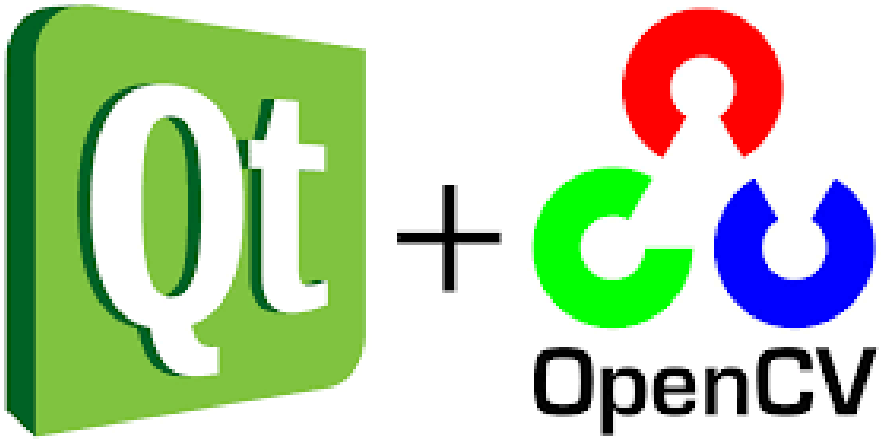
數位影像處理概論



使用 Qt + OpenCV+ MediaPipe 實作

資工三甲

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楊孟繁學

目錄

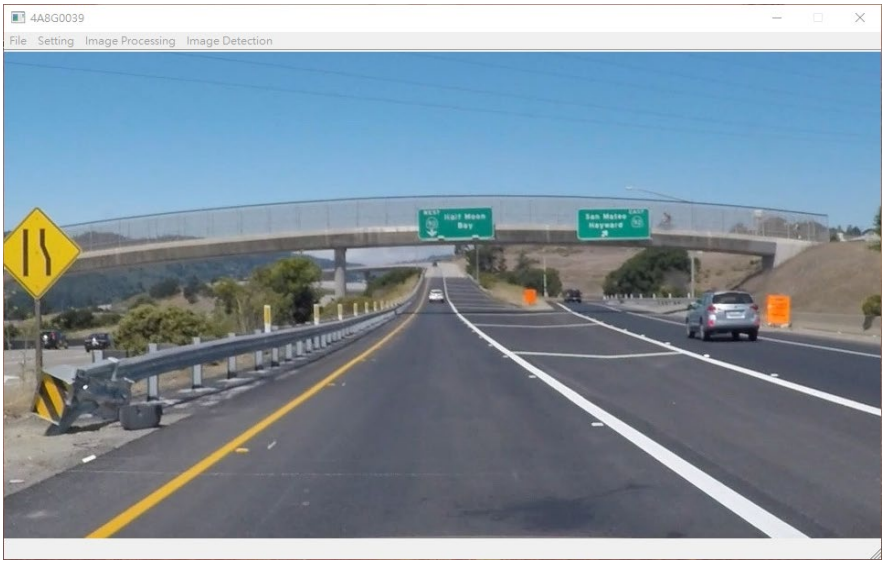
HW3

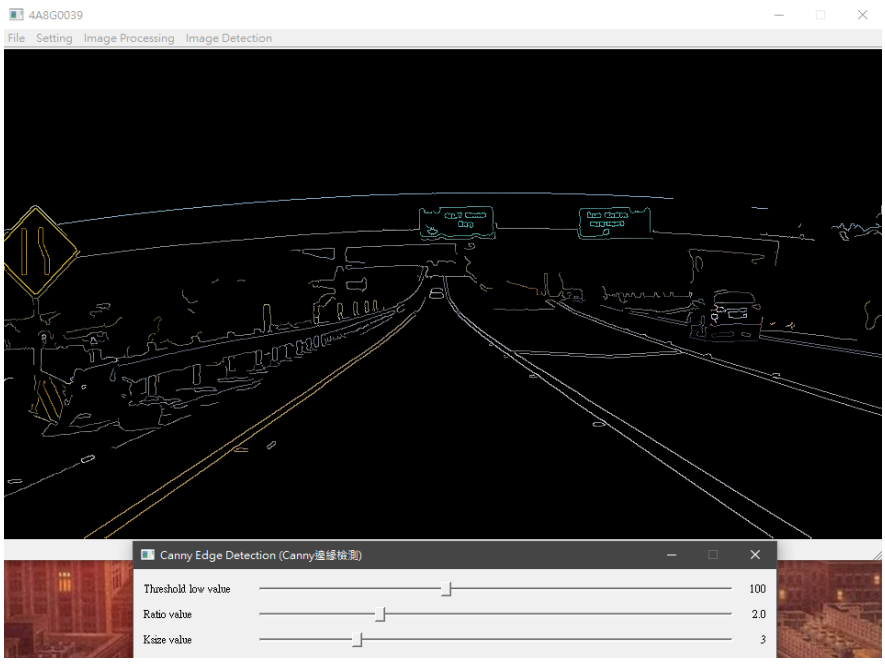
GitHub 連結

Canny Edge Detection (Canny 邊緣檢測)

使用 cv2.Canny()抓取物件邊緣。

Threshold low value： 最低閥值
Ratio value： 高低閥值比
Ksize value： 模糊內核大小





Hough Line Transform (霍夫轉換)

使用 cv2.Canny()抓取物件邊緣後再使用 cv2.HoughLines()或 cv2.HoughLinesP()找出圖中的直線。

Canny Edge Detection :

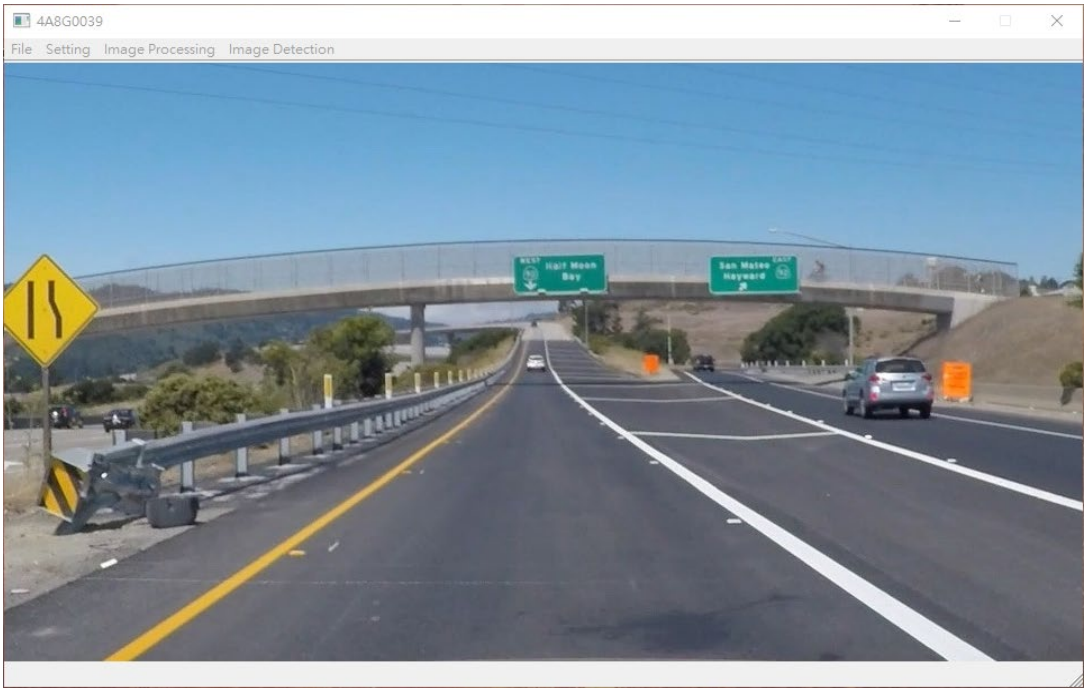
Threshold low value : 最低閥值

Ratio value : 高低閥值比

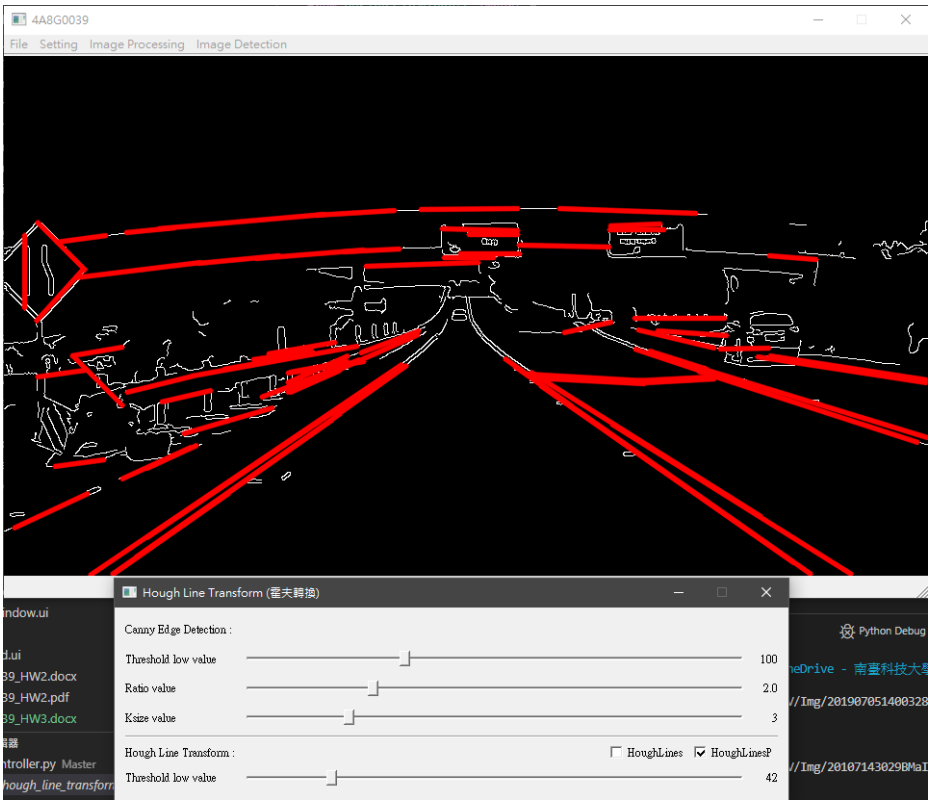
Ksize value : 模糊內核大小

Hough Line Transform :

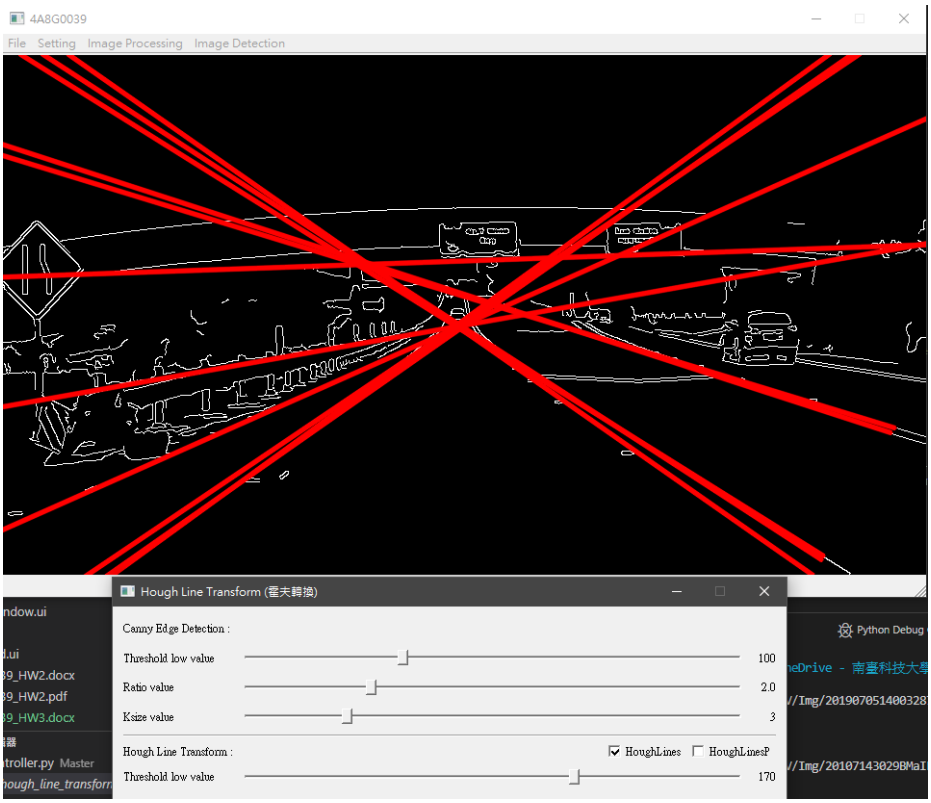
Threshold low value : 最低閥值



HoughLinesP



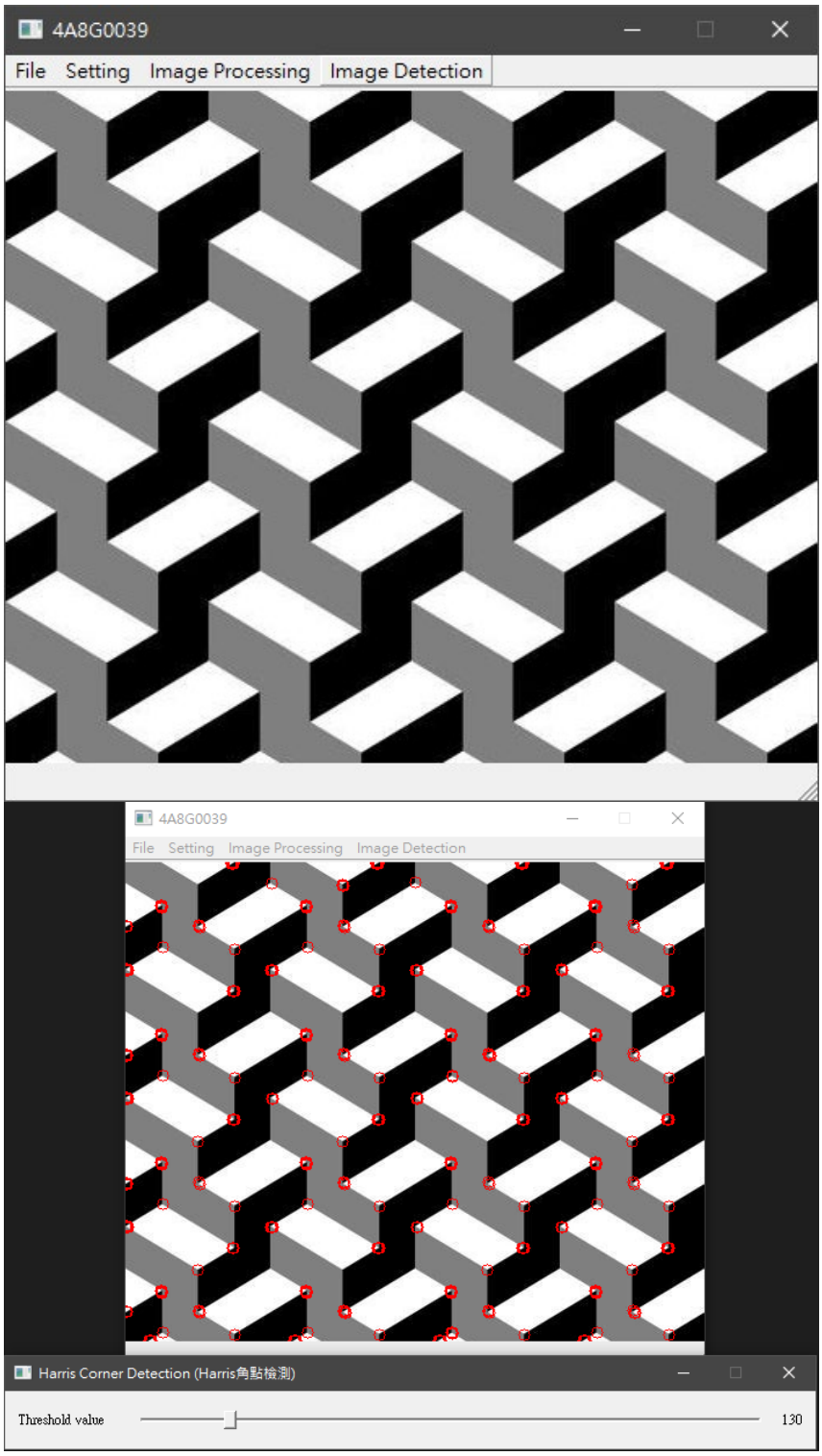
HoughLines



Harris Corner Detection (Harris 角點檢測)

使用 cv2.cornerHarris()找出圖中的角並圈出來。

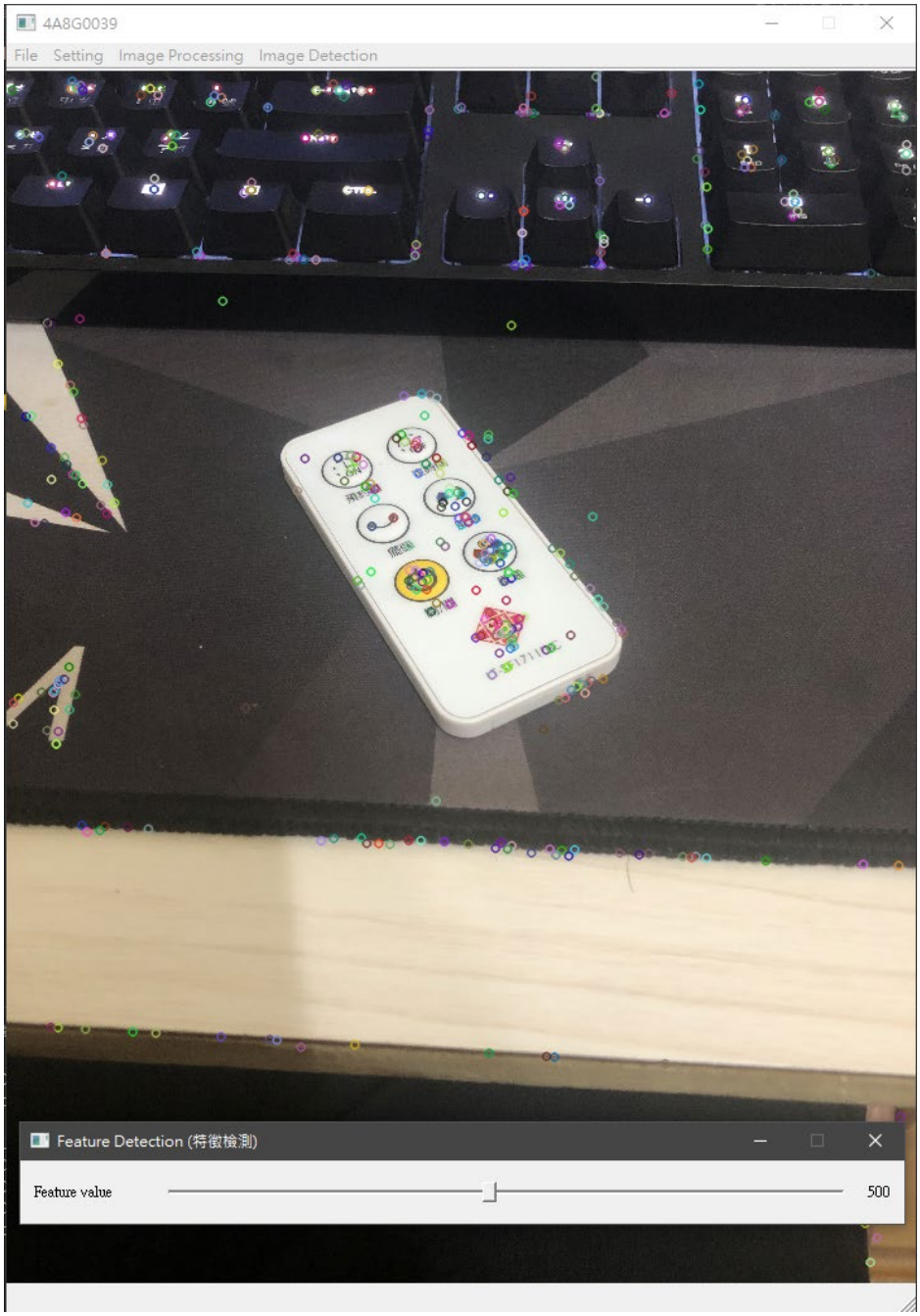
Threshold value： 閥值



Feature Detection (特徵檢測)

使用 cv2.SIFT_create()找出圖中的特徵點並圈出來。

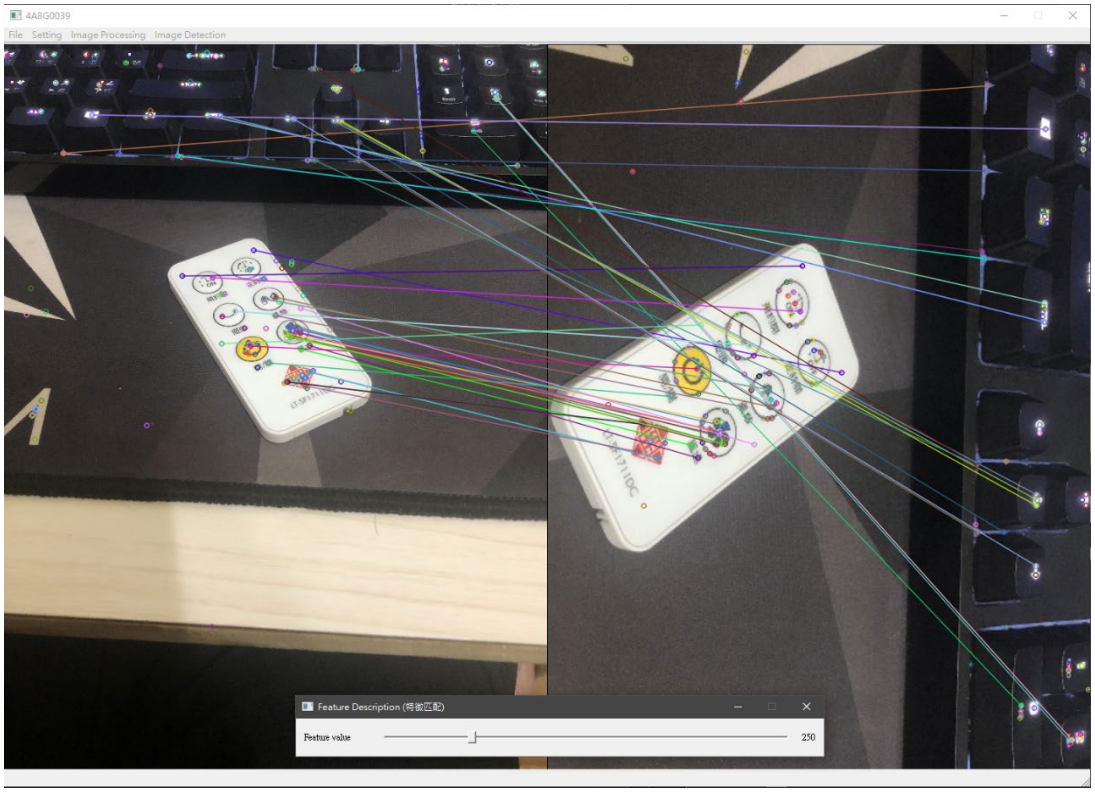
Feature value： 特徵點數量



Feature Description (特徵匹配)

使用 cv2.SIFT_create()找出圖中的特徵點並圈出來，
再用 cv2.BFMatcher()比對兩張圖的特徵點，
最後再把權重較高的對應點連起來。

Feature value： 特徵點數量



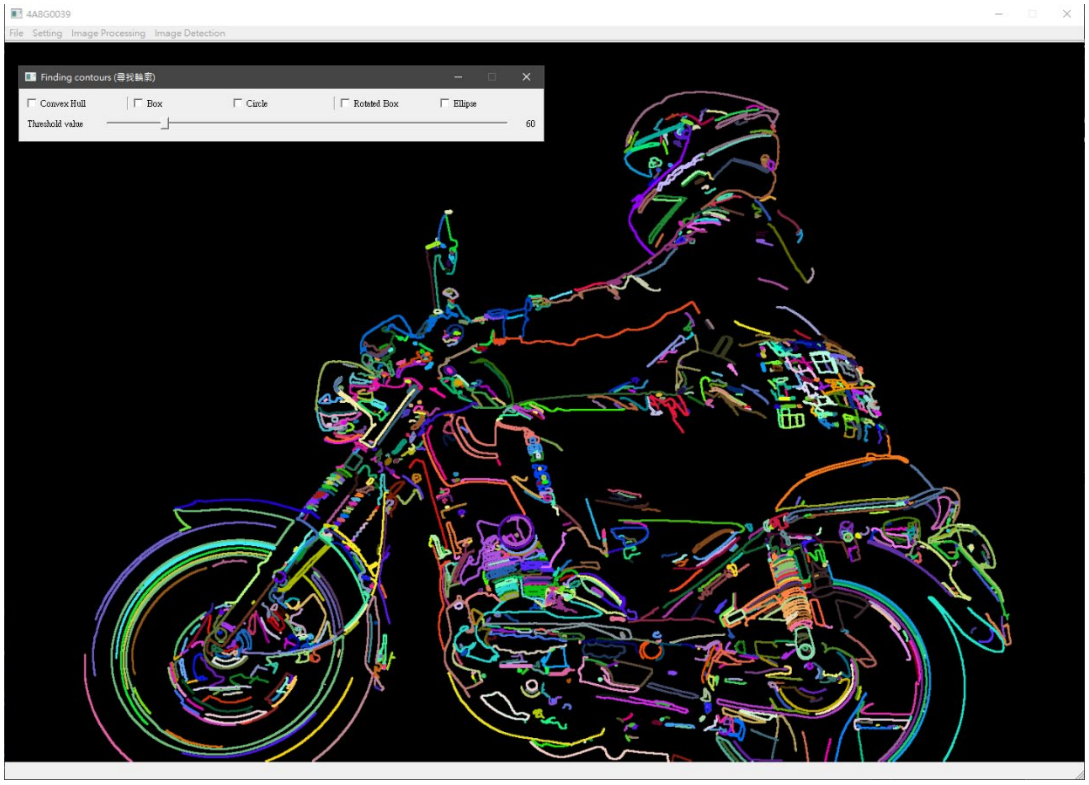
Finding contours (尋找輪廓)

使用 cv2.Canny()抓取物件邊緣後再使用 cv2.findContours()找出物件的輪廓。
找出輪廓後就可 ：

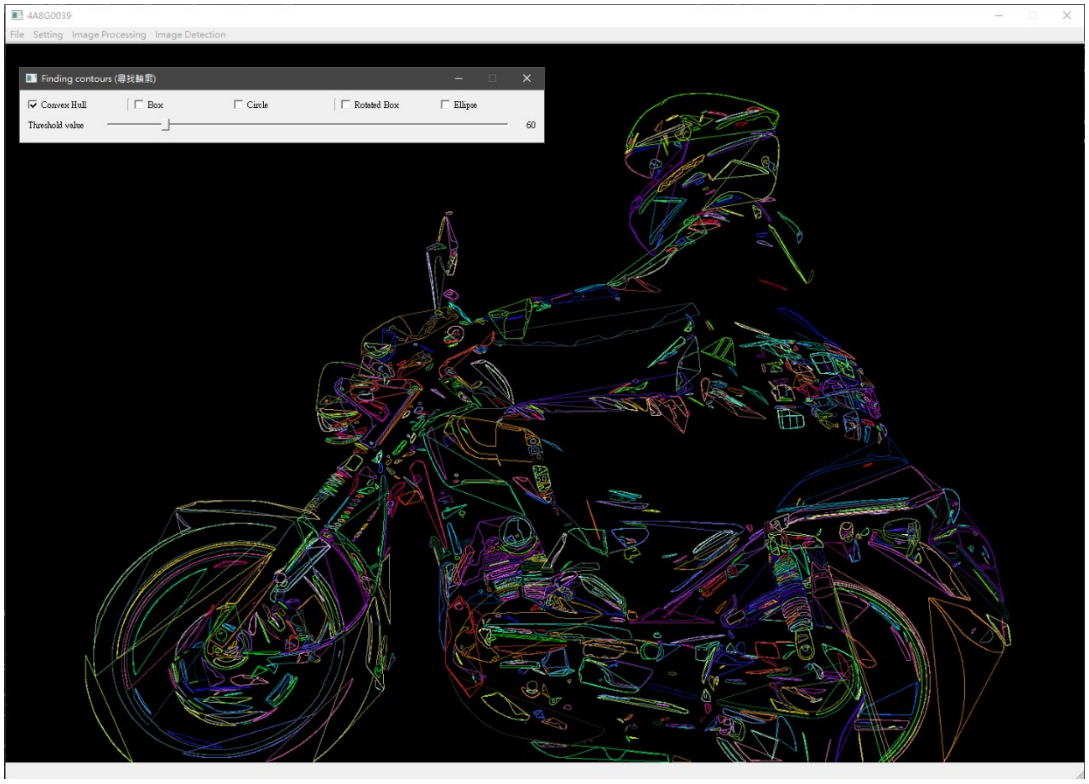
使用 cv2.convexHull()找出物件的凸包(最外框)。
使用 cv2.boundingRect()找出物件的最小矩形框。
使用 cv2.minEnclosingCircle()找出物件的最小圓形框。
使用 cv2.minAreaRect()找出物件的最小旋轉矩形框。
使用 cv2.fitEllipse()找出物件的最小橢圓形框。

Threshold value : Canny 閥值

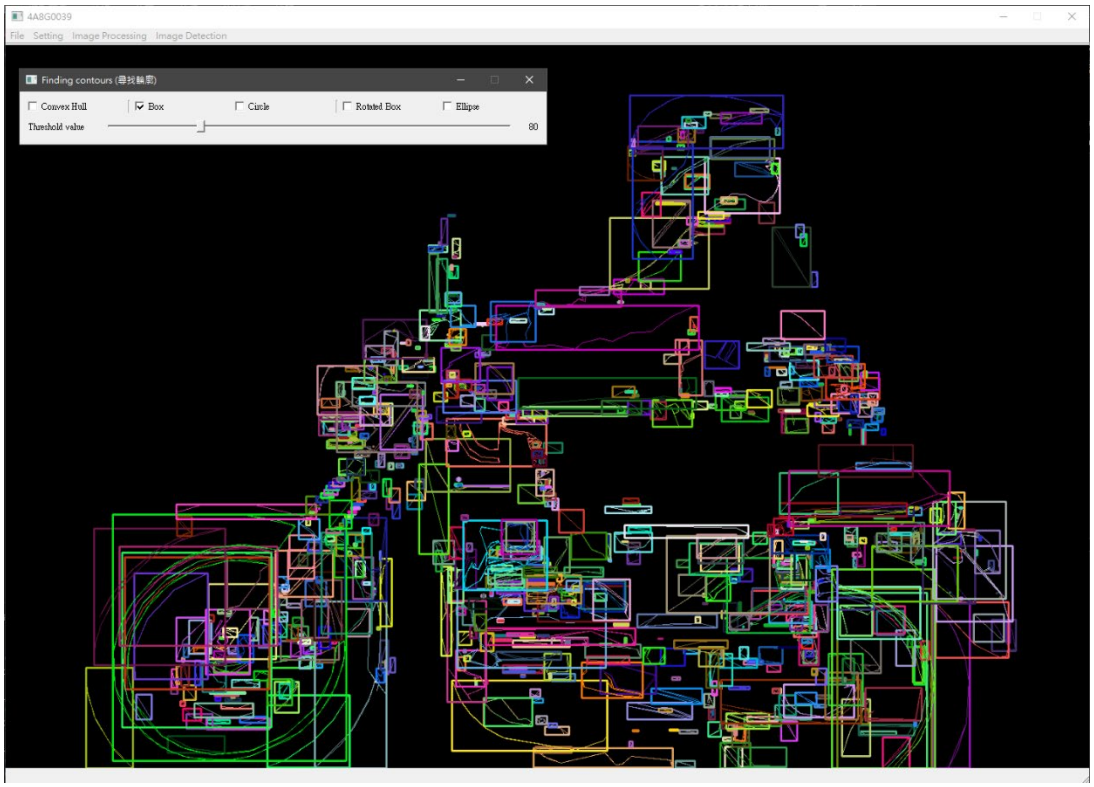
cv2.findContours



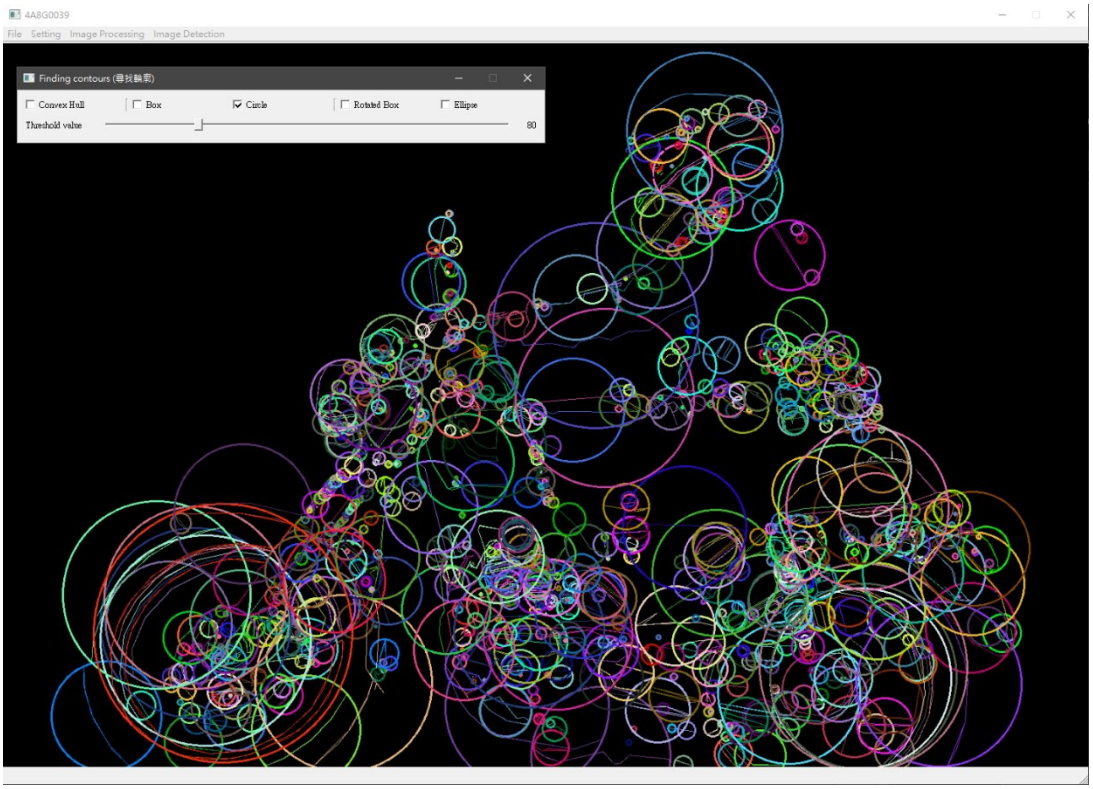
cv2.convexHull



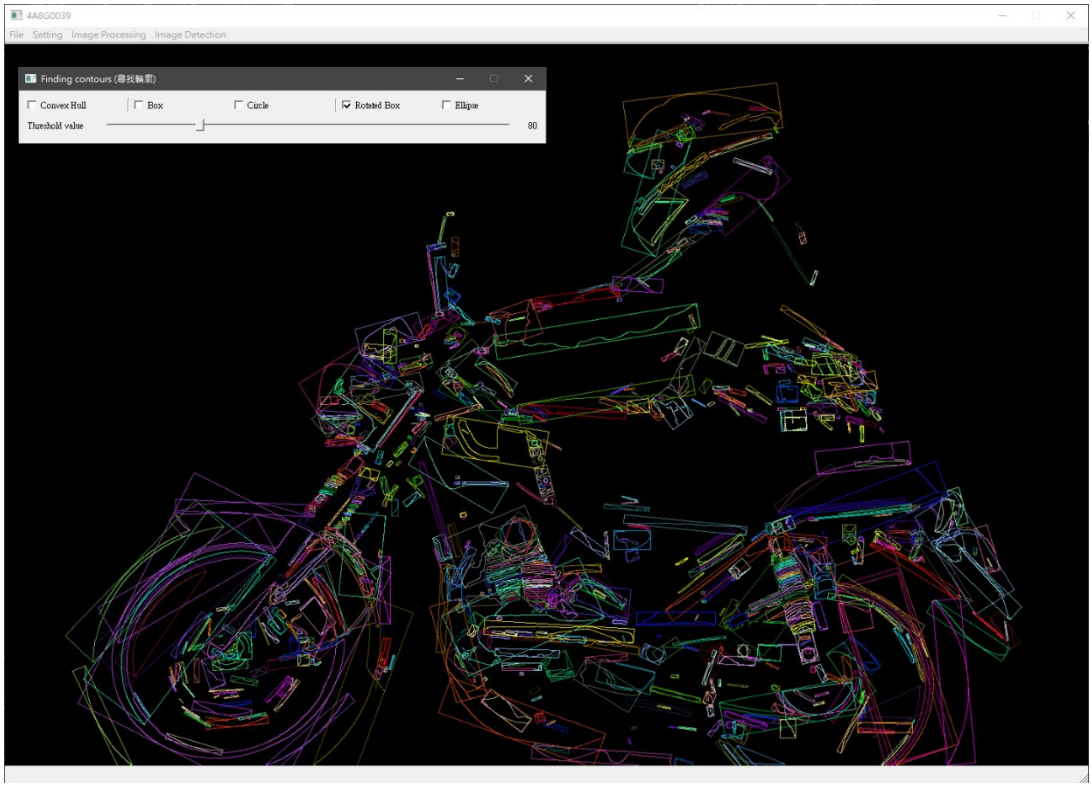
cv2.boundingRect



cv2.minEnclosingCircle



cv2.minAreaRect



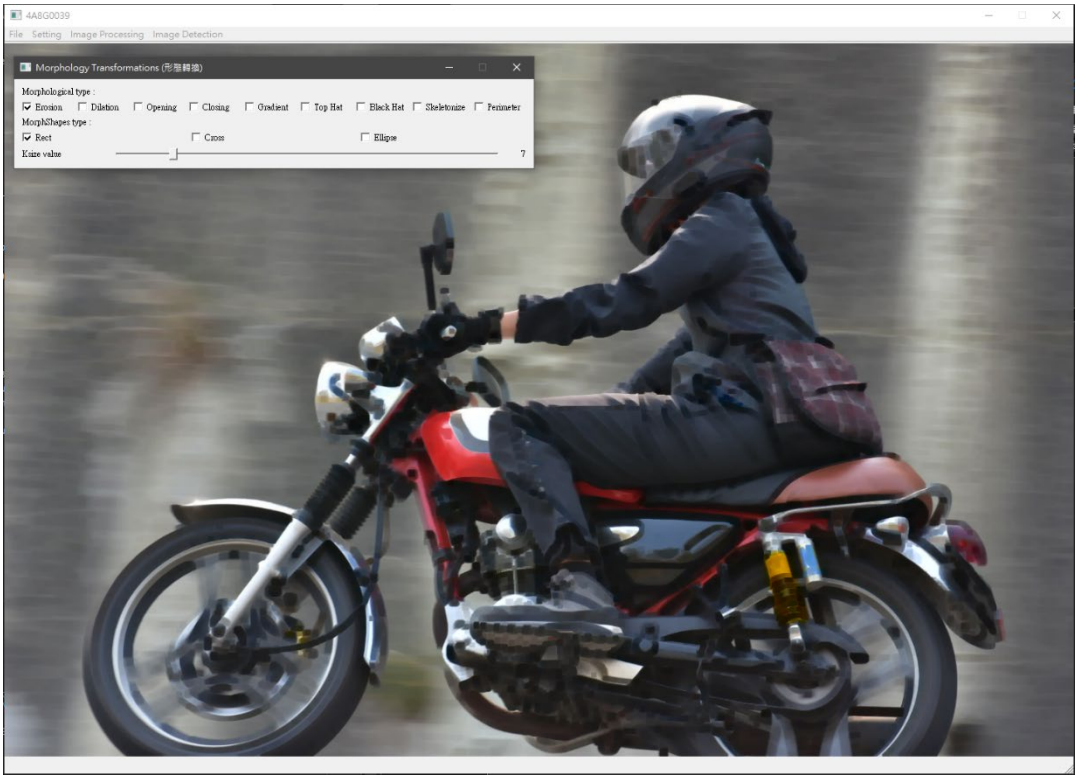
cv2.fitEllipse

Morphology Transformations (形態轉換)

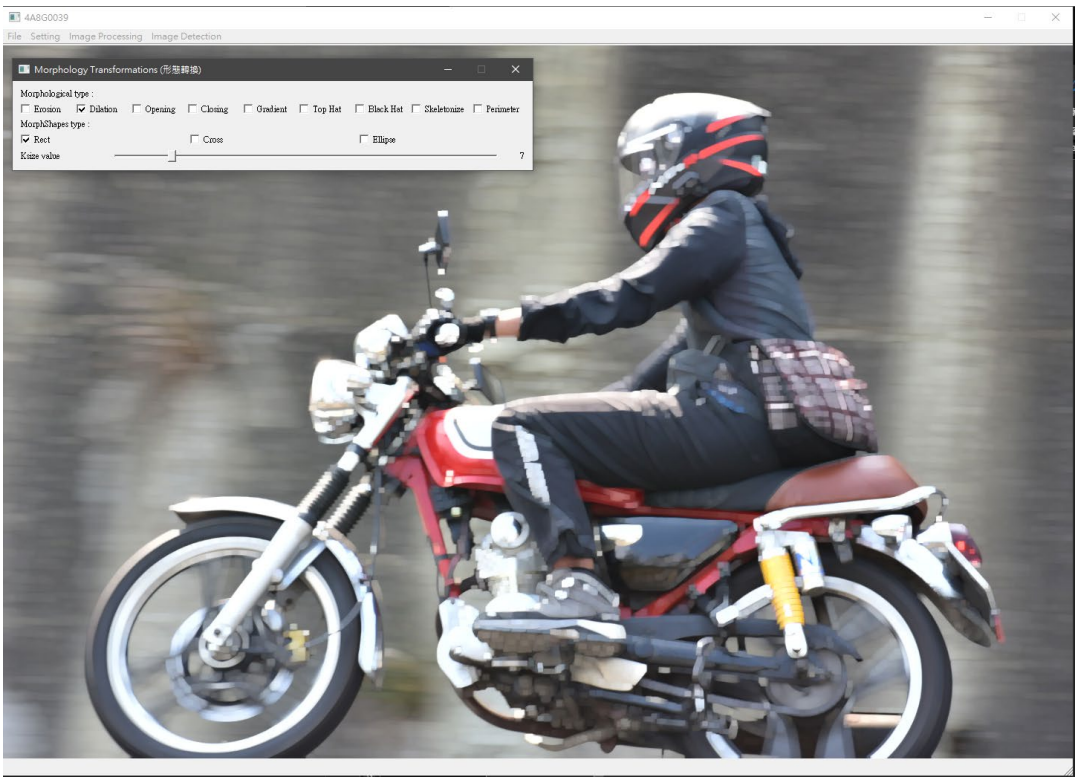
使用 cv2.MORPH_ERODE 實作腐蝕圖像。
使用 cv2.MORPH_DILATE 實作擴大圖像。
使用 cv2.MORPH_OPEN 實作腐蝕圖像後擴大圖像。
使用 cv2.MORPH_CLOSE 實作擴大圖像後腐蝕圖像。
使用 cv2. MORPH_GRADIENT 實作擴大圖像 - 腐蝕圖像。
使用 cv2.MORPH_TOPHAT 實作原圖像 - cv2.MORPH_OPEN。
使用 cv2.MORPH_BLACKHAT 實作
cv2.MORPH_CLOSE - 原圖像。

Ksize value： 模糊內核大小

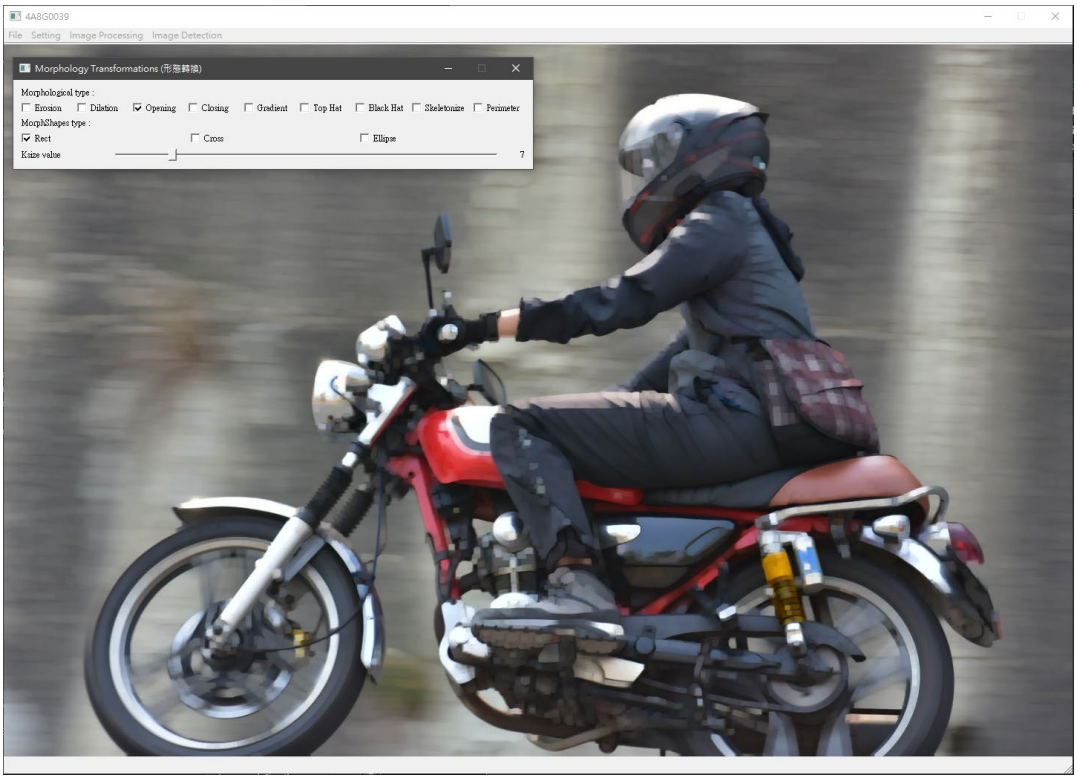
cv2.MORPH_ERODE



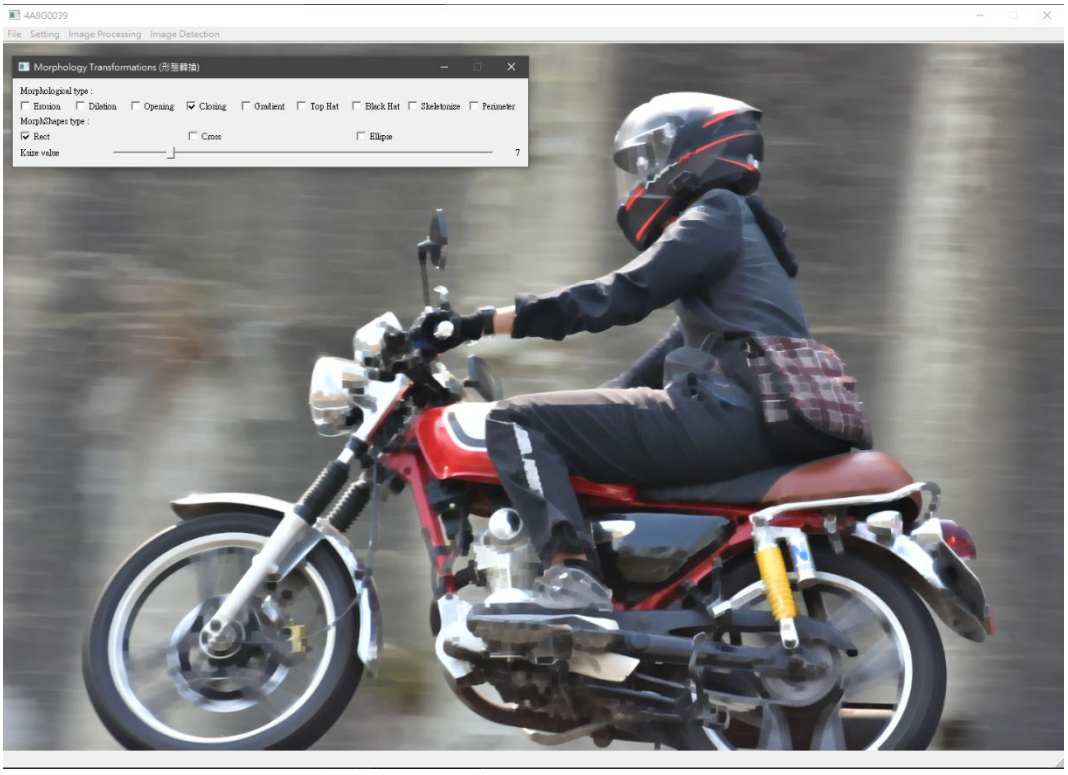
cv2.MORPH_DILATE



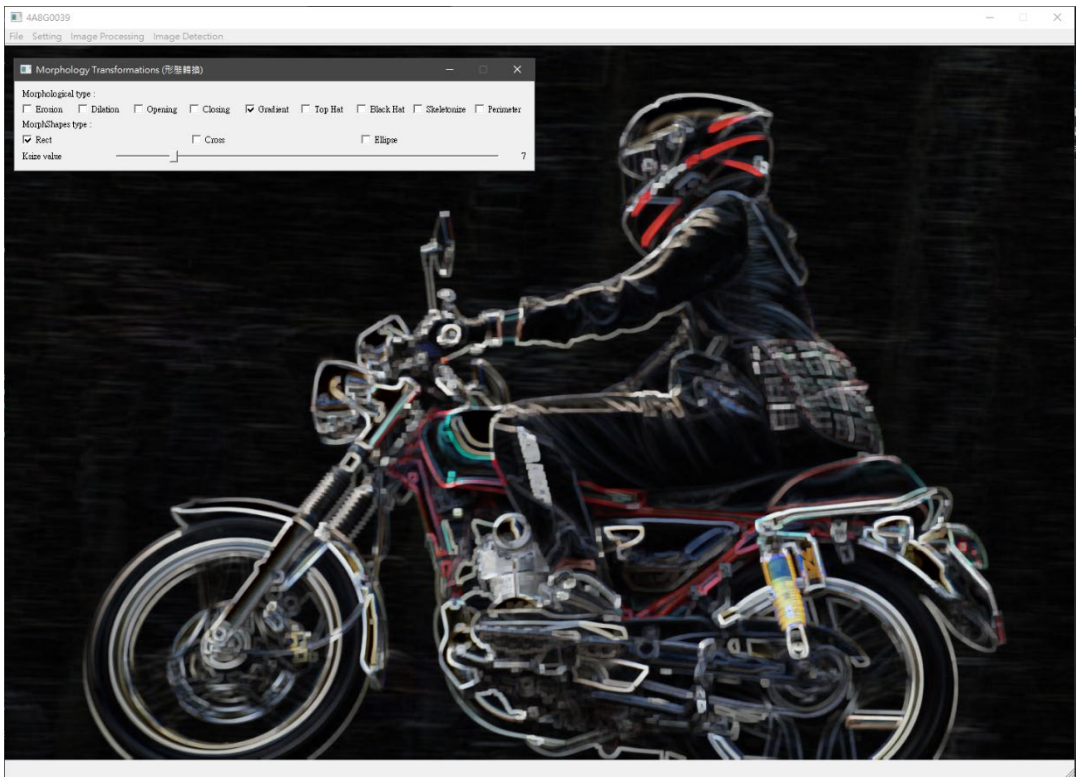
cv2.MORPH_OPEN



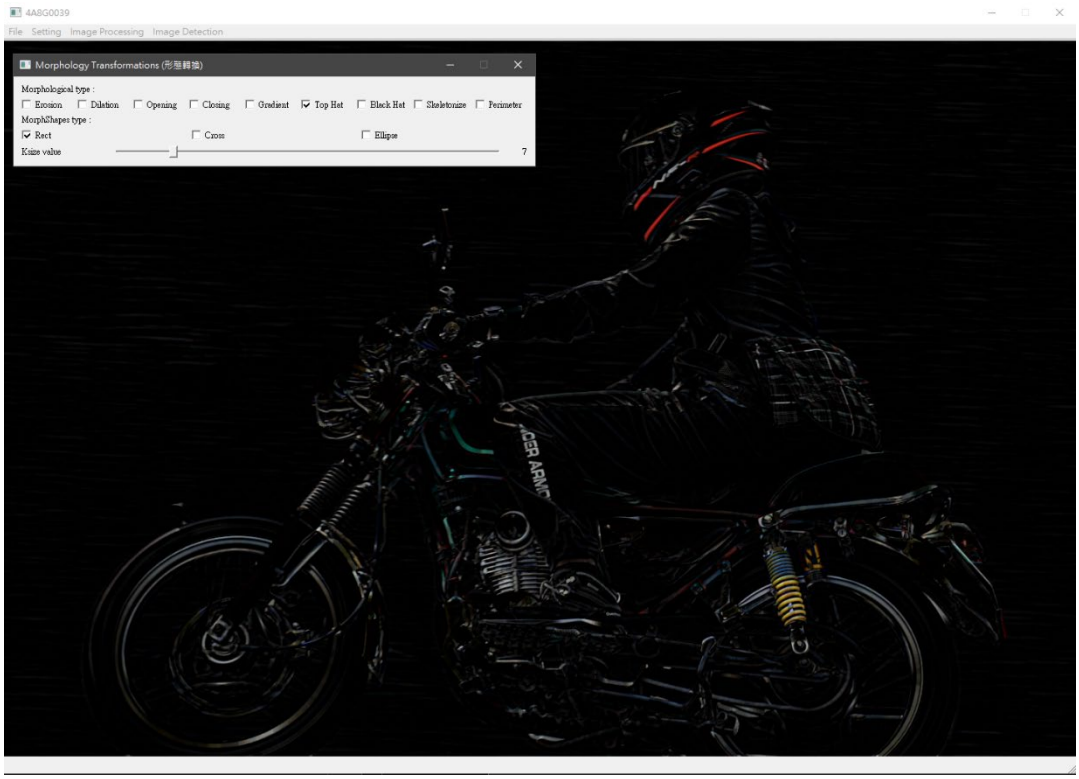
cv2.MORPH_CLOSE



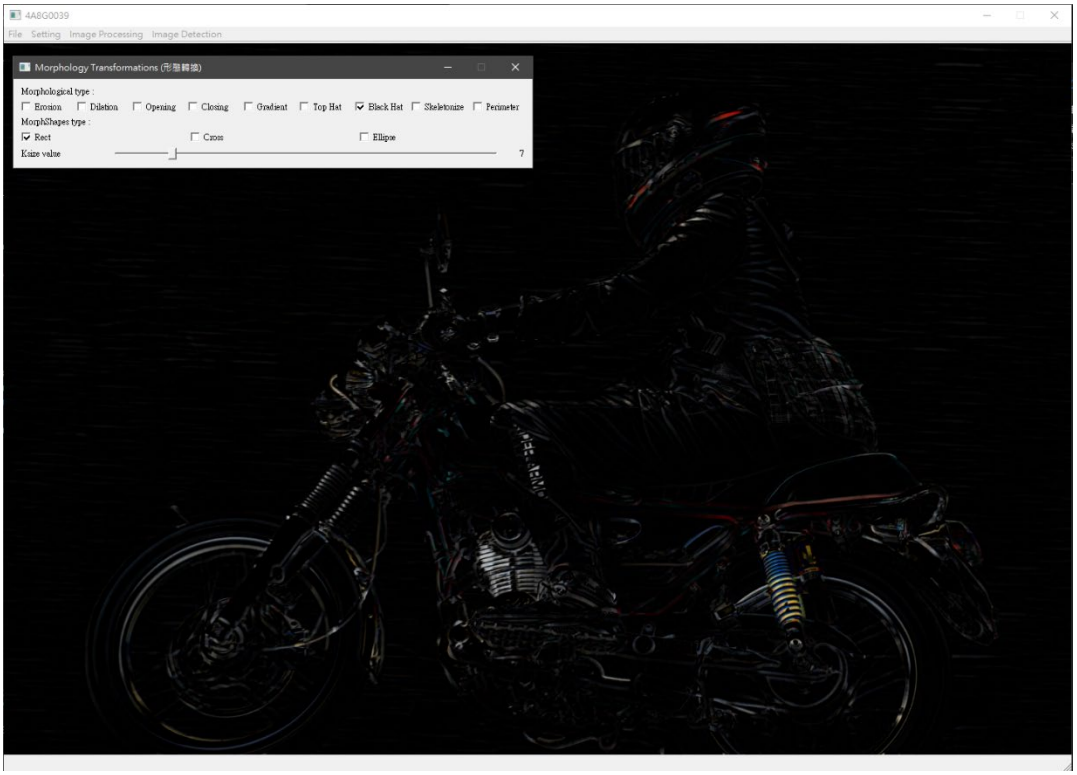
cv2. MORPH_GRADIENT



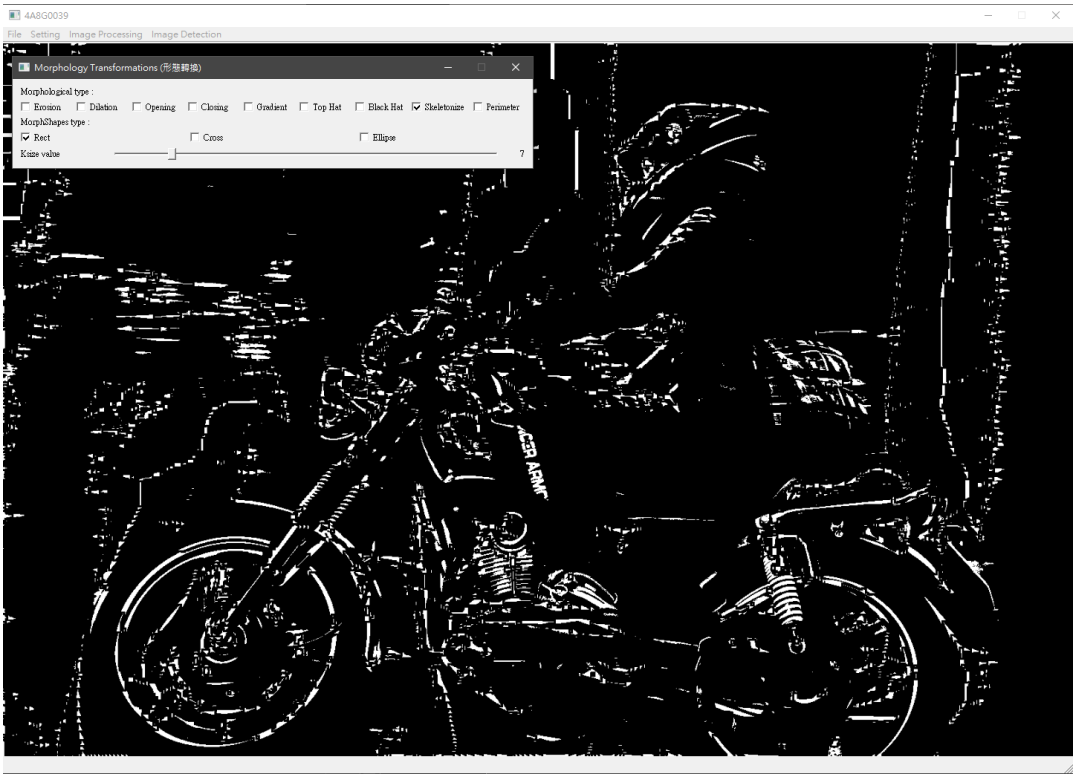
cv2.MORPH_TOPHAT



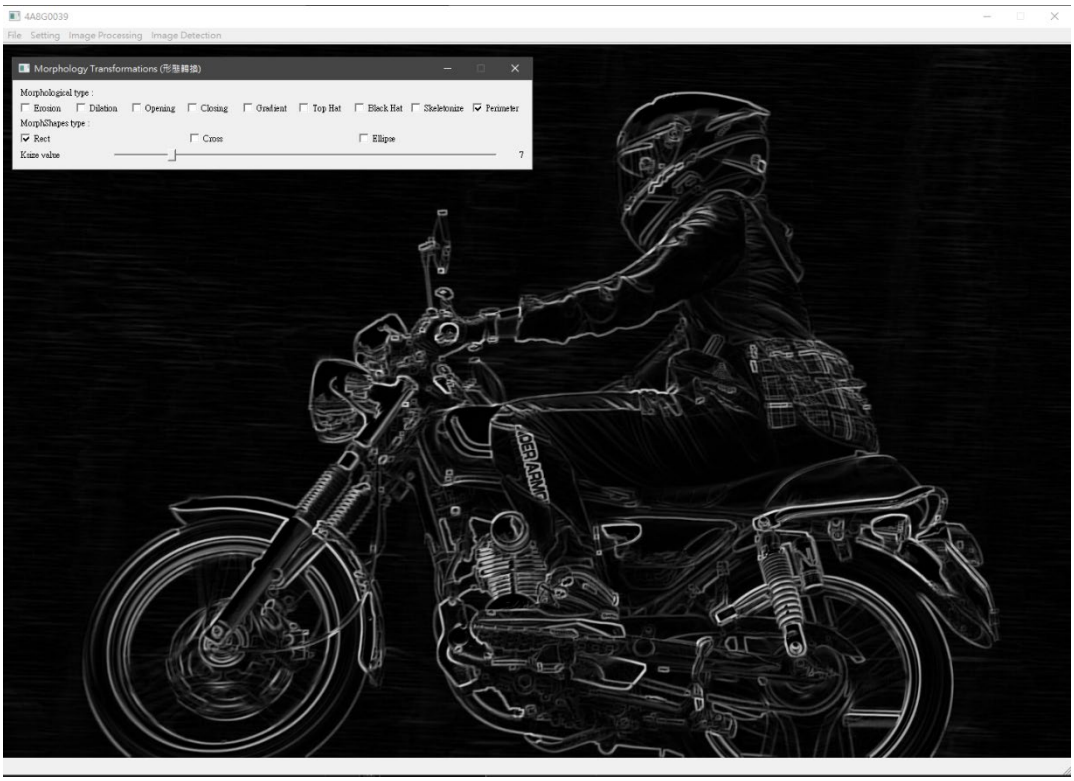
cv2.MORPH_BLACKHAT



Skeletonize



Perimeter


4A8G0039
File Setting Image Processing Image Detection
Morphology Transformations (形態轉換)
Morphological type :
Erosion Dilation Opening Closing Gradient Top Hat Black Hat Skeletonize Perimeter
MorphShapes type :
Rect Cross Ellipse
Ksize value
7

Final_HW

GitHub 連結

Hand Detection

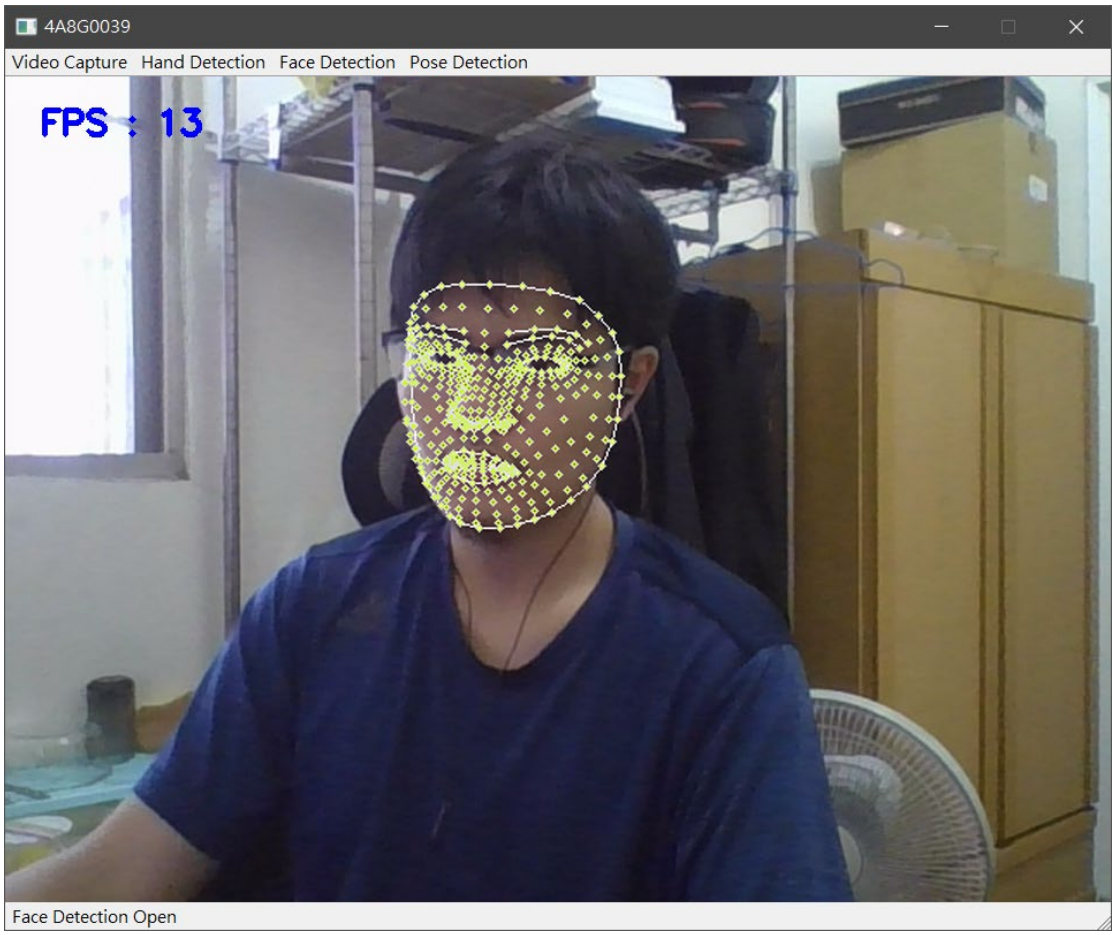
```
self.mp_hands = mp.solutions.hands
self.mp_Hands = self.mp_hands.Hands(min_detection_confidence=0.5,
min_tracking_confidence=0.5) #設定手部偵測數值
self.mp_drawing = mp.solutions.drawing_utils

hands_result = self.mp_Hands.process(imgRGB) #偵測手部
if hands_result.multi_hand_landmarks:
    for handLms in hands_result.multi_hand_landmarks: #讀取手部標記點
        self.mp_drawing.draw_landmarks(frame, handLms,
    self.mp_hands.HAND_CONNECTIONS,
    self.mp_drawing.DrawingSpec(color=(255,0,255), thickness=2,
    circle_radius=3), self.mp_drawing.DrawingSpec(color=(0,0,255),
    thickness=2)) #畫出手部標記點
```

Face Detection

```
self.mp_face_mesh = mp.solutions.face_mesh
self.mp_FaceMesh =
self.mp_face_mesh.FaceMesh(min_detection_confidence=0.5,
min_tracking_confidence=0.5) #設定臉部偵測數值
self.mp_drawing = mp.solutions.drawing_utils

face_mesh_result = self.mp_FaceMesh.process(imgRGB) #偵測臉部
if face_mesh_result.multi_face_landmarks:
    for face_mesh_Lms in face_mesh_result.multi_face_landmarks: #讀取臉
    部標記點
        self.mp_drawing.draw_landmarks(frame,face_mesh_Lms,self.mp_face
    _mesh.FACEMESH_CONTOURS,self.mp_drawing.DrawingSpec(color=(0,255,20
    0), thickness=1, circle_radius=1),
    self.mp_drawing.DrawingSpec(color=(255,255,255), thickness=1,
    circle_radius=1)) #畫出臉部標記點
```



Pose Detection

```
self.mp_pose = mp.solutions.pose
self.mp_Pose = self.mp_pose.Pose(min_detection_confidence=0.5,
min_tracking_confidence=0.5) #設定軀幹偵測數值
self.mp_drawing = mp.solutions.drawing_utils

Pose_result = self.mp_Pose.process(imgRGB) #偵測軀幹
self.mp_drawing.draw_landmarks(frame, Pose_result.pose_landmarks,
self.mp_pose.POSE_CONNECTIONS,
elf.mp_drawing.DrawingSpec(color=(255,0,0), thickness=2,
circle_radius=3), self.mp_drawing.DrawingSpec(color=(0,255,0),
thickness=2)) #畫出軀幹標記點
```