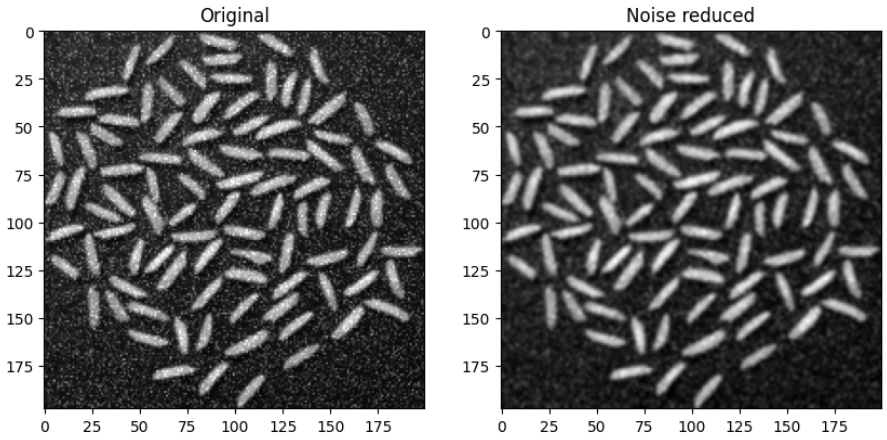
Question No.04

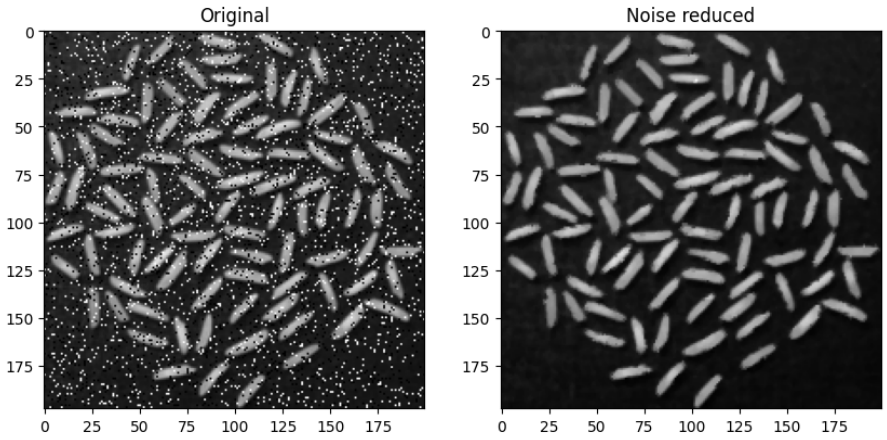
```
import cv2 as cv
import matplotlib.pyplot as plt
from google.colab import drive
drive.mount ('/content/drive')
image =cv.imread("/content/drive/MyDrive/images/rice_gaussian_noise.png", cv.IMREAD_GRAYSCALE)

assert image is not None

k = 3

Noise_reduced = cv.GaussianBlur(image, (k,k), 0)

fig, ax = plt.subplots(1,2,figsize = (10,10))
ax[0].imshow(image, cmap = 'gray')
ax[0].set_title('Original')
ax[1].imshow(Noise_reduced, cmap = 'gray')
ax[1].set_title('Noise reduced')

plt.show()
```

```
Drive already mounted at /content/drive; to attempt to forcibly remount, call drive.mour
```



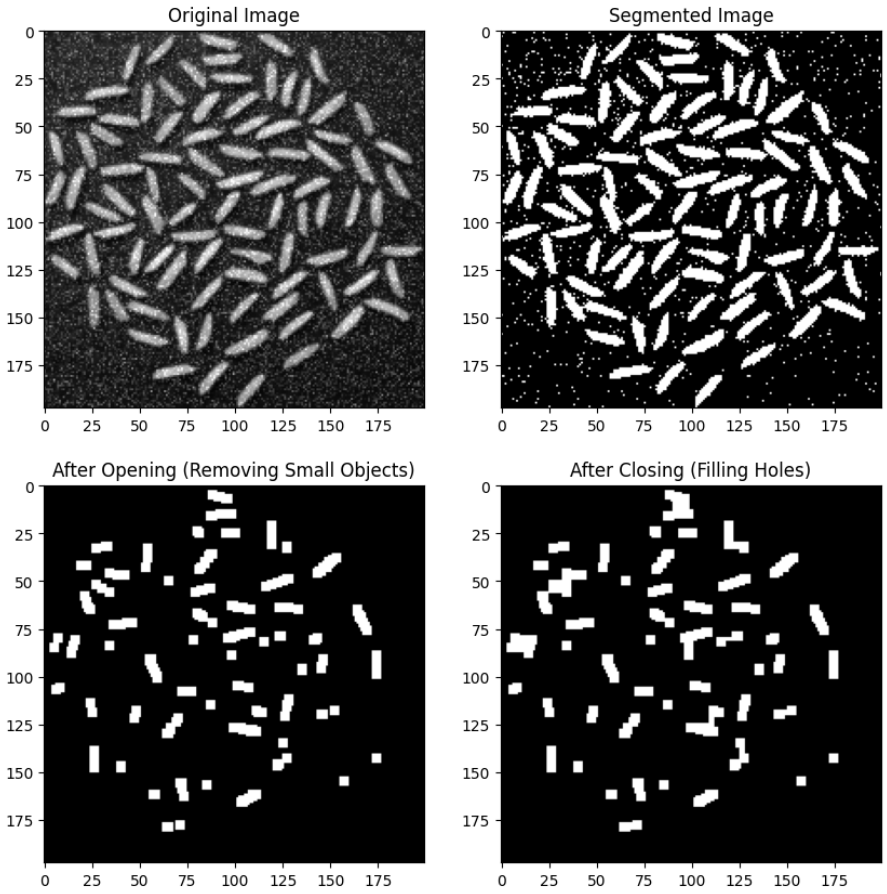

```
import cv2 as cv
import matplotlib.pyplot as plt
from google.colab import drive
drive.mount('/content/drive')

im1 = cv.imread("/content/drive/MyDrive/images/rice_salt_pepper_noise.png", cv.IMREAD_GRAYSCALE)

assert im1 is not None

k = 3
im2 = cv.medianBlur(im1, k)

fig, ax = plt.subplots(1,2,figsize = (10,10))
ax[0].imshow(im1, cmap = 'gray')
ax[0].set_title('Original')
ax[1].imshow(im2, cmap = 'gray')
ax[1].set_title('Noise reduced')

plt.show()
```

```
Drive already mounted at /content/drive; to attempt to forcibly remount, call drive.mour
```




```
import cv2 as cv
import numpy as np
import matplotlib.pyplot as plt
from google.colab import drive
drive.mount ('/content/drive')

# Load the image
im1 = cv.imread("/content/drive/MyDrive/images/rice_gaussian_noise.png", cv.IMREAD_GRAYSCALE)

# Threshold the image using Otsu's method
_, im2 = cv.threshold(im1, 0, 255, cv.THRESH_BINARY + cv.THRESH_OTSU)
k = 5
# Apply morphological opening to remove small objects
kernel = np.ones((k,k), np.uint8)
im3 = cv.morphologyEx(im2, cv.MORPH_OPEN, kernel)

# Apply morphological closing to fill holes
im4 = cv.morphologyEx(im3, cv.MORPH_CLOSE, kernel)

# Plot original, segmented, opened, and closed images
fig, ax = plt.subplots(2, 2, figsize=(10,10))
ax[0,0].imshow(im1, cmap='gray')
ax[0,0].set_title('Original Image')

ax[0,1].imshow(im2, cmap='gray')
ax[0,1].set_title('Segmented Image')

ax[1,0].imshow(im3, cmap='gray')
ax[1,0].set_title('After Opening (Removing Small Objects)')

ax[1,1].imshow(im4, cmap='gray')
ax[1,1].set_title('After Closing (Filling Holes)')

plt.show()
```

```
Drive already mounted at /content/drive; to attempt to forcibly remount, call drive.mour
```




```
import numpy as np
import cv2 as cv
import matplotlib.pyplot as plt
from google.colab import drive
drive.mount ('/content/drive')

im1 = cv.imread("/content/drive/MyDrive/images/rice_gaussian_noise.png", cv.IMREAD_GRAYSCALE)

assert im1 is not None

_, im2 = cv.threshold(im1, 0, 255, cv.THRESH_BINARY + cv.THRESH_OTSU) #Apply OTSU's thresholding

k = 5

kernel = np.ones((k,k), np.uint8)  # Define kernel size for morphological operations

im3 = cv.morphologyEx(im2, cv.MORPH_OPEN, kernel)  # Perform morphological opening

im4 = cv.morphologyEx(im3, cv.MORPH_CLOSE, kernel) #Perform morphological closing

num_labels, labeled_images, stats, centroids = cv.connectedComponentsWithStats(im4, connectivity = 8)

plt.imshow(labeled_images, cmap = 'jet') #Display results
plt.colorbar()
plt.title('connected components')
plt.show()

num_rice_grains = num_labels
print("Number of rice grains = ", num_rice_grains)
```

```
Drive already mounted at /content/drive; to attempt to forcibly remount, call drive.mount("/content/drive", force_remount=True).
```