Group Project 2

October 20, 2019

[ ]:
```
# 3. Use your webcam and record a movie, write a motion detection code and␣
 ↪print the message "Motion Detected" on the
#    original frame. Try to make a better visualization by using different␣
 ↪masking.
import cv2
import numpy as np
import matplotlib.pyplot as plt
cv2.ocl.setUseOpenCL(False) #added to try and fix jupyter crashing with␣
 ↪imshow().

video_filepath = "/Users/adam/Desktop/example_motion480.mov"

cap=cv2.VideoCapture(video_filepath) # import video capture

return1, frame1=cap.read() #first frame reference
return2, frame2=cap.read() #second frame reference

while True:
    #get gray scales
    frame1_gray=cv2.cvtColor(frame1, cv2.COLOR_BGR2GRAY)
    frame2_gray=cv2.cvtColor(frame2, cv2.COLOR_BGR2GRAY)

    #get gaussian blurs
    frame1_blur=cv2.GaussianBlur(frame1_gray, (21, 21), 0)
    frame2_blur=cv2.GaussianBlur(frame2_gray, (21, 21), 0)

    frames_diff = cv2.absdiff(frame1_blur, frame2_blur) #get difference between␣
 ↪frames

    #various filters provided in lecture
    thresh = cv2.threshold(frames_diff,20,255,cv2.THRESH_BINARY)[1]
    final = cv2.dilate(thresh, None, iterations=2)
    masked = cv2.bitwise_and(frame1,frame1, mask=thresh)

    #calculate motion example
    white_pixels=np.sum(thresh)/255
```

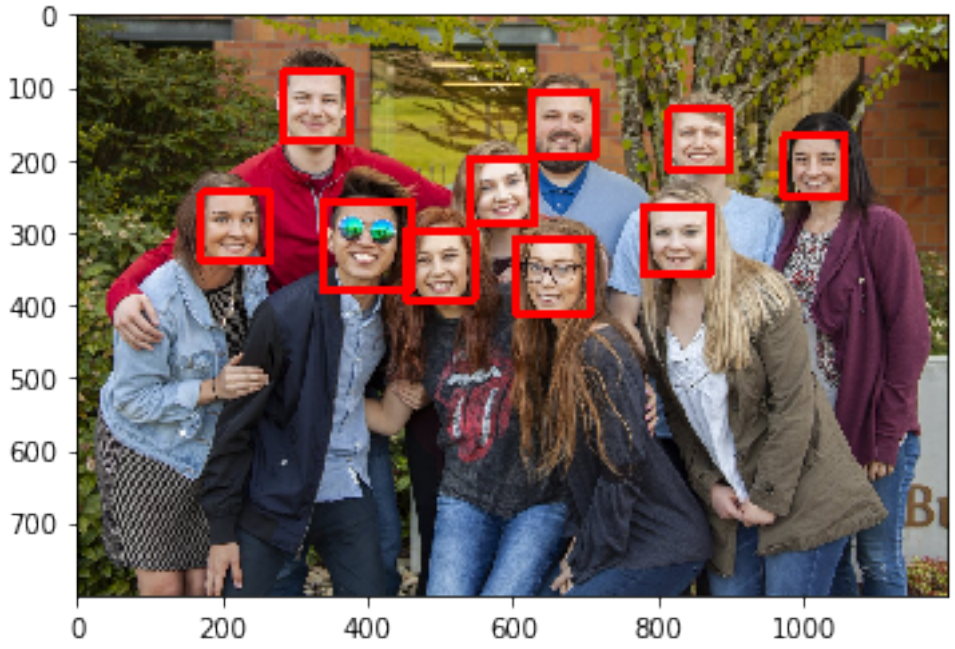
```
    rows,cols = thresh.shape
    total=rows*cols

    #if detected -> output text indicating such
    if white_pixels > 0.01*total:
        font = cv2.FONT_HERSHEY_PLAIN
        cv2.putText(frame1, "Motion Detected!",(10,50),font,1,(0,0,255),2,cv2.
 ↪LINE_AA)

    #output image frame.
    cv2.imshow("Example Motion Video", frame1)

    #update frames iteratively
    frame1 = frame2
    returns, frame2 = cap.read()

    #break if no remaining reads
    if not returns:
        break

    #get input from user or if window is exited end loop
    k = cv2.waitKey(10) & 0xff
    if k == 2 or cv2.getWindowProperty("Example Motion Video", 0) < 0:
        break

# handle closing of windows. At least on my Mac, still has issue where a Python␣
 ↪session attached to the
# opened video window stays active and blocks Jupyter execution until it is␣
 ↪manually closed outside Jupyter
cv2.waitKey(0)
cv2.destroyAllWindows()
cap.release()
```

[2]:
```
# 4. Use a group picture of a minimum of 4 faces and try to detect as many as␣
 ↪faces that you can.
#    Draw red rectangle around the detected faces.

import cv2
import numpy as np
import matplotlib.pyplot as plt

image_filepath = "/Users/adam/Desktop/group_image.png"

# load image
test_image = cv2.imread(image_filepath)

# convert image to gray scale
```

```
test_image_gray = cv2.cvtColor(test_image, cv2.COLOR_BGR2GRAY);

# output the image
plt.imshow(test_image_gray, cmap='gray')

# import haar cascade face from repo provided in lecture notes
haar_cascade_face = cv2.CascadeClassifier('/Users/adam/Desktop/
 ↪Face-Detection-in-Python-using-OpenCV/data/haarcascades/
 ↪haarcascade_frontalface_alt2.xml')

# detect multiple faces
faces_rects = haar_cascade_face.detectMultiScale(test_image_gray, scaleFactor =␣
 ↪1.2, minNeighbors = 5);

# output number of faces detected
print('# Of Faces found: ', len(faces_rects))

# loop through each face and draw a rectangle to image
for (x,y,w,h) in faces_rects:
     cv2.rectangle(test_image, (x, y), (x+w, y+h), (0, 0, 255), 10)  # BGR SO␣
 ↪0,0,255 is red

# convert image back to RGB color
plt.imshow(cv2.cvtColor(test_image, cv2.COLOR_BGR2RGB))
```

```
# Of Faces found:  10
```

[2]: <matplotlib.image.AxesImage at 0x10cd001d0>



[ ]: