKey(0)
cv2.destroyAllWindows()

```

- Step 5: Extract the foreground objects using the following suggested codes:

```

cap = cv2.VideoCapture("/--- your directory ---/traffic.avi")
grAvgImg = cv2.cvtColor(normImg, cv2.COLOR_BGR2GRAY)
for fr in range(frameCount):
    _,img = cap.read()
    grImg = cv2.cvtColor(img, cv2.COLOR_BGR2GRAY)
    diffImg = cv2.absdiff(grImg, grAvgImg)
    thresh, biImg = cv2.threshold(diffImg, 0, 255,
cv2.THRESH_BINARY+cv2.THRESH_OTSU)
    fg = cv2.dilate(biImg, None, iterations = 2)
    bgtemp = cv2.erode(biImg, None, iterations=3)
    thresh2, bg = cv2.threshold(bgtemp, 2, 255, cv2.THRESH_BINARY_INV)
    res = cv2.bitwise_and(img, img, fg, fg)
    cv2.imshow('foreground', res)
    cv2.waitKey(100)
    fg = res
    cv2.imshow('Binarized Image', biImg)
    cv2.waitKey(0)
    cv2.imshow('foreground Image', fg)
    cv2.waitKey(0)
    cv2.imshow('background image', bg)

```

```
cv2.waitKey(0)
cv2.destroyAllWindows()
cap.release()
```

Part 2. Submit your python code, explain the functions used, and write down and explain the equation used to do the averaging.

Submission Instruction

Submit the following to the TA at the end of the lab session:

1. Show the video output (background and foreground objects) to the TA
2. Capture a snapshot of the background and print it on hardcopy
3. Capture a snapshot of the foreground objects and print it on hardcopy
4. Submit the hardcopy printout of your python code

Submit also the softcopy of your Python code to IVLE.

Please put your python code in a folder and submit the folder. Use the following convention to name your folder:

MatriculationNumber_yourName_Lab#. For example, if your matriculation number is A1234567B, and your name is Chow Yuen Fatt, for this lab, your file name should be A1234567B_ChowYuenFatt_Lab4.

Remember to write your name on the hardcopy print-outs.