“COMPUTER VISION”

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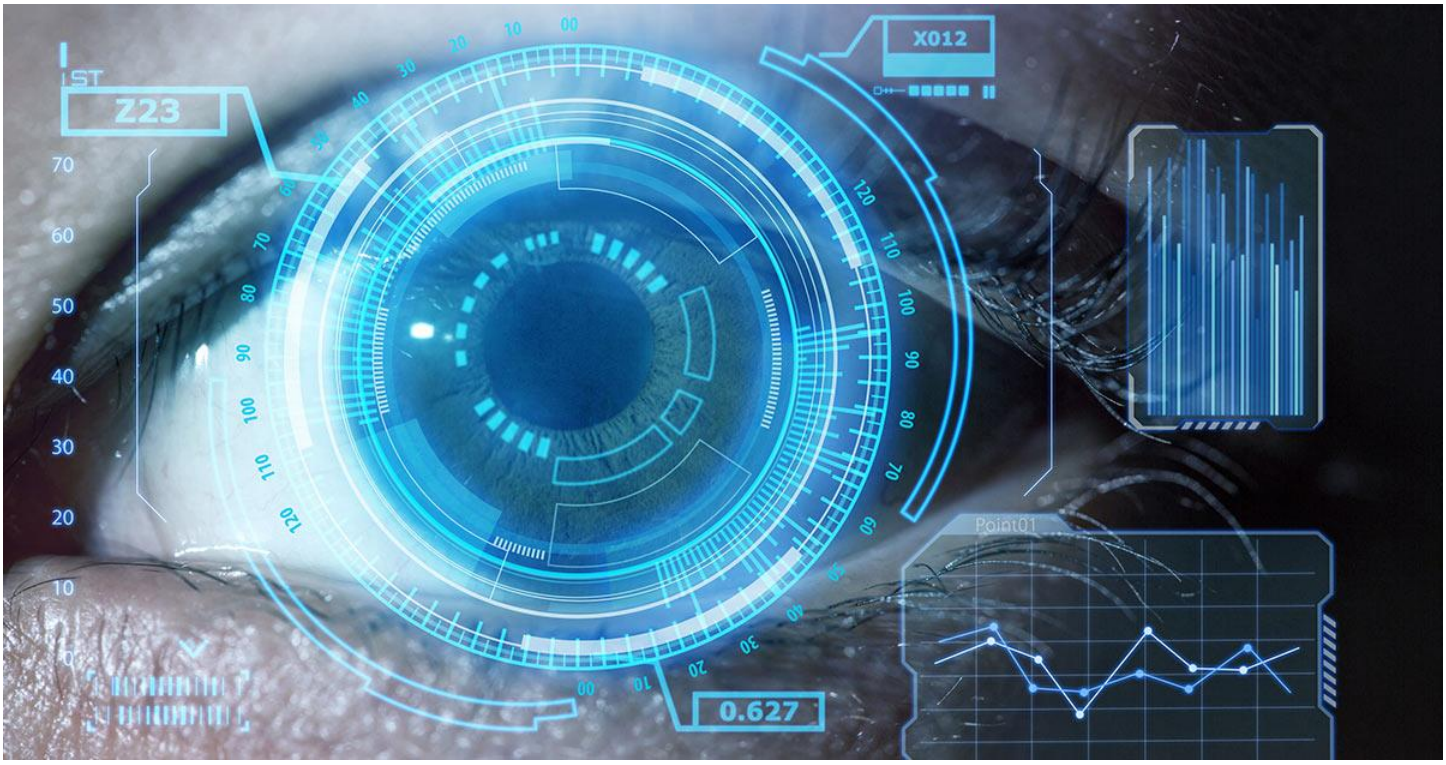

SESSION NO.“3”

- OPENCV LIBRARY
  1. Opening & Saving photos
  2. Read videos
  3. Write videos
  4. Photo basics
  5. Drawing shapes

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1. Opening & Saving photos

```
"""
First look at openCv and starting by:
1- opening the image
2- exploring other methods
3- saving image in other format
"""
import cv2
###? preparing OpenCV ###

#! Don't use single quote (') in the image path
IMG_PATH = "images\khwarizmy.jpg"

image = cv2.imread(IMG_PATH)

print("Shape: {}".format(image.shape))  # (height, width, 3)
print("height: {} pixels".format(image.shape[0]))
print("width: {} pixels".format(image.shape[1]))
print("channels: {}".format(image.shape[2]))

cv2.imshow('The Image', image)
cv2.waitKey(0)

print(cv2.imwrite('images\mod.png', image))
```

2. Read videos

```
import cv2


# ? can be used with:
# 1- webcam
# 2- local video File
# 3- ip camera

# **  1- webcam  **
video = cv2.VideoCapture(0)
while True:
    grabbed, frame = video.read()
    frame = cv2.resize(frame, (800, 500))

    if cv2.waitKey(1) & 0xFF == ord('q'):
        break

    cv2.imshow('video', frame)

video.release()
```

```python
cv2.destroyAllWindows()

# * ==========================================

# **  2- local video File  **
video = cv2.VideoCapture("images/road.webm")

# Video Properties : #? CAP_PROP_*
#!READ THIS:
# https://docs.opencv.org/2.4/modules/highgui/doc/reading_and_writing_images_and_video.html#videocapture-get


print('==========================================')
fps = int(video.get(cv2.CAP_PROP_FPS))
frames_num = int(video.get(cv2.CAP_PROP_FRAME_COUNT))
w = int(video.get(cv2.CAP_PROP_FRAME_WIDTH))
h = int(video.get(cv2.CAP_PROP_FRAME_HEIGHT))

print(fps, "FPS")
print(frames_num, "Frames")
print("Width:",  w)
print("Height:", h)
print('Duration: {} seconds'.format(frames_num // fps))
print('==========================================')


# ? another way
while video.isOpened():
    graped, frame = video.read()
    key = cv2.waitKey(1)
    if (key & 0xFF) == ord('q') or not graped:
        break

    if (key & 0xFF) == ord('0'):
        video.set(cv2.CAP_PROP_POS_FRAMES, 0)

    cv2.imshow("video", frame)

    cv2.waitKey(fps)  # ? 30 FPS ==> 1 frame per 0.033 second ==> 30 ms


* ========================================== *


**  3- ip camera  **
video = cv2.VideoCapture(
    "http://217.126.89.102:8010/axis-cgi/mjpg/video.cgi")
```

3. Write videos

```
import cv2
import webbrowser


#! READ THIS:
# http://www.fourcc.org/codecs.php
# https://docs.opencv.org/2.4/modules/highgui/doc/reading_and_writing_images_and_video.html#cv2.VideoWriter.open


video = cv2.VideoCapture('images/pepole.gif')

# ? Python: cv2.VideoWriter(filename, fourcc, fps, frameSize[, isColor])

codec = cv2.VideoWriter_fourcc(*'mp4v')  # same as ('X', 'V', 'I', 'D')
fps = int(video.get(cv2.CAP_PROP_FPS))
frames_num = int(video.get(cv2.CAP_PROP_FRAME_COUNT))
w = int(video.get(cv2.CAP_PROP_FRAME_WIDTH))
h = int(video.get(cv2.CAP_PROP_FRAME_HEIGHT))
colored_video = True

writer = cv2.VideoWriter('ped.mp4', codec, fps, (w, h), colored_video)

# # ? another way
while video.isOpened():
    graped, frame = video.read()
    key = cv2.waitKey(1)
    if (key & 0xFF) == ord('0') or not graped:
        break

    writer.write(frame)
    cv2.imshow("video", frame)

#     #! I don't need to wait because I don't need to see the original video
#     # cv2.waitKey(fps)


writer.release()
video.release()
webbrowser.open('ped.mp4')


# ? Backward Video
original_video = cv2.VideoCapture('E:\Work\OpenCV\OpenCV-in-Arabic-for-Beginners-master\OpenCV-in-Arabic-for-Beginners-master\images/pepole.gif')

codec = cv2.VideoWriter_fourcc(*'mp4V')
```

```
fps = int(original_video.get(cv2.CAP_PROP_FPS))
frames_num = int(original_video.get(cv2.CAP_PROP_FRAME_COUNT))
w = int(original_video.get(cv2.CAP_PROP_FRAME_WIDTH))
h = int(original_video.get(cv2.CAP_PROP_FRAME_HEIGHT))
colored_video = True

writer_backward = cv2.VideoWriter('ped_backward.mp4', codec, fps, (w, h), True)

frame_index = original_video.get(cv2.CAP_PROP_FRAME_COUNT) - 1

while frame_index > -1:
    original_video.set(cv2.CAP_PROP_POS_FRAMES, frame_index)
    graped, frame = original_video.read()

    key = cv2.waitKey(1)
    if (key & 0xFF) == ord('q') or not graped:
        break

    writer_backward.write(frame)
    frame_index -= 1

writer_backward.release()
original_video.release()
webbrowser.open('ped_backward.mp4')
```

4. Photos basics

THIS IS ONLY FOR UNDERSTANDING

5. Drawing shapes

```
import numpy as np
import cv2

RED = (0, 0, 255)
GREEN = (0, 255, 0)
BLUE = (255, 0, 0)

image = cv2.imread(
    "E:\Work\OpenCV\OpenCV-in-Arabic-for-Beginners-master\OpenCV-in-Arabic-for-Beginners-
master\images\khwarizmy.jpg")
cv2.imshow("Croped", image[200:300, 200:500])
cv2.waitKey(0)
```

```
###? Image ###
canvas = np.zeros((300, 300, 3), dtype="uint8")
cv2.imshow('Canvas', canvas)
cv2.waitKey(0)

###? Lines ###
cv2.line(canvas, (0, 0), (300, 300), RED, 1)
cv2.imshow('Red Line Canvas', canvas)
cv2.waitKey(0)

cv2.line(canvas, (300, 0), (0, 300),  GREEN, 30)
cv2.imshow('Red X Green Lines Canvas', canvas)
cv2.waitKey(0)

###? Rectangle ###
cv2.rectangle(canvas, (100, 100), (200, 200),  BLUE, -1)
cv2.imshow('Blue Regtangle Canvas', canvas)
cv2.waitKey(0)

###? Circle ###
center = canvas.shape[1] // 2, canvas.shape[0] // 2
cv2.circle(canvas, center, 55, GREEN, -1)
cv2.imshow('Circle Canvas', canvas)
cv2.waitKey(0)

###? Bullseye ###
for r in range(25, 151, 25):
    cv2.circle(canvas, center, r, (255, 100, 255))
cv2.imshow('BullEyes Canvas', canvas)
cv2.waitKey(0)


print(type(np.random.randint(0, high=256, size=(3,)).tolist()[0]))
print(type(np.random.randint(0, high=256, size=(3,))[0]))

for i in range(0, 25):
    radius = np.random.randint(5, high=200)
    color = np.random.randint(0, high=256, size=3).tolist()
    pt = np.random.randint(0, high=300, size=(2,)).tolist()
    cv2.circle(canvas, tuple(pt), radius, color, -1)

cv2.imshow("Random Circles Canvas", canvas)
cv2.waitKey(0)
```

WITH MY BEST WISHES

ENG/AHMED MUBARAK 😉