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import numpy as np
import cv2
from collections import deque

# default called trackbar function
def setValues(x):
    print("success")

# Creating the trackbars needed for adjusting the marker colour
cv2.namedWindow("Color detectors")
cv2.createTrackbar("Upper Hue", "Color detectors", 153, 180, setValues)
cv2.createTrackbar("Upper Saturation", "Color detectors", 255, 255,
setValues)
cv2.createTrackbar("Upper Value", "Color detectors", 255, 255, setValues)
cv2.createTrackbar("Lower Hue", "Color detectors", 64, 180, setValues)
cv2.createTrackbar("Lower Saturation", "Color detectors", 72, 255,
setValues)
cv2.createTrackbar("Lower Value", "Color detectors", 49, 255, setValues)

bpoints = [deque(maxlen=1024)]
gppoints = [deque(maxlen=1024)]
rppoints = [deque(maxlen=1024)]
ypoints = [deque(maxlen=1024)]

# These indexes will be used to mark the points in particular arrays of
specific colour
blue_index = 0
green_index = 0
red_index = 0
yellow_index = 0

# The kernel to be used for dilation purpose
kernel = np.ones((5, 5), np.uint8)
colors = [(255, 0, 0), (0, 255, 0), (0, 0, 255), (0, 255, 255)]
colorIndex = 0

paintWindow = np.zeros((471, 636, 3)) + 255
paintWindow = cv2.rectangle(paintWindow, (40, 1), (140, 65), (0, 0, 0), 2)
paintWindow = cv2.rectangle(paintWindow, (160, 1), (255, 65), colors[0], -
1)
paintWindow = cv2.rectangle(paintWindow, (275, 1), (370, 65), colors[1], -
1)
paintWindow = cv2.rectangle(paintWindow, (390, 1), (485, 65), colors[2], -
1)
paintWindow = cv2.rectangle(paintWindow, (505, 1), (600, 65), colors[3], -
1)
cv2.putText(paintWindow, "CLEAR", (49, 33), cv2.FONT_HERSHEY_SIMPLEX, 0.5,
(0, 0, 0), 2, cv2.LINE_AA)
cv2.putText(paintWindow, "BLUE", (185, 33), cv2.FONT_HERSHEY_SIMPLEX, 0.5,
(255, 255, 255), 2, cv2.LINE_AA)
cv2.putText(paintWindow, "GREEN", (298, 33), cv2.FONT_HERSHEY_SIMPLEX, 0.5,
(255, 255, 255), 2, cv2.LINE_AA)
cv2.putText(paintWindow, "RED", (420, 33), cv2.FONT_HERSHEY_SIMPLEX, 0.5,
(255, 255, 255), 2, cv2.LINE_AA)
cv2.putText(paintWindow, "YELLOW", (520, 33), cv2.FONT_HERSHEY_SIMPLEX,
0.5, (150, 150, 150), 2, cv2.LINE_AA)
cv2.namedWindow('Paint', cv2.WINDOW_AUTOSIZE)

cap = cv2.VideoCapture(0)

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# Keep looping
while True:
    ret, frame = cap.read()

    frame = cv2.flip(frame, 1)
    hsv = cv2.cvtColor(frame, cv2.COLOR_BGR2HSV)
    u_hue = cv2.getTrackbarPos("Upper Hue", "Color detectors")
    u_saturation = cv2.getTrackbarPos("Upper Saturation", "Color
detectors")
    u_value = cv2.getTrackbarPos("Upper Value", "Color detectors")
    l_hue = cv2.getTrackbarPos("Lower Hue", "Color detectors")
    l_saturation = cv2.getTrackbarPos("Lower Saturation", "Color
detectors")
    l_value = cv2.getTrackbarPos("Lower Value", "Color detectors")
    Upper_hsv = np.array([u_hue, u_saturation, u_value])
    Lower_hsv = np.array([l_hue, l_saturation, l_value])

    # Adding the colour buttons to the live frame for colour access
    frame = cv2.rectangle(frame, (40, 1), (140, 65), (122, 122, 122), -1)
    frame = cv2.rectangle(frame, (160, 1), (255, 65), colors[0], -1)
    frame = cv2.rectangle(frame, (275, 1), (370, 65), colors[1], -1)
    frame = cv2.rectangle(frame, (390, 1), (485, 65), colors[2], -1)
    frame = cv2.rectangle(frame, (505, 1), (600, 65), colors[3], -1)
    cv2.putText(frame, "CLEAR ALL", (49, 33), cv2.FONT_HERSHEY_SIMPLEX,
0.5, (255, 255, 255), 2, cv2.LINE_AA)
    cv2.putText(frame, "BLUE", (185, 33), cv2.FONT_HERSHEY_SIMPLEX, 0.5,
(255, 255, 255), 2, cv2.LINE_AA)
    cv2.putText(frame, "GREEN", (298, 33), cv2.FONT_HERSHEY_SIMPLEX, 0.5,
(255, 255, 255), 2, cv2.LINE_AA)
    cv2.putText(frame, "RED", (420, 33), cv2.FONT_HERSHEY_SIMPLEX, 0.5,
(255, 255, 255), 2, cv2.LINE_AA)
    cv2.putText(frame, "YELLOW", (520, 33), cv2.FONT_HERSHEY_SIMPLEX, 0.5,
(150, 150, 150), 2, cv2.LINE_AA)

    # Identifying the pointer by making its mask
    Mask = cv2.inRange(hsv, Lower_hsv, Upper_hsv)
    Mask = cv2.erode(Mask, kernel, iterations=1)
    Mask = cv2.morphologyEx(Mask, cv2.MORPH_OPEN, kernel)
    Mask = cv2.dilate(Mask, kernel, iterations=1)

    # Find contours for the pointer after identifying it
    cnts, _ = cv2.findContours(Mask.copy(), cv2.RETR_EXTERNAL,
cv2.CHAIN_APPROX_SIMPLE)

    center = None

    # If the contours are formed
    if len(cnts) > 0:

        cnt = sorted(cnts, key=cv2.contourArea, reverse=True)[0]
        ((x, y), radius) = cv2.minEnclosingCircle(cnt)
        cv2.circle(frame, (int(x), int(y)), int(radius), (0, 255, 255), 2)
        M = cv2.moments(cnt)
        center = (int(M['m10'] / M['m00']), int(M['m01'] / M['m00']))

        if center[1] <= 65:
            if 40 <= center[0] <= 140: # Clear Button
                bpoints = [deque(maxlen=512)]
                gpoints = [deque(maxlen=512)]
                rpoints = [deque(maxlen=512)]
                ypoints = [deque(maxlen=512)]

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        blue_index = 0
        green_index = 0
        red_index = 0
        yellow_index = 0
        paintWindow[67:, :, :] = 255
    elif 160 <= center[0] <= 255:
        colorIndex = 0 # Blue
    elif 275 <= center[0] <= 370:
        colorIndex = 1 # Green
    elif 390 <= center[0] <= 485:
        colorIndex = 2 # Red
    elif 505 <= center[0] <= 600:
        colorIndex = 3 # Yellow
else:
    if colorIndex == 0:
        bpoints[blue_index].appendleft(center)
    elif colorIndex == 1:
        gpoints[green_index].appendleft(center)
    elif colorIndex == 2:
        rpoints[red_index].appendleft(center)
    elif colorIndex == 3:
        ypoints[yellow_index].appendleft(center)

else:
    bpoints.append(deque(maxlen=512))
    blue_index += 1
    gpoints.append(deque(maxlen=512))
    green_index += 1
    rpoints.append(deque(maxlen=512))
    red_index += 1
    ypoints.append(deque(maxlen=512))
    yellow_index += 1

points = [bpoints, gpoints, rpoints, ypoints]
for i in range(len(points)):
    for j in range(len(points[i])):
        for k in range(1, len(points[i][j])):
            if points[i][j][k - 1] is None or points[i][j][k] is None:
                continue

            cv2.line(frame, points[i][j][k - 1], points[i][j][k],
colors[i], 2)
            cv2.line(paintWindow, points[i][j][k - 1], points[i][j][k],
colors[i], 2)

cv2.imshow("Tracking", frame)
cv2.imshow("Paint", paintWindow)
cv2.imshow("mask", Mask)

# If the 'q' key is pressed then stop the application
if cv2.waitKey(1) & 0xFF == ord("q"):
    break

# Release the camera and all resources
cap.release()
cv2.destroyAllWindows()

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