

Pankajan .T 190428D

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In [ ]: import cv2 as cv
import numpy as np
import matplotlib.pyplot as plt
from plyfile import PlyData, PlyElement
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In [ ]: pcd = PlyData.read(r'airplane.ply')

points = np.concatenate((pcd['vertex']['x'].reshape(1,-1),pcd['vertex']['y'].reshape(1,-1),pcd['vertex']['z'].reshape(1,-1)))

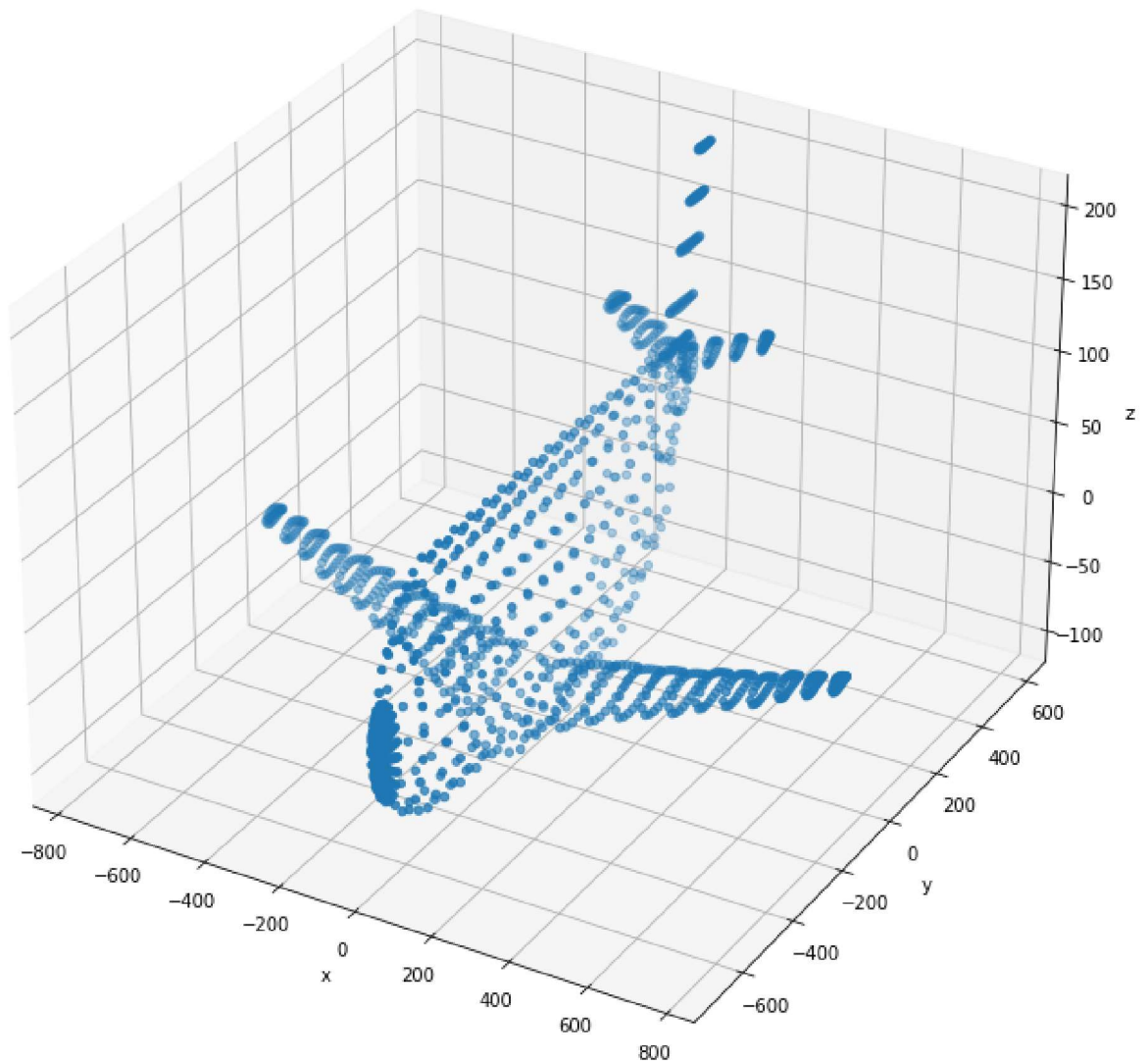
points = points - np.mean(points,axis = 1).reshape(3,1)
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In [ ]: fig = plt.figure(figsize = (12,12))

ax = fig.add_subplot(111,projection = '3d')

ax.scatter(points[0,:],points[1,:],points[2,:])
ax.set_xlabel('x')
ax.set_ylabel('y')
ax.set_zlabel('z')
```

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Out[ ]: Text(0.5, 0, 'z')
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In [ ]: ones = np.ones((1,points.shape[1]))
X = np.concatenate((points,ones),axis=0)
points = np.concatenate((points,ones),axis = 0)

R = np.array([[1,0,0],[0,1,0],[0,0,1]])
K = np.array([[1,0,0],[0,1,0],[0,0,1]])

t = np.array([[0],[0],[-4000]])

P1 = K @ np.concatenate((R,t),axis=1)

R = np.array([[1,0,0],[1,1,0],[0,0,1]])

k = np.array([[1,0,0],[0,1,0],[0,0,1]])
t = np.array([[0],[0],[-4000]])

P2 = K @ np.concatenate((R,t),axis=1)

X1 = P1 @X
X2 = P2 @X
```

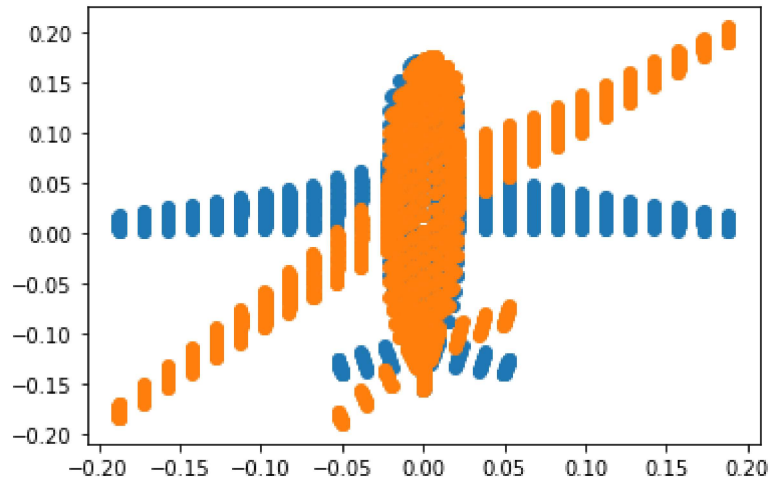
```

X1 = X1/X1[2,:]
X2 = X2/X2[2,:]

fig ,ax =plt.subplots(1,sharex =True,sharey = True)
ax.scatter (X1[0,:],X1[1,:])
ax.scatter(X2[0,:],X2[1,:])

```

Out[ ]: <matplotlib.collections.PathCollection at 0x1eb0766ca90>



```

In [ ]: im = cv.imread(r'earrings.jpg',cv.IMREAD_COLOR)

hsv = cv.cvtColor(im,cv.COLOR_BGR2HSV)
th , bw = cv.threshold(hsv[:, :,1],0,255,cv.THRESH_BINARY+cv.THRESH_OTSU)

w = 5
kernel = np.ones((w,w),np.uint8)
opened = cv.morphologyEx(bw,cv.MORPH_CLOSE,kernel)

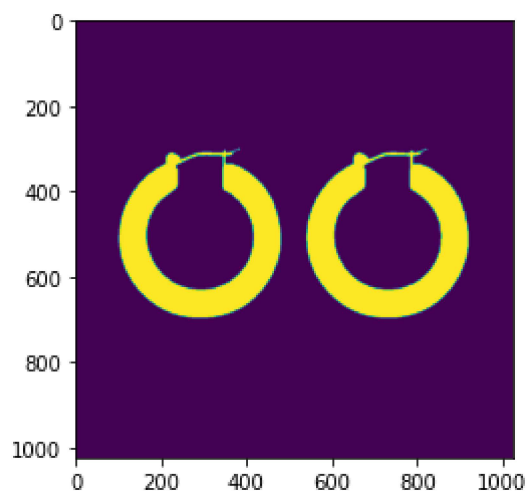
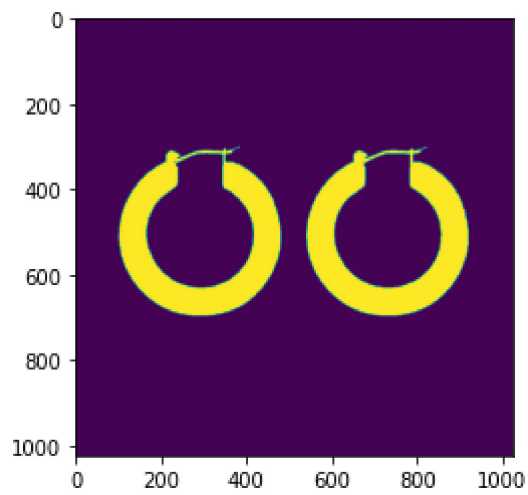
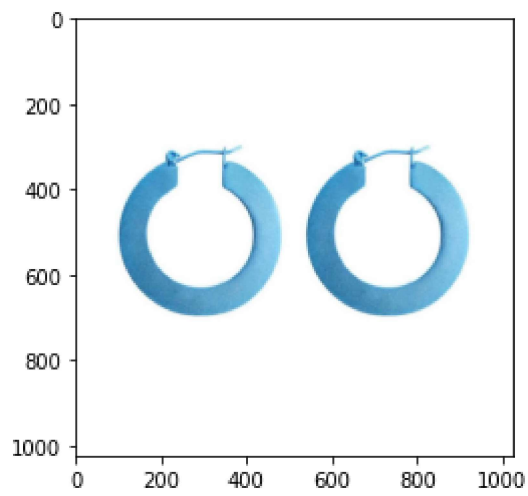
retval , labels,stats ,centroids = cv.connectedComponentsWithStats(bw)
colormapped = cv.applyColorMap((labels/np.amax(labels)*255).astype('uint8'),cv.COLORMAP_JET)

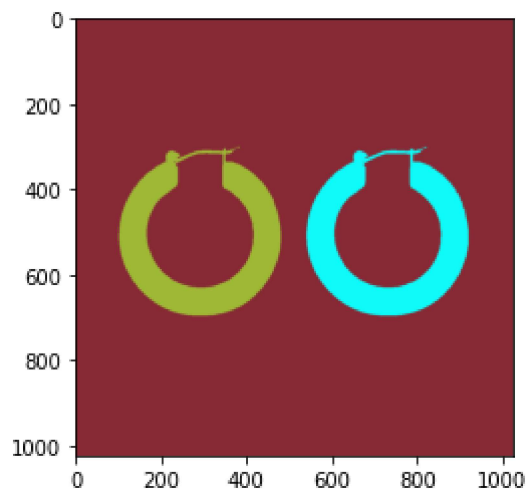
Z = 720
f = 8
for i,s in enumerate(stats):
    if i!=0:
        print('item',i,'area in pixels =',s[4])
        print('item',i,'area in mm^2 =',s[4]*(2.2e-3)**2*(Z*Z)/(f*f))

plt.imshow(im)
plt.show()
plt.imshow(bw)
plt.show()
plt.imshow(opened)
plt.show()
plt.imshow(colormapped)
plt.show()

item 1 ,area in pixels = 59143
item 1 ,area in mm^2 = 2318.642172
item 2 ,area in pixels = 59211
item 2 ,area in mm^2 = 2321.3080440000003

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In [ ]: