Percentage Porosity Calculation

Step 1 : Importing Python Libraries

```
import cv2 as cv
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
from google.colab.patches import cv2_imshow
```

Step 2: Loading image “Sample Image.jpg” directly from google drive

```
# Loading the image
image = cv.imread(f'/content/drive/MyDrive/SoC Image Processing and
Object Detection/Sample Image.jpg')
print(image.shape)
```

Step 3: Showing the RGB image using matplotlib

```
# Showing RGB image
rgb = cv.cvtColor(image, cv.COLOR_BGR2RGB)
plt.axis('off')
plt.imshow(rgb)
```

```
<matplotlib.image.AxesImage at 0x7cf220ba0910>
```

Percentage Porosity Calculation

Step 4: Applying Gaussian Blur to reduce the noise from the image and then converting it to grayscale image and then binarizing the image with a threshold of 72. This threshold value can affect the percentage porosity, as we increase the threshold value the percentage porosity will also increase.

```
# Applying gaussian blur to reduce noise from the image
blur = cv.GaussianBlur(image, (15,15), 0)

# Converting the blur image to grayscale image
gray = cv.cvtColor(blur, cv.COLOR_BGR2GRAY)

# binarizing the image
ret, binary_gray = cv.threshold(gray, 72, 255, cv.THRESH_BINARY)
cv2_imshow(binary_gray)
```

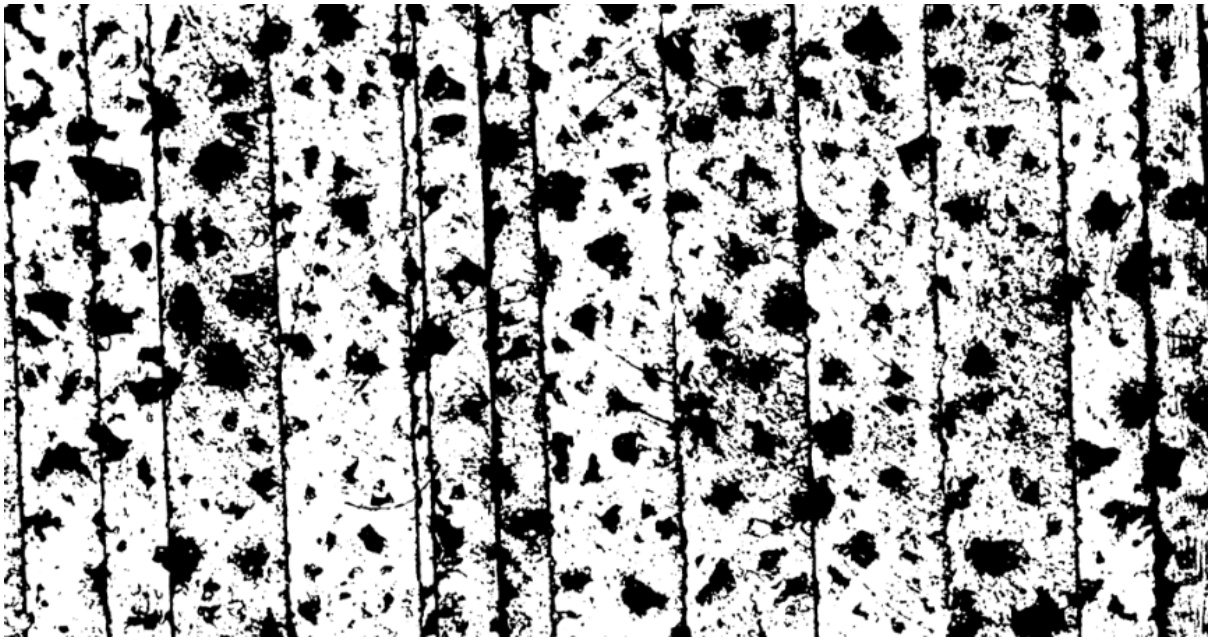

Figure 1 - Small Output of the full image

Step 5: Calculating total number of pixels and total number of pore pixels in the image. Pixels with grayscale value 0 is considered as pore pixels.

```
# Calculating total number of pixel
total_pixel = image.shape[0] * image.shape[1]

# Only 0 and 255 grayscale pixels are there in the image. Pixels with 0
grayscale value are pore pixels
# Calculating number of pore pixel
pore_pixel = total_pixel - cv.countNonZero(binary_gray)

print(f'Total number of pixel in the image : {total_pixel}')
print(f'Number of pore pixels in the image : {pore_pixel}')
```

Output:

```
Total number of pixel in the image : 72751314
```

Percentage Porosity Calculation

```
Number of pore pixels in the image : 22638212
```

Step 6: Calculation of percentage porosity by the given formula. The percentage porosity in this case is 31.12%

```
# Calculating Porosity percentage
porosity_percentage = (pore_pixel/total_pixel) * 100
print(f'Porosity percentage : {round(porosity_percentage, 2)}%')
```

Output:

```
Porosity percentage : 31.12%
```