```
import math
import cv2
import numpy as np
x1 = 10
y1 = 10
x2 = 10
y2 = 10
count = 0
theta = 0
r = 0
X=["0"]
Y=["0"]
xx = 0
yy = 0
a1=0
a2=0
a3=0
a4=0
a5=0
a6=0
x1x = 0
y1y = 0
a7=0
a8=0
a9=0
a10=0
a11=0
a12=0
angle = 0
occupation1 = 0
occupation2 = 0
occupation3 = 0
occupation4 = 0
occupation5 = 0
occupation6 = 0
occupation7 = 0
occupation8 = 0
occupation9 = 0
occupation10 = 0
occupation11 = 0
angle1 = 0
angle2 = 0
angle3 = 0
angle4 = 0
angle5 = 0
angle6 = 0
angle7 = 0
angle8 = 0
angle9 = 0
angle10 = 0
angle11 = 0
velocity = 0
```

```
X1=["0"]
Y1=["0"]
X2=[0]
Y2=[0]
count1 = 0
img11 = cv2.imread('C:/Users/Yugesh/Desktop/major project/M2U000121
(2-27-2019 10-23-27 PM)/M2U000121 0247.jpg')
img22 = cv2.imread('C:/Users/Yugesh/Desktop/major project/M2U000121
(2-27-2019 10-23-27 PM)/M2U000121 0248.jpg')
img33 = cv2.imread('C:/Users/Yugesh/Desktop/major project/M2U000121
(2-27-2019 10-23-27 PM)/M2U000121 0249.jpg')
img1 = cv2.resize(img22,None,fx=0.5*1912/1024,fy=0.5*1077/576)
img2 = cv2.resize(img33,None,fx=0.5*1912/1024,fy=0.5*1077/576)
img3 = cv2.resize(img11,None,fx=0.5*1912/1024,fy=0.5*1077/576)



def mouse11_drawing(event, x, y, flags, params):
    if event == cv2.EVENT_LBUTTONDOWN:
        print(x, y)
        global x1x
        x1x = x
        global y1y
        y1y = y
        cv2.destroyWindow("Frame 11")



def mouse1_drawing(event, x, y, flags, params):
    if event == cv2.EVENT_LBUTTONDOWN:
        print(x, y)
        global x1
        x1 = x
        global y1
        y1 = y


    if event == cv2.EVENT_RBUTTONDOWN:
        global xx
        xx = x
        global yy
        yy = y
        print(x,y)
        cv2.destroyWindow("Frame 1")
        cv2.namedWindow("Frame 2");
        cv2.imshow( "Frame 2", img2 );
        cv2.setMouseCallback("Frame 2", mouse2_drawing)



def mouse2_drawing(event, x, y, flags, params):
    if event == cv2.EVENT_RBUTTONDOWN:
```

```
        print(x, y)
        global x2
        x2 = x
        global y2
        y2 = y
        r1x =
((y2-y1)/(3.888443))+(3.8191*x2/3.888443)+(0.069343*x1/3.888443)
        r1y = 0.069343*r1x+y1-0.069343*x1
        rx = ((((x2-r1x)**2)+((y2-r1y)**2))**(0.5))*13.1/368.457
        ry = ((((x1-r1x)**2)+((y1-r1y)**2))**(0.5))*10.23/546.323
        global velocity
        velocity = ((rx**2+ry**2)**(0.5))/(0.5)
        print('velocity=',velocity)
        global theta
        theta = math.degrees(math.atan((y1-y1y)/(x1x-x1)))
        print(theta)
        theta1 = math.degrees(math.atan((y1-y2)/(x2-x1)))
        print(theta1)
        xx1 = round(x1+1500*math.cos((theta1-5)*math.pi/180))
        yy1 = round(y1-1500*math.sin((theta1-5)*math.pi/180))
        cv2.line(img1, (xx1,yy1), (x2,y2), (0,255,0), 3)
        cv2.line(img1, (x1,y1), (x1x,y1y), (0,0,255), 1)
        x3=round(x1+1500*math.cos((theta-5)*math.pi/180))
        y3=round(y1-1500*math.sin((theta-5)*math.pi/180))
        cv2.line(img1, (x1,y1),(x3,y3), (0,0,255), 1)
        x4=round(x1+1500*math.cos((theta+5)*math.pi/180))
        y4=round(y1-1500*math.sin((theta+5)*math.pi/180))
        cv2.line(img1, (x1,y1),(x4,y4), (0,0,255), 1)
        x5=round(x1+1500*math.cos((theta-15)*math.pi/180))
        y5=round(y1-1500*math.sin((theta-15)*math.pi/180))
        cv2.line(img1, (x1,y1),(x5,y5), (0,0,255), 1)
        x6=round(x1+1500*math.cos((theta+15)*math.pi/180))
        y6=round(y1-1500*math.sin((theta+15)*math.pi/180))
        cv2.line(img1, (x1,y1),(x6,y6), (0,0,255), 1)
        x7=round(x1+1500*math.cos((theta-25)*math.pi/180))
        y7=round(y1-1500*math.sin((theta-25)*math.pi/180))
        cv2.line(img1, (x1,y1),(x7,y7), (0,0,255), 1)
        x8=round(x1+1500*math.cos((theta+25)*math.pi/180))
        y8=round(y1-1500*math.sin((theta+25)*math.pi/180))
        cv2.line(img1, (x1,y1),(x8,y8), (0,0,255), 1)
        x9=round(x1+1500*math.cos((theta-40)*math.pi/180))
        y9=round(y1-1500*math.sin((theta-40)*math.pi/180))
        cv2.line(img1, (x1,y1),(x9,y9), (0,0,255), 1)
        x10=round(x1+1500*math.cos((theta+40)*math.pi/180))
        y10=round(y1-1500*math.sin((theta+40)*math.pi/180))
        cv2.line(img1, (x1,y1),(x10,y10), (0,0,255), 1)
        x11=round(x1+1500*math.cos((theta-60)*math.pi/180))
        y11=round(y1-1500*math.sin((theta-60)*math.pi/180))
        cv2.line(img1, (x1,y1),(x11,y11), (0,0,255), 1)
        x12=round(x1+1500*math.cos((theta+60)*math.pi/180))
        y12=round(y1-1500*math.sin((theta+60)*math.pi/180))
        cv2.line(img1, (x1,y1),(x12,y12), (0,0,255), 1)
```

```
x13=round(x1+1500*math.cos((theta-85)*math.pi/180))
y13=round(y1-1500*math.sin((theta-85)*math.pi/180))
cv2.line(img1, (x1,y1),(x13,y13), (0,0,255), 1)
x14=round(x1+1500*math.cos((theta+85)*math.pi/180))
y14=round(y1-1500*math.sin((theta+85)*math.pi/180))
cv2.line(img1, (x1,y1),(x14,y14), (0,0,255), 1)
global r
r=round(math.sqrt((x2-x1)*(x2-x1)+(y2-y1)*(y2-y1)))
cv2.circle(img1, (x1,y1), r, (0,0,255), 1)
theta1 = math.degrees(math.atan((y1-y2)/(x2-x1)))
xx1 = round(x1+1500*math.cos((theta1-5)*math.pi/180))
yy1 = round(y1-1500*math.sin((theta1-5)*math.pi/180))
cv2.line(img1, (xx1,yy1), (x2,y2), (0,255,0), 1)
cv2.line(img2, (x1,y1), (x1x,y1y), (0,0,255), 1)
x3=round(x1+1500*math.cos((theta-5)*math.pi/180))
y3=round(y1-1500*math.sin((theta-5)*math.pi/180))
cv2.line(img2, (x1,y1),(x3,y3), (0,0,255), 1)
x4=round(x1+1500*math.cos((theta+5)*math.pi/180))
y4=round(y1-1500*math.sin((theta+5)*math.pi/180))
cv2.line(img2, (x1,y1),(x4,y4), (0,0,255), 1)
x5=round(x1+1500*math.cos((theta-15)*math.pi/180))
y5=round(y1-1500*math.sin((theta-15)*math.pi/180))
cv2.line(img2, (x1,y1),(x5,y5), (0,0,255), 1)
x6=round(x1+1500*math.cos((theta+15)*math.pi/180))
y6=round(y1-1500*math.sin((theta+15)*math.pi/180))
cv2.line(img2, (x1,y1),(x6,y6), (0,0,255), 1)
x7=round(x1+1500*math.cos((theta-25)*math.pi/180))
y7=round(y1-1500*math.sin((theta-25)*math.pi/180))
cv2.line(img2, (x1,y1),(x7,y7), (0,0,255), 1)
x8=round(x1+1500*math.cos((theta+25)*math.pi/180))
y8=round(y1-1500*math.sin((theta+25)*math.pi/180))
cv2.line(img2, (x1,y1),(x8,y8), (0,0,255), 1)
x9=round(x1+1500*math.cos((theta-40)*math.pi/180))
y9=round(y1-1500*math.sin((theta-40)*math.pi/180))
cv2.line(img2, (x1,y1),(x9,y9), (0,0,255), 1)
x10=round(x1+1500*math.cos((theta+40)*math.pi/180))
y10=round(y1-1500*math.sin((theta+40)*math.pi/180))
cv2.line(img2, (x1,y1),(x10,y10), (0,0,255), 1)
x11=round(x1+1500*math.cos((theta-60)*math.pi/180))
y11=round(y1-1500*math.sin((theta-60)*math.pi/180))
cv2.line(img2, (x1,y1),(x11,y11), (0,0,255), 1)
x12=round(x1+1500*math.cos((theta+60)*math.pi/180))
y12=round(y1-1500*math.sin((theta+60)*math.pi/180))
cv2.line(img2, (x1,y1),(x12,y12), (0,0,255), 1)
x13=round(x1+1500*math.cos((theta-85)*math.pi/180))
y13=round(y1-1500*math.sin((theta-85)*math.pi/180))
cv2.line(img2, (x1,y1),(x13,y13), (0,0,255), 1)
x14=round(x1+1500*math.cos((theta+85)*math.pi/180))
y14=round(y1-1500*math.sin((theta+85)*math.pi/180))
cv2.line(img2, (x1,y1),(x14,y14), (0,0,255), 1)

cv2.destroyWindow("Frame 2")
```

```
        cv2.namedWindow("Frame 3")
        cv2.imshow( "Frame 3", img1 )
        cv2.setMouseCallback("Frame 3", mouse3_drawing)
def mouse3_drawing(event, x, y, flags, params):
    if event == cv2.EVENT_LBUTTONDOWN:
        print(x,y)
        global count
        global X
        X.append(x)
        global Y
        Y.append(y)
        global count
        count = count + 1
        print (count)
        x3=round(x1+r*math.cos((theta-72.5)*math.pi/180))
        y3=round(y1-r*math.sin((theta-72.5)*math.pi/180))

        x4=round(x1+r*math.cos((theta-50)*math.pi/180))
        y4=round(y1-r*math.sin((theta-50)*math.pi/180))

        x5=round(x1+r*math.cos((theta-32.5)*math.pi/180))
        y5=round(y1-r*math.sin((theta-32.5)*math.pi/180))

        x6=round(x1+r*math.cos((theta-20)*math.pi/180))
        y6=round(y1-r*math.sin((theta-20)*math.pi/180))

        x7=round(x1+r*math.cos((theta-10)*math.pi/180))
        y7=round(y1-r*math.sin((theta-10)*math.pi/180))

        x8=round(x1+r*math.cos((theta)*math.pi/180))
        y8=round(y1-r*math.sin((theta)*math.pi/180))

        x9=round(x1+r*math.cos((theta+10)*math.pi/180))
        y9=round(y1-r*math.sin((theta+10)*math.pi/180))

        x10=round(x1+r*math.cos((theta+20)*math.pi/180))
        y10=round(y1-r*math.sin((theta+20)*math.pi/180))

        x11=round(x1+r*math.cos((theta+32.5)*math.pi/180))
        y11=round(y1-r*math.sin((theta+32.5)*math.pi/180))

        x12=round(x1+r*math.cos((theta+50)*math.pi/180))
        y12=round(y1-r*math.sin((theta+50)*math.pi/180))

        x13=round(x1+r*math.cos((theta-72.5)*math.pi/180))
        y13=round(y1-r*math.sin((theta-72.5)*math.pi/180))

        X2 = [x3,x4,x5,x6,x7,x8,x9,x10,x11,x12,x13]
        Y2 = [y3,y4,y5,y6,y7,y8,y9,y10,y11,y12,y13]

        global occupation1
        for i in range(count, count+1,1):
```

```
            r1x =
((Y2[0]-Y[i])/(3.888443))+(3.8191*X2[0]/3.888443)+(0.069343*X[i]/3.888
443)
            r1y = 0.069343*r1x+Y[i]-0.069343*X[i]
            rx =
((((X2[0]-r1x)**2)+((Y2[0]-r1y)**2))**(0.5))*13.1/368.457
            ry =
((((X[i]-r1x)**2)+((Y[i]-r1y)**2))**(0.5))*10.23/546.323
            occupation1 = occupation1 +
math.exp(-((rx**2+ry**2)**(0.5)))


            print('occupation1=',occupation1)
        global occupation2
        for i in range(count, count+1,1):

            r1x =
((Y2[1]-Y[i])/(3.888443))+(3.8191*X2[1]/3.888443)+(0.069343*X[i]/3.888
443)
            r1y = 0.069343*r1x+Y[i]-0.069343*X[i]
            rx =
((((X2[1]-r1x)**2)+((Y2[1]-r1y)**2))**(0.5))*13.1/368.457
            ry =
((((X[i]-r1x)**2)+((Y[i]-r1y)**2))**(0.5))*10.23/546.323
            occupation2 = occupation2 +
math.exp(-((rx**2+ry**2)**(0.5)))
            print('occupation2=',occupation2)
        global occupation3
        for i in range(count, count+1,1):

            r1x =
((Y2[2]-Y[i])/(3.888443))+(3.8191*X2[2]/3.888443)+(0.069343*X[i]/3.888
443)
            r1y = 0.069343*r1x+Y[i]-0.069343*X[i]
            rx =
((((X2[2]-r1x)**2)+((Y2[2]-r1y)**2))**(0.5))*13.1/368.457
            ry =
((((X[i]-r1x)**2)+((Y[i]-r1y)**2))**(0.5))*10.23/546.323
            occupation3 = occupation3 +
math.exp(-((rx**2+ry**2)**(0.5)))
            print('occupation3=',occupation3)
        global occupation4
        for i in range(count, count+1,1):

            r1x =
((Y2[3]-Y[i])/(3.888443))+(3.8191*X2[3]/3.888443)+(0.069343*X[i]/3.888
443)
            r1y = 0.069343*r1x+Y[i]-0.069343*X[i]
            rx =
((((X2[3]-r1x)**2)+((Y2[3]-r1y)**2))**(0.5))*13.1/368.457
```

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            ry =
((((X[i]-r1x)**2)+((Y[i]-r1y)**2))**(0.5))*10.23/546.323
            occupation4 = occupation4 +
math.exp(-((rx**2+ry**2)**(0.5)))
            print('occupation4=',occupation4)
        global occupation5
        for i in range(count, count+1,1):

            r1x =
((Y2[4]-Y[i])/(3.888443))+(3.8191*X2[4]/3.888443)+(0.069343*X[i]/3.888
443)
            r1y = 0.069343*r1x+Y[i]-0.069343*X[i]
            rx =
((((X2[4]-r1x)**2)+((Y2[4]-r1y)**2))**(0.5))*13.1/368.457
            ry =
((((X[i]-r1x)**2)+((Y[i]-r1y)**2))**(0.5))*10.23/546.323
            occupation5 = occupation5 +
math.exp(-((rx**2+ry**2)**(0.5)))
            print('occupation5=',occupation5)
        global occupation6
        for i in range(count, count+1,1):

            r1x =
((Y2[5]-Y[i])/(3.888443))+(3.8191*X2[5]/3.888443)+(0.069343*X[i]/3.888
443)
            r1y = 0.069343*r1x+Y[i]-0.069343*X[i]
            rx =
((((X2[5]-r1x)**2)+((Y2[5]-r1y)**2))**(0.5))*13.1/368.457
            ry =
((((X[i]-r1x)**2)+((Y[i]-r1y)**2))**(0.5))*10.23/546.323
            occupation6 = occupation6 +
math.exp(-((rx**2+ry**2)**(0.5)))
            print('occupation6=',occupation6)

        global occupation7
        for i in range(count, count+1,1):

            r1x =
((Y2[6]-Y[i])/(3.888443))+(3.8191*X2[6]/3.888443)+(0.069343*X[i]/3.888
443)
            r1y = 0.069343*r1x+Y[i]-0.069343*X[i]
            rx =
((((X2[6]-r1x)**2)+((Y2[6]-r1y)**2))**(0.5))*13.1/368.457
            ry =
((((X[i]-r1x)**2)+((Y[i]-r1y)**2))**(0.5))*10.23/546.323
            occupation7 = occupation7 +
math.exp(-((rx**2+ry**2)**(0.5)))
            print('occupation7=',occupation7)

        global occupation8
        for i in range(count, count+1,1):
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            r1x =
((Y2[7]-Y[i])/(3.888443))+(3.8191*X2[7]/3.888443)+(0.069343*X[i]/3.888
443)
            r1y = 0.069343*r1x+Y[i]-0.069343*X[i]
            rx =
((((X2[7]-r1x)**2)+((Y2[7]-r1y)**2))**(0.5))*13.1/368.457
            ry =
((((X[i]-r1x)**2)+((Y[i]-r1y)**2))**(0.5))*10.23/546.323
            occupation8 = occupation8 +
math.exp(-((rx**2+ry**2)**(0.5)))
            print('occupation8=',occupation8)

        global occupation9
        for i in range(count, count+1,1):

            r1x =
((Y2[8]-Y[i])/(3.888443))+(3.8191*X2[8]/3.888443)+(0.069343*X[i]/3.888
443)
            r1y = 0.069343*r1x+Y[i]-0.069343*X[i]
            rx =
((((X2[8]-r1x)**2)+((Y2[8]-r1y)**2))**(0.5))*13.1/368.457
            ry =
((((X[i]-r1x)**2)+((Y[i]-r1y)**2))**(0.5))*10.23/546.323
            occupation9 = occupation9 +
math.exp(-((rx**2+ry**2)**(0.5)))
            print('occupation9=',occupation9)

        global occupation10
        for i in range(count, count+1,1):

            r1x =
((Y2[9]-Y[i])/(3.888443))+(3.8191*X2[9]/3.888443)+(0.069343*X[i]/3.888
443)
            r1y = 0.069343*r1x+Y[i]-0.069343*X[i]
            rx =
((((X2[9]-r1x)**2)+((Y2[9]-r1y)**2))**(0.5))*13.1/368.457
            ry =
((((X[i]-r1x)**2)+((Y[i]-r1y)**2))**(0.5))*10.23/546.323
            occupation10 = occupation10 +
math.exp(-((rx**2+ry**2)**(0.5)))
            print('occupation10=',occupation10)

        global occupation11
        for i in range(count, count+1,1):

            r1x =
((Y2[10]-Y[i])/(3.888443))+(3.8191*X2[10]/3.888443)+(0.069343*X[i]/3.8
88443)
            r1y = 0.069343*r1x+Y[i]-0.069343*X[i]
            rx =
((((X2[10]-r1x)**2)+((Y2[10]-r1y)**2))**(0.5))*13.1/368.457
            ry =
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((((X[i]-r1x)**2)+((Y[i]-r1y)**2))**(0.5))*10.23/546.323
            occupation11 = occupation11 +
math.exp(-((rx**2+ry**2)**(0.5)))
            print('occupation11=',occupation11)
        print('first cone - direction=',72.5)
        print('second cone - direction=',50)
        print('third cone - direction=',32.5)
        print('fourth cone - direction=',20)
        print('fifth cone - direction=',10)
        print('sixth cone - direction=',0)
        print('seventh cone - direction=',10)
        print('eigth cone - direction=',20)
        print('ninth cone - direction=',32.5)
        print('tenth cone - direction=',50)
        print('eleventh cone - direction=',72.5)

    if event == cv2.EVENT_RBUTTONDOWN:
            cv2.destroyWindow("Frame 3")
            cv2.namedWindow("Frame 4")
            cv2.imshow( "Frame 4", img2 )
            cv2.setMouseCallback("Frame 4", mouse4_drawing)



def mouse4_drawing(event, x, y, flags, params):
    if event == cv2.EVENT_LBUTTONDOWN:
        print(x,y)
        global count
        global X1
        X1.append(x)
        global Y1
        Y1.append(y)
        global count1
        count1 = count1 + 1
        print (count1)
        x3=round(x1+r*math.cos((theta-72.5)*math.pi/180))
        y3=round(y1-r*math.sin((theta-72.5)*math.pi/180))

        x4=round(x1+r*math.cos((theta-50)*math.pi/180))
        y4=round(y1-r*math.sin((theta-50)*math.pi/180))

        x5=round(x1+r*math.cos((theta-32.5)*math.pi/180))
        y5=round(y1-r*math.sin((theta-32.5)*math.pi/180))

        x6=round(x1+r*math.cos((theta-20)*math.pi/180))
        y6=round(y1-r*math.sin((theta-20)*math.pi/180))

        x7=round(x1+r*math.cos((theta-10)*math.pi/180))
        y7=round(y1-r*math.sin((theta-10)*math.pi/180))

        x8=round(x1+r*math.cos((theta)*math.pi/180))
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        y8=round(y1-r*math.sin((theta)*math.pi/180))

        x9=round(x1+r*math.cos((theta+10)*math.pi/180))
        y9=round(y1-r*math.sin((theta+10)*math.pi/180))

        x10=round(x1+r*math.cos((theta+20)*math.pi/180))
        y10=round(y1-r*math.sin((theta+20)*math.pi/180))

        x11=round(x1+r*math.cos((theta+32.5)*math.pi/180))
        y11=round(y1-r*math.sin((theta+32.5)*math.pi/180))

        x12=round(x1+r*math.cos((theta+50)*math.pi/180))
        y12=round(y1-r*math.sin((theta+50)*math.pi/180))

        x13=round(x1+r*math.cos((theta-72.5)*math.pi/180))
        y13=round(y1-r*math.sin((theta-72.5)*math.pi/180))

        X2 = [x3,x4,x5,x6,x7,x8,x9,x10,x11,x12,x13]
        Y2 = [y3,y4,y5,y6,y7,y8,y9,y10,y11,y12,y13]

        global angle1
        for i in range(count1, count1+1,1):
            r1x =
((Y2[0]-Y[i])/(3.888443))+(3.8191*X2[0]/3.888443)+(0.069343*X[i]/3.888
443)
            r1y = 0.069343*r1x+Y[i]-0.069343*X[i]
            rx =
((((X2[0]-r1x)**2)+((Y2[0]-r1y)**2))**(0.5))*13.1/368.457
            ry =
((((X[i]-r1x)**2)+((Y[i]-r1y)**2))**(0.5))*10.23/546.323
            b1 = math.degrees(math.atan((Y2[0]-y1)/(X2[0]-x1)))
            if b1<0:
                b1 = 180 - abs(b1)
            b2 = math.degrees(math.atan((Y[i]-Y1[i])/(X[i]-X1[i])))
            if b2<0:
                b2 = 180 - abs(b2)
            angle1 = angle1 +
math.exp(-((rx**2+ry**2)**(0.5)))*abs(b1-b2)
            print('angle1=',angle1)
        global angle2
        for i in range(count1, count1+1,1):
            r1x =
((Y2[1]-Y[i])/(3.888443))+(3.8191*X2[1]/3.888443)+(0.069343*X[i]/3.888
443)
            r1y = 0.069343*r1x+Y[i]-0.069343*X[i]
            rx =
((((X2[1]-r1x)**2)+((Y2[1]-r1y)**2))**(0.5))*13.1/368.457
            ry =
((((X[i]-r1x)**2)+((Y[i]-r1y)**2))**(0.5))*10.23/546.323
            b1 = math.degrees(math.atan(((Y2[1]-y1)/(X2[1]-x1))))
            if b1<0:
                b1 = 180 - abs(b1)
```

```
            b2 = math.degrees(math.atan((Y[i]-Y1[i])/(X[i]-X1[i])))
            if b2<0:
                b2 = 180 - abs(b2)
            angle2 = angle2 +
math.exp(-((rx**2+ry**2)**(0.5)))*abs(b1-b2)
            print('angle2=',angle2)
        global angle3
        for i in range(count1, count1+1,1):
            r1x =
((Y2[2]-Y[i])/(3.888443))+(3.8191*X2[2]/3.888443)+(0.069343*X[i]/3.888
443)
            r1y = 0.069343*r1x+Y[i]-0.069343*X[i]
            rx =
((((X2[2]-r1x)**2)+((Y2[2]-r1y)**2))**(0.5))*13.1/368.457
            ry =
((((X[i]-r1x)**2)+((Y[i]-r1y)**2))**(0.5))*10.23/546.323
            b1 = math.degrees(math.atan(((Y2[2]-y1)/(X2[2]-x1))))
            if b1<0:
                b1 = 180 - abs(b1)
            b2 = math.degrees(math.atan((Y[i]-Y1[i])/(X[i]-X1[i])))
            if b2<0:
                b2 = 180 - abs(b2)
            angle3 = angle3 +
math.exp(-((rx**2+ry**2)**(0.5)))*abs(b1-b2)
            print('angle3=',angle3)
        global angle4
        for i in range(count1, count1+1,1):
            r1x =
((Y2[3]-Y[i])/(3.888443))+(3.8191*X2[3]/3.888443)+(0.069343*X[i]/3.888
443)
            r1y = 0.069343*r1x+Y[i]-0.069343*X[i]
            rx =
((((X2[3]-r1x)**2)+((Y2[3]-r1y)**2))**(0.5))*13.1/368.457
            ry =
((((X[i]-r1x)**2)+((Y[i]-r1y)**2))**(0.5))*10.23/546.323
            b1 = math.degrees(math.atan(((Y2[3]-y1)/(X2[3]-x1))))
            if b1<0:
                b1 = 180 - abs(b1)
            b2 = math.degrees(math.atan((Y[i]-Y1[i])/(X[i]-X1[i])))
            if b2<0:
                b2 = 180 - abs(b2)
            angle4 = angle4 +
math.exp(-((rx**2+ry**2)**(0.5)))*abs(b1-b2)
            print('angle4=',angle4)
        global angle5
        for i in range(count1, count1+1,1):
            r1x =
((Y2[4]-Y[i])/(3.888443))+(3.8191*X2[4]/3.888443)+(0.069343*X[i]/3.888
443)
            r1y = 0.069343*r1x+Y[i]-0.069343*X[i]
            rx =
((((X2[4]-r1x)**2)+((Y2[4]-r1y)**2))**(0.5))*13.1/368.457
```

```
            ry =
((((X[i]-r1x)**2)+((Y[i]-r1y)**2))**(0.5))*10.23/546.323
            b1 = math.degrees(math.atan(((Y2[4]-y1)/(X2[4]-x1))))
            if b1<0:
                b1 = 180 - abs(b1)
            b2 = math.degrees(math.atan((Y[i]-Y1[i])/(X[i]-X1[i])))
            if b2<0:
                b2 = 180 - abs(b2)
            angle5 = angle5 +
math.exp(-((rx**2+ry**2)**(0.5)))*abs(b1-b2)
            print('angle5=',angle5)
        global angle6
        for i in range(count1, count1+1,1):
            r1x =
((Y2[5]-Y[i])/(3.888443))+(3.8191*X2[5]/3.888443)+(0.069343*X[i]/3.888
443)
            r1y = 0.069343*r1x+Y[i]-0.069343*X[i]
            rx =
((((X2[5]-r1x)**2)+((Y2[5]-r1y)**2))**(0.5))*13.1/368.457
            ry =
((((X[i]-r1x)**2)+((Y[i]-r1y)**2))**(0.5))*10.23/546.323
            b1 = math.degrees(math.atan(((Y2[5]-y1)/(X2[5]-x1))))
            if b1<0:
                b1 = 180 - abs(b1)
            b2 = math.degrees(math.atan((Y[i]-Y1[i])/(X[i]-X1[i])))
            if b2<0:
                b2 = 180 - abs(b2)
            angle6 = angle6 +
math.exp(-((rx**2+ry**2)**(0.5)))*abs(b1-b2)
            print('angle6=',angle6)
        global angle7
        for i in range(count1, count1+1,1):
            r1x =
((Y2[6]-Y[i])/(3.888443))+(3.8191*X2[6]/3.888443)+(0.069343*X[i]/3.888
443)
            r1y = 0.069343*r1x+Y[i]-0.069343*X[i]
            rx =
((((X2[6]-r1x)**2)+((Y2[6]-r1y)**2))**(0.5))*13.1/368.457
            ry =
((((X[i]-r1x)**2)+((Y[i]-r1y)**2))**(0.5))*10.23/546.323
            b1 = math.degrees(math.atan(((Y2[6]-y1)/(X2[6]-x1))))
            if b1<0:
                b1 = 180 - abs(b1)
            b2 = math.degrees(math.atan((Y[i]-Y1[i])/(X[i]-X1[i])))
            if b2<0:
                b2 = 180 - abs(b2)
            angle7 = angle7 +
math.exp(-((rx**2+ry**2)**(0.5)))*abs(b1-b2)
            print('angle7=',angle7)
        global angle8
        for i in range(count1, count1+1,1):
            r1x =
```

```
((Y2[7]-Y[i])/(3.888443))+(3.8191*X2[7]/3.888443)+(0.069343*X[i]/3.888
443)
            r1y = 0.069343*r1x+Y[i]-0.069343*X[i]
            rx =
((((X2[7]-r1x)**2)+((Y2[7]-r1y)**2))**(0.5))*13.1/368.457
            ry =
((((X[i]-r1x)**2)+((Y[i]-r1y)**2))**(0.5))*10.23/546.323
            b1 = math.degrees(math.atan(((Y2[7]-y1)/(X2[7]-x1))))
            if b1<0:
                b1 = 180 - abs(b1)
            b2 = math.degrees(math.atan((Y[i]-Y1[i])/(X[i]-X1[i])))
            if b2<0:
                b2 = 180 - abs(b2)
            angle8 = angle8 +
math.exp(-((rx**2+ry**2)**(0.5)))*abs(b1-b2)
            print('angle8=',angle8)
        global angle9
        for i in range(count1, count1+1,1):
            r1x =
((Y2[8]-Y[i])/(3.888443))+(3.8191*X2[8]/3.888443)+(0.069343*X[i]/3.888
443)
            r1y = 0.069343*r1x+Y[i]-0.069343*X[i]
            rx =
((((X2[8]-r1x)**2)+((Y2[8]-r1y)**2))**(0.5))*13.1/368.457
            ry =
((((X[i]-r1x)**2)+((Y[i]-r1y)**2))**(0.5))*10.23/546.323
            b1 = math.degrees(math.atan(((Y2[8]-y1)/(X2[8]-x1))))
            if b1<0:
                b1 = 180 - abs(b1)
            b2 = math.degrees(math.atan((Y[i]-Y1[i])/(X[i]-X1[i])))
            if b2<0:
                b2 = 180 - abs(b2)
            angle9 = angle9 +
math.exp(-((rx**2+ry**2)**(0.5)))*abs(b1-b2)
            print('angle9=',angle9)
        global angle10
        for i in range(count1, count1+1,1):
            r1x =
((Y2[9]-Y[i])/(3.888443))+(3.8191*X2[9]/3.888443)+(0.069343*X[i]/3.888
443)
            r1y = 0.069343*r1x+Y[i]-0.069343*X[i]
            rx =
((((X2[9]-r1x)**2)+((Y2[9]-r1y)**2))**(0.5))*13.1/368.457
            ry =
((((X[i]-r1x)**2)+((Y[i]-r1y)**2))**(0.5))*10.23/546.323
            b1 = math.degrees(math.atan(((Y2[9]-y1)/(X2[9]-x1))))
            if b1<0:
                b1 = 180 - abs(b1)
            b2 = math.degrees(math.atan((Y[i]-Y1[i])/(X[i]-X1[i])))
            if b2<0:
                b2 = 180 - abs(b2)
            angle10 = angle10 +
```

```
math.exp(-((rx**2+ry**2)**(0.5)))*abs(b1-b2)
            print('angle10=',angle10)
        global angle11
        for i in range(count1, count1+1,1):
            r1x =
((Y2[10]-Y[i])/(3.888443))+(3.8191*X2[10]/3.888443)+(0.069343*X[i]/3.8
88443)
            r1y = 0.069343*r1x+Y[i]-0.069343*X[i]
            rx =
((((X2[10]-r1x)**2)+((Y2[10]-r1y)**2))**(0.5))*13.1/368.457
            ry =
((((X[i]-r1x)**2)+((Y[i]-r1y)**2))**(0.5))*10.23/546.323
            b1 = math.degrees(math.atan(((Y2[10]-y1)/(X2[10]-x1))))
            if b1<0:
                b1 = 180 - abs(b1)
            b2 = math.degrees(math.atan((Y[i]-Y1[i])/(X[i]-X1[i])))
            if b2<0:
                b2 = 180 - abs(b2)
            angle11 = angle11 +
math.exp(-((rx**2+ry**2)**(0.5)))*abs(b1-b2)
            print('angle11=',angle11)

    if event == cv2.EVENT_RBUTTONDOWN:
            cv2.destroyWindow("Frame 4")
            x3=round(x1+r*math.cos((theta-72.5)*math.pi/180))
            y3=round(y1-r*math.sin((theta-72.5)*math.pi/180))

            x4=round(x1+r*math.cos((theta-50)*math.pi/180))
            y4=round(y1-r*math.sin((theta-50)*math.pi/180))

            x5=round(x1+r*math.cos((theta-32.5)*math.pi/180))
            y5=round(y1-r*math.sin((theta-32.5)*math.pi/180))

            x6=round(x1+r*math.cos((theta-20)*math.pi/180))
            y6=round(y1-r*math.sin((theta-20)*math.pi/180))

            x7=round(x1+r*math.cos((theta-10)*math.pi/180))
            y7=round(y1-r*math.sin((theta-10)*math.pi/180))

            x8=round(x1+r*math.cos((theta)*math.pi/180))
            y8=round(y1-r*math.sin((theta)*math.pi/180))

            x9=round(x1+r*math.cos((theta+10)*math.pi/180))
            y9=round(y1-r*math.sin((theta+10)*math.pi/180))

            x10=round(x1+r*math.cos((theta+20)*math.pi/180))
            y10=round(y1-r*math.sin((theta+20)*math.pi/180))

            x11=round(x1+r*math.cos((theta+32.5)*math.pi/180))
            y11=round(y1-r*math.sin((theta+32.5)*math.pi/180))

            x12=round(x1+r*math.cos((theta+50)*math.pi/180))
```

```
            y12=round(y1-r*math.sin((theta+50)*math.pi/180))

            x13=round(x1+r*math.cos((theta-72.5)*math.pi/180))
            y13=round(y1-r*math.sin((theta-72.5)*math.pi/180))

            X2 = [x3,x4,x5,x6,x7,x8,x9,x10,x11,x12,x13]
            Y2 = [y3,y4,y5,y6,y7,y8,y9,y10,y11,y12,y13]

            r1x =
((y1-yy)/(3.888443))+(3.8191*x1/3.888443)+(0.069343*xx/3.888443)
            r1y = 0.069343*r1x+yy-0.069343*xx
            rx =
(x1-xx)/(abs(x1-xx))*((((x1-r1x)**2)+((y1-r1y)**2))**(0.5))*13.1/368.4
57
            ry =
(y1-yy)/(abs(y1-yy))*((((xx-r1x)**2)+((yy-r1y)**2))**(0.5))*10.23/546.
323
            r2x =
((y1-y3)/(3.888443))+(3.8191*x1/3.888443)+(0.069343*x3/3.888443)
            r2y = 0.069343*r2x+y3-0.069343*x3
            rxx =
(x1-x3)/(abs(x1-x3))*((((x1-r2x)**2)+((y1-r2y)**2))**(0.5))*13.1/368.4
57
            ryy =
(y1-yy)/(abs(y1-y3))*((((x3-r2x)**2)+((y3-r2y)**2))**(0.5))*10.23/546.
323
            global a1
            a1 = math.degrees(math.atan(ry/rx))
            if a1<0:
                a1 = 180 - abs(a1)
            global a2
            a2 = math.degrees(math.atan(ryy/rxx))
            if a2<0:
                a2= 180-abs(a2)
            destination1 = abs(a1- a2)
            print('destination1=',destination1)
            r3x =
((y1-y4)/(3.888443))+(3.8191*x1/3.888443)+(0.069343*x4/3.888443)
            r3y = 0.069343*r2x+y4-0.069343*x4
            rxx1 =
(x1-x4)/(abs(x1-x4))*((((x1-r3x)**2)+((y1-r3y)**2))**(0.5))*13.1/368.4
57
            ryy1 =
(y1-y4)/(abs(y1-y4))*((((x4-r3x)**2)+((y4-r3y)**2))**(0.5))*10.23/546.
323
            global a3
            a3 = math.degrees(math.atan(ryy1/rxx1))
            if a3<0:
                a3= 180-abs(a3)
            destination2 = abs(a3-a1)
            print('destination2=',destination2)
            r4x =
```

```
((y1-y5)/(3.888443))+(3.8191*x1/3.888443)+(0.069343*x5/3.888443)
            r4y = 0.069343*r2x+y5-0.069343*x5
            rxx2 =
(x1-x5)/(abs(x1-x5))*((((x1-r4x)**2)+((y1-r4y)**2))**(0.5))*13.1/368.4
57
            ryy2 =
(y1-y5)/(abs(y1-y5))*((((x5-r4x)**2)+((y5-r4y)**2))**(0.5))*10.23/546.
323
            global a4
            a4 = math.degrees(math.atan(ryy2/rxx2))
            if a4<0:
                a4= 180-abs(a4)
            destination3 = abs(a4-a1)
            print('destination3=',destination3)
            r5x =
((y1-y6)/(3.888443))+(3.8191*x1/3.888443)+(0.069343*x6/3.888443)
            r5y = 0.069343*r2x+y6-0.069343*x6
            rxx3 =
(x1-x6)/(abs(x1-x6))*((((x1-r5x)**2)+((y1-r5y)**2))**(0.5))*13.1/368.4
57
            ryy3 =
(y1-y6)/(abs(y1-y6))*((((x6-r5x)**2)+((y6-r5y)**2))**(0.5))*10.23/546.
323
            global a5
            a5 = math.degrees(math.atan(ryy3/rxx3))
            if a5<0:
                a5= 180-abs(a5)
            destination4 = abs(a5-a1)
            print('destination4=',destination4)
            r6x =
((y1-y7)/(3.888443))+(3.8191*x1/3.888443)+(0.069343*x7/3.888443)
            r6y = 0.069343*r2x+y7-0.069343*x7
            rxx4 =
(x1-x7)/(abs(x1-x7))*((((x1-r6x)**2)+((y1-r6y)**2))**(0.5))*13.1/368.4
57
            ryy4 =
(y1-y7)/(abs(y1-y7))*((((x7-r6x)**2)+((y7-r6y)**2))**(0.5))*10.23/546.
323
            global a6
            a6 = math.degrees(math.atan(ryy4/rxx4))
            if a6<0:
                a6= 180-abs(a6)
            destination5 = abs(a1-a6)
            print('destination5=',destination5)
            r7x =
((y1-y8)/(3.888443))+(3.8191*x1/3.888443)+(0.069343*x8/3.888443)
            r7y = 0.069343*r2x+y8-0.069343*x8
            rxx5 =
(x1-x8)/(abs(x1-x8))*((((x1-r7x)**2)+((y1-r7y)**2))**(0.5))*13.1/368.4
57
            ryy5 =
(y1-y8)/(abs(y1-y8))*((((x8-r7x)**2)+((y8-r7y)**2))**(0.5))*10.23/546.
```

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323
            global a7
            a7 = math.degrees(math.atan(ryy5/rxx5))
            if a7<0:
                a7= 180-abs(a7)
            destination6 = abs(a1-a7)
            print('destination6=',destination6)
            r8x =
((y1-y9)/(3.888443))+(3.8191*x1/3.888443)+(0.069343*x9/3.888443)
            r8y = 0.069343*r2x+y9-0.069343*x9
            rxx6 =
(x1-x9)/(abs(x1-x9))*((((x1-r8x)**2)+((y1-r8y)**2))**(0.5))*13.1/368.4
57
            ryy6 =
(y1-y9)/(abs(y1-y9))*((((x9-r8x)**2)+((y9-r8y)**2))**(0.5))*10.23/546.
323
            global a8
            a8 = math.degrees(math.atan(ryy6/rxx6))
            if a8<0:
                a8= 180-abs(a8)
            destination7 = abs(a1-a8)
            print('destination7=',destination7)
            r9x =
((y1-y10)/(3.888443))+(3.8191*x1/3.888443)+(0.069343*x10/3.888443)
            r9y = 0.069343*r2x+y10-0.069343*x10
            rxx7 =
(x1-x5)/(abs(x1-x5))*((((x1-r9x)**2)+((y1-r9y)**2))**(0.5))*13.1/368.4
57
            ryy7 =
(y1-y4)/(abs(y1-y4))*((((x10-r9x)**2)+((y10-r9y)**2))**(0.5))*10.23/54
6.323
            global a9
            a9 = math.degrees(math.atan(ryy7/rxx7))
            if a9<0:
                a9= 180-abs(a9)
            destination8 = abs(a1-a9)
            print('destination8=',destination8)
            r10x =
((y1-y11)/(3.888443))+(3.8191*x1/3.888443)+(0.069343*x11/3.888443)
            r10y = 0.069343*r2x+y11-0.069343*x11
            rxx8 =
(x1-x5)/(abs(x1-x5))*((((x1-r10x)**2)+((y1-r10y)**2))**(0.5))*13.1/368
.457
            ryy8=
(y1-y4)/(abs(y1-y4))*((((x11-r10x)**2)+((y11-r10y)**2))**(0.5))*10.23/
546.323
            global a10
            a10 = math.degrees(math.atan(ryy8/rxx8))
            if a10<0:
                a10= 180-abs(a10)
            destination9 = abs(a1-a10)
            print('destination9=',destination9)
```

```
            r11x =
((y1-y12)/(3.888443))+(3.8191*x1/3.888443)+(0.069343*x12/3.888443)
            r11y = 0.069343*r2x+y12-0.069343*x12
            rxx9 =
(x1-x5)/(abs(x1-x5))*((((x1-r11x)**2)+((y1-r11y)**2))**(0.5))*13.1/368
.457
            ryy9=
(y1-y4)/(abs(y1-y4))*((((x12-r11x)**2)+((y12-r11y)**2))**(0.5))*10.23/
546.323
            global a11
            a11 = math.degrees(math.atan(ryy9/rxx9))
            if a11<0:
                a11= 180-abs(a11)
            destination10 = abs(a1-a11)
            print('destination10=',destination10)
            r12x =
((y1-y13)/(3.888443))+(3.8191*x1/3.888443)+(0.069343*x13/3.888443)
            r12y = 0.069343*r2x+y13-0.069343*x13
            rxx10 =(x1-x5)/(abs(x1-x5))*
((((x1-r12x)**2)+((y1-r12y)**2))**(0.5))*13.1/368.457
            ryy10 =
(y1-y4)/(abs(y1-y4))*((((x13-r12x)**2)+((y13-r12y)**2))**(0.5))*10.23/
546.323
            global a12
            a12 = math.degrees(math.atan(ryy10/rxx10))
            if a12<0:
                a12= 180-abs(a12)
            destination11 = abs(a1-a12)
            print('destination11=',destination11)
```

```
cv2.namedWindow("Frame 1")
cv2.imshow( "Frame 1", img1 )
cv2.setMouseCallback("Frame 1", mouse1_drawing)

cv2.namedWindow("Frame 11")
cv2.imshow( "Frame 11", img3 )
cv2.setMouseCallback("Frame 11", mouse11_drawing)

cv2.waitKey(0)
cv2.destroyAllWindows()
```