Halcon實例轉OpenCV--低對比度圖像中提取圓形輪廓(附源碼)

原創 色彩空間 OpenCV與AI深度學習 今天

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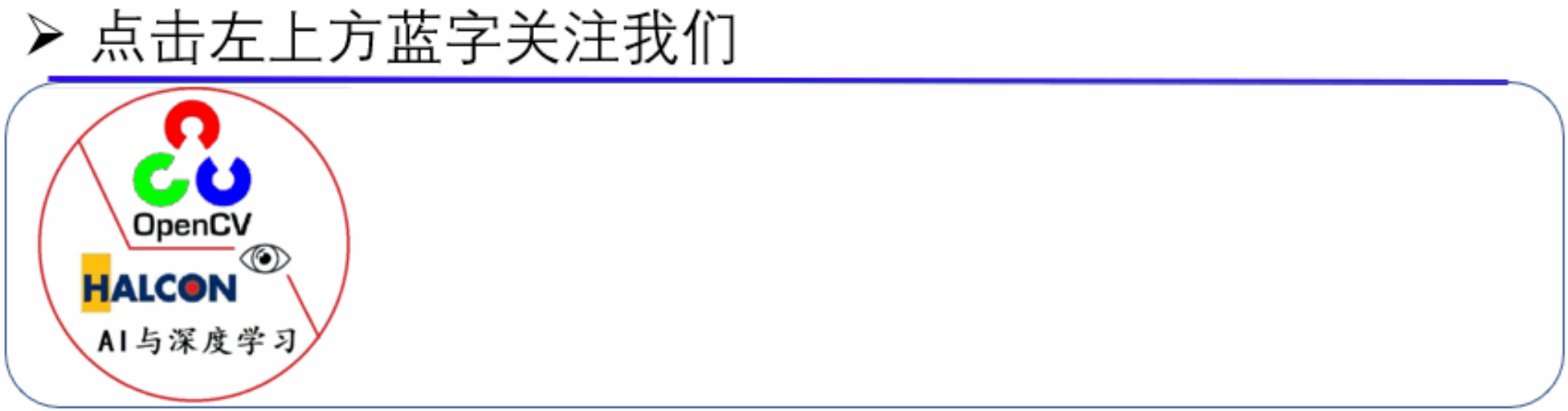


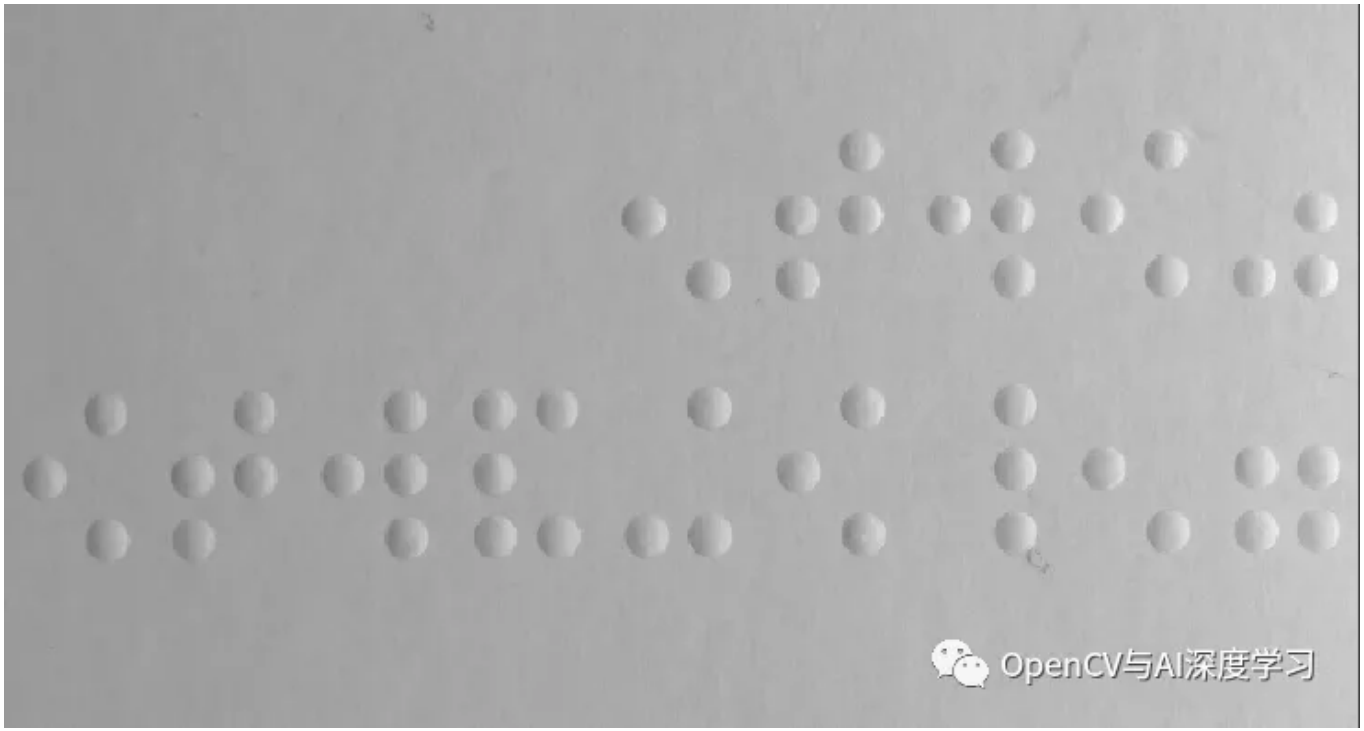
導讀

本文主要介紹一個在低對比度圖像中提取圓形輪廓的實例，並將Halcon實現轉為OpenCV

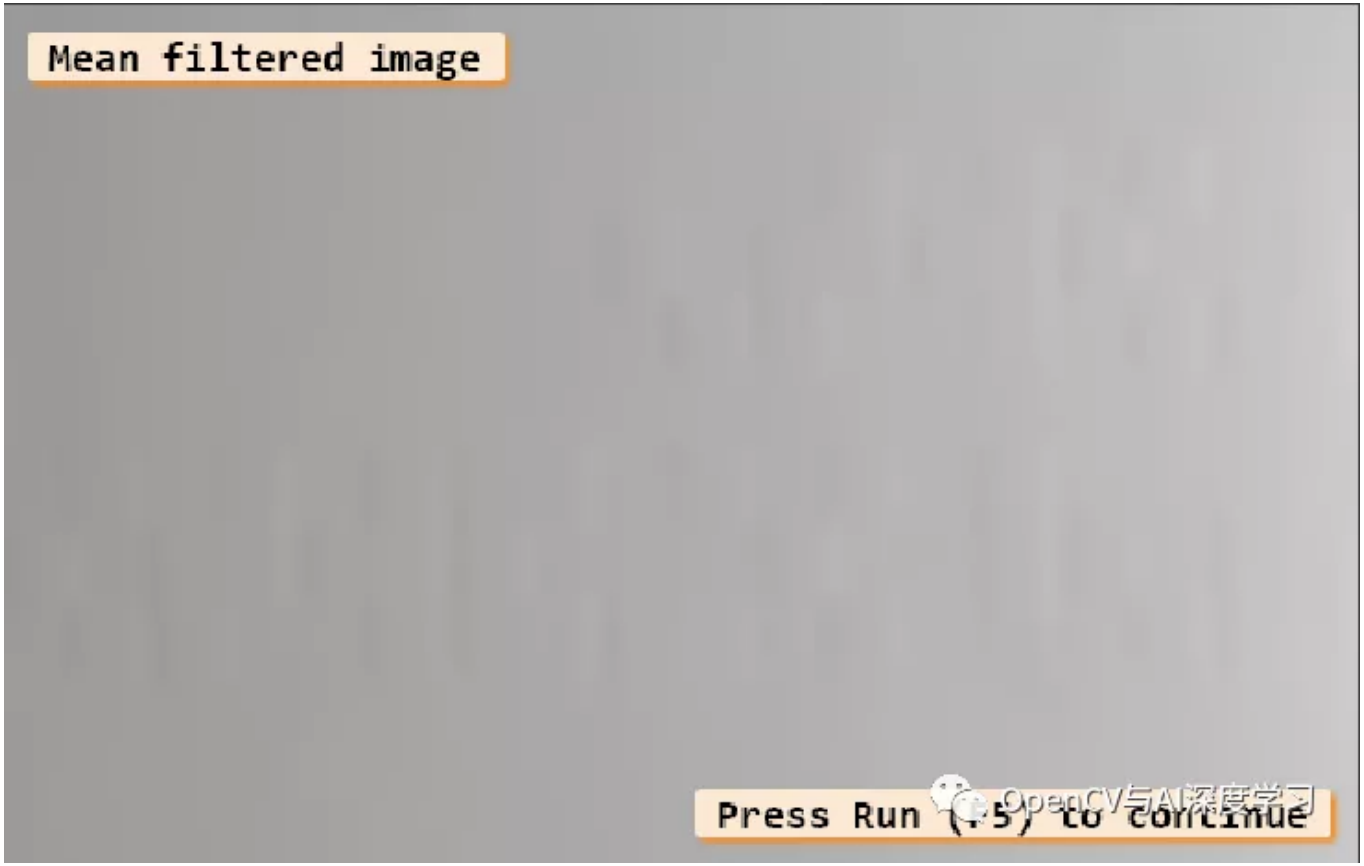
實例來源

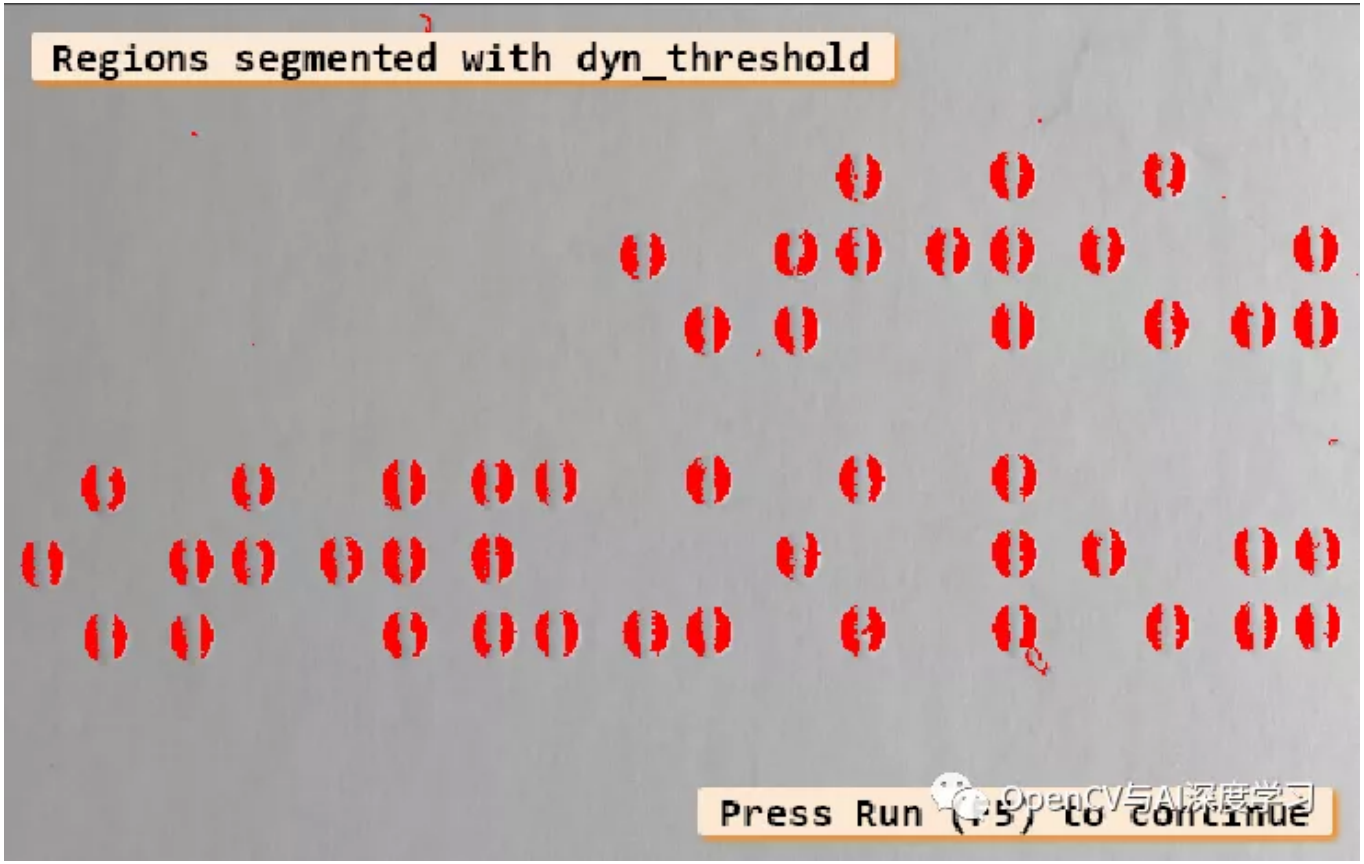
Halcon例程dyn_threshold.hdev--動態閾值算子使用實例。

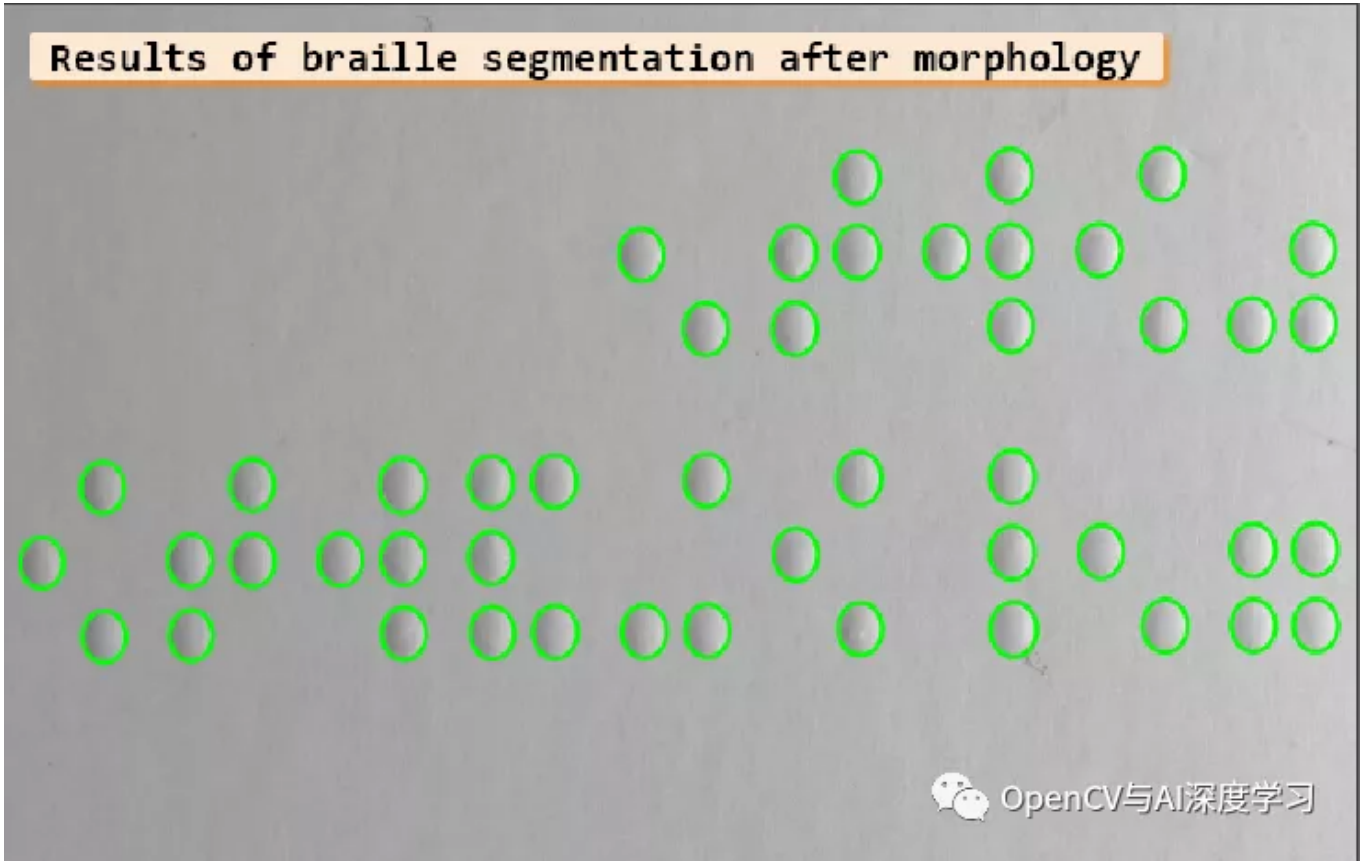
原圖：



Halcon實現效果：







OpenCV實現步驟與代碼

實現步驟:

【1】dyn_threshold操作替代--均值濾波+圖像差分+閾值提取

【2】圓形結構元素閉運算+開運算

【3】輪廓查找+最小外接圓

【4】標註結果：圓心+外圓輪廓

逐步效果演示與代碼:

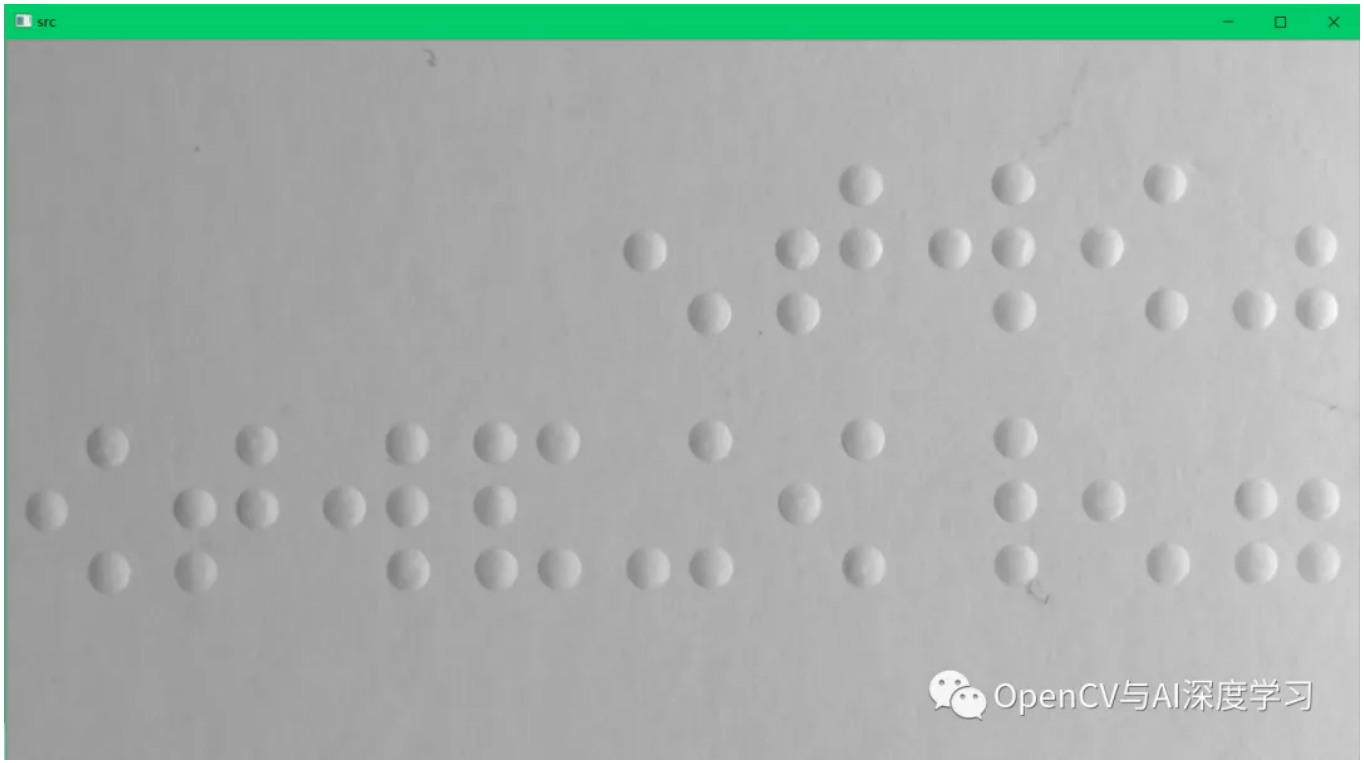
完整源碼：

```
#--公众号：OenCV与AI深度学习
#--Author:Color Space
import numpy as np

import cv2

font=cv2.FONT_HERSHEY_SIMPLEX

img = cv2.imread('embossed_01.png')

cv2.imshow('src', img)

gray = cv2.cvtColor(img, cv2.COLOR_BGR2GRAY)

blur = cv2.blur(gray, (50,50))

cv2.imshow('blur', blur)

diff = cv2.absdiff(gray, blur)

cv2.imshow('diff', diff)

ret,thres = cv2.threshold(diff,15,255,cv2.cv2.THRESH_BINARY)
```

```
24
25 cv2.imshow('thres', thres)
26
27 k1 = np.zeros((19, 19),np.uint8)
28 cv2.circle(k1,(9,9),9,(1,1,1),-1,cv2.LINE_AA)
29
30 closing = cv2.morphologyEx(thres, cv2.MORPH_CLOSE, k1, None, None, 1)#闭运算
31 cv2.imshow('closing',closing)
32
33 k2 = np.zeros((13, 13),np.uint8)
34 cv2.circle(k2,(6,6),6,(1,1,1),-1,cv2.LINE_AA)
35
36 opening = cv2.morphologyEx(closing, cv2.MORPH_OPEN, k2, None, None, 1)#闭运算
37 cv2.imshow('opening',opening)
38
39 contours,hierarchy = cv2.findContours(opening, cv2.RETR_EXTERNAL, cv2.CHAIN_APPROX_NONE)
40 count = 0
41 for cnt in contours:
42   center,radius = cv2.minEnclosingCircle(cnt)
43   if radius < 5:
44     continue
45   count = count + 1
46   cv2.circle(img,(int(center[0]),int(center[1])),int(radius),(0,255,0),2)
47   cv2.drawMarker(img,(int(center[0]),int(center[1])),(0,0,255),
48                      cv2.MARKER_CROSS, 15,1,8)
49 strCount = "count = %d" % count
50 cv2.putText(img,strCount,(10,30),font,1.0,(255,0,0),2)
```

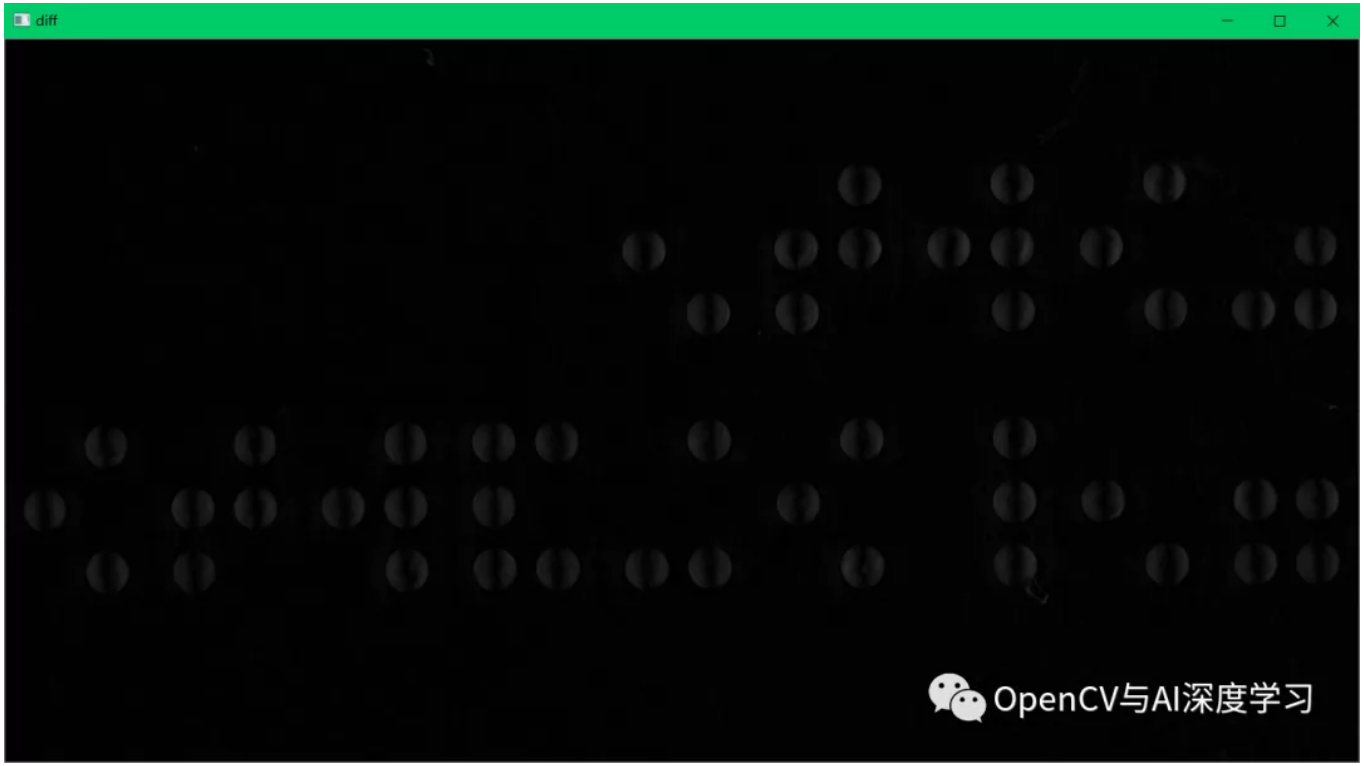
```
51
52 cv2.imshow('result', img)
53 cv2.imwrite('result.jpg', img)
54
55 cv2.waitKey(0)
56 cv2.destroyAllWindows()
```

原圖：

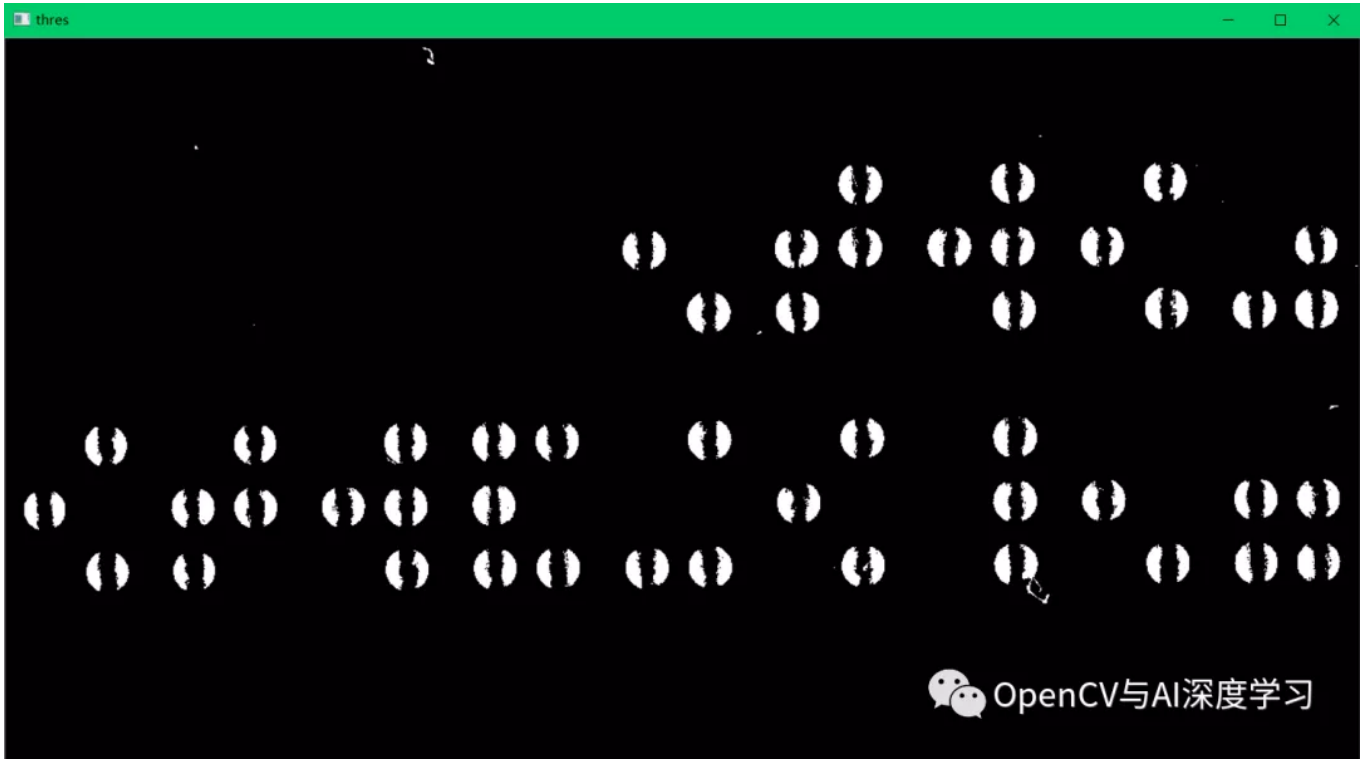


均值濾波結果圖：

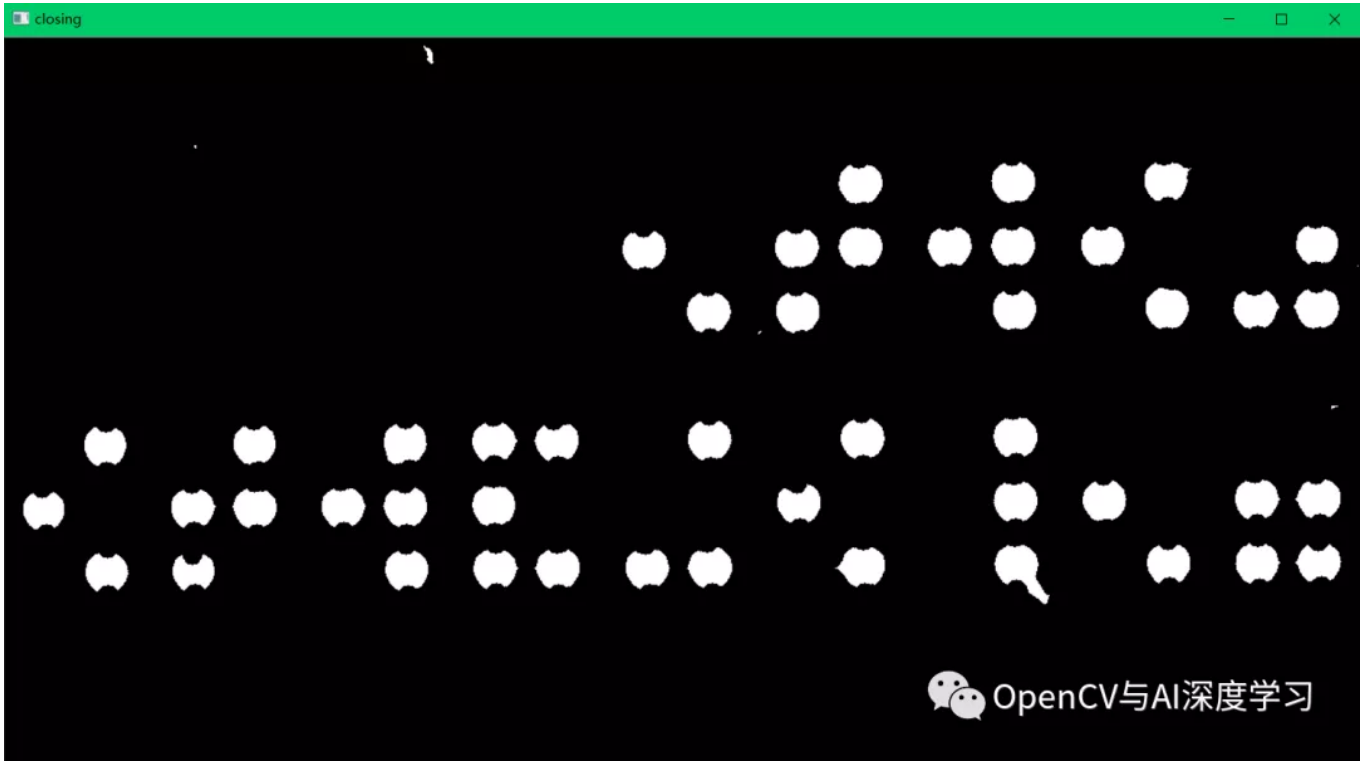
差分圖像：



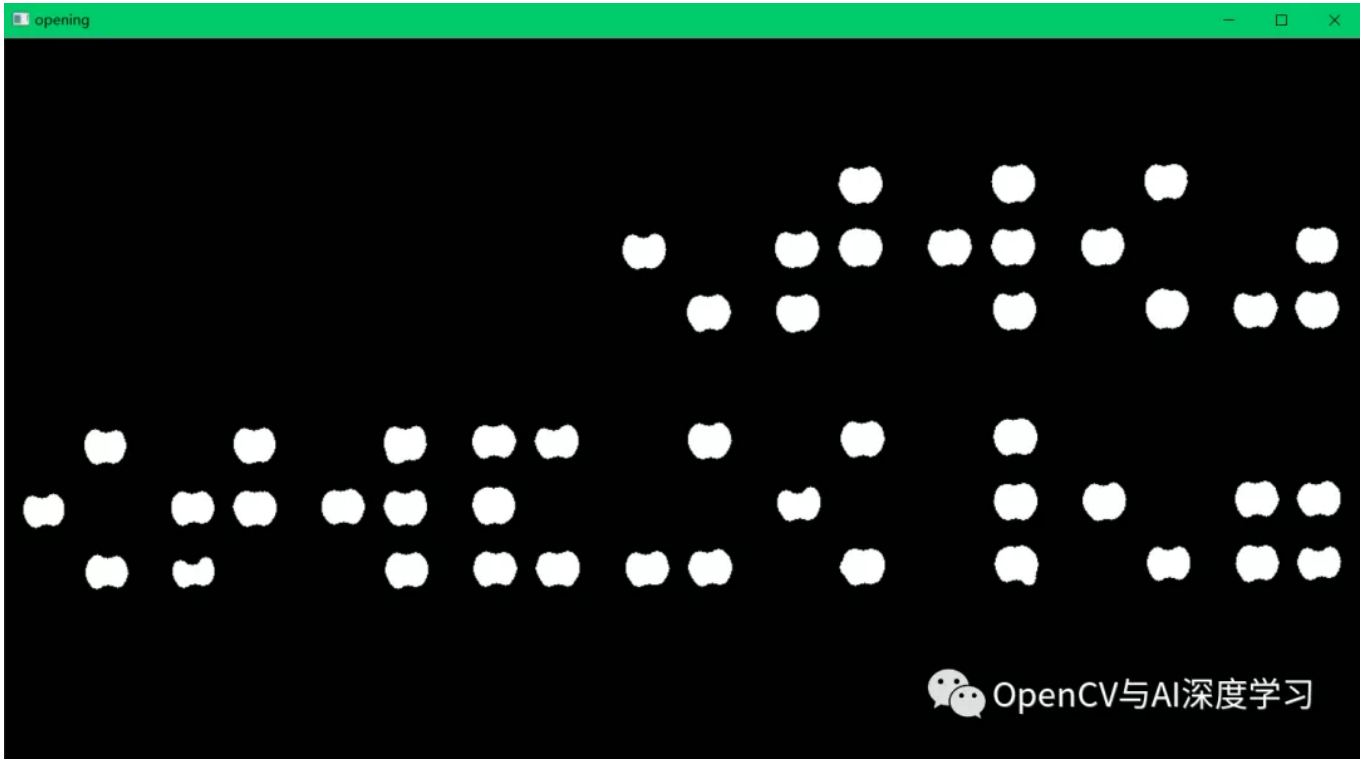
閾值結果：



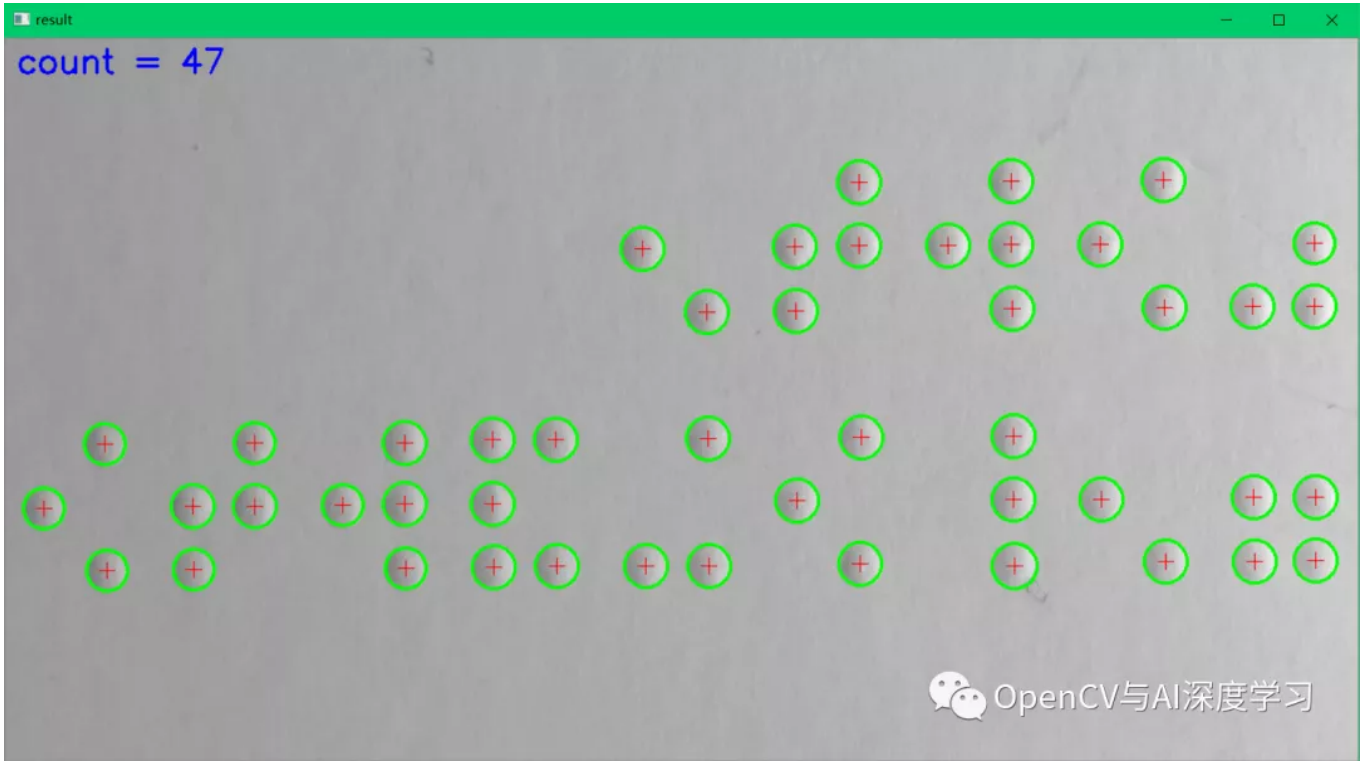
閉運算結果：



開運算結果：



最終結果：



C++與C#實現源碼及素材，如有需要可在知識星球中獲取。

歡迎加入

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