Software Engineering

User Guide

Project – 24
Microstructure-Segmentation

1. **Steps to run the project:**
    1. Install the following packages using pip OR create a conda environment and install the following

        - python 3.6 (Note: Please do not use python version 3.8 as the torch binaries are broken for this version)
        - torch 1.2.0
        - torchvision 0.2.2

            pip install torch==1.2.0+cpu torchvision==0.2.2.post3 -f
   https://download.pytorch.org/whl/torch_stable.html

        - scikit-image 0.15.0
        - pillow 6.0.0
        - numpy 1.16.3
        - matplotlib 3.1.0
        - opencv

            pip install opencv-python

        - matplotlib

            pip install matplotlib

    2. Navigate to the project folder

    3. Launch the command prompt OR the conda environment (if you have created any)
    4. Run the script Microstructure_segmentation.py using the command:
   **python Microstructure_segmentation.py** .
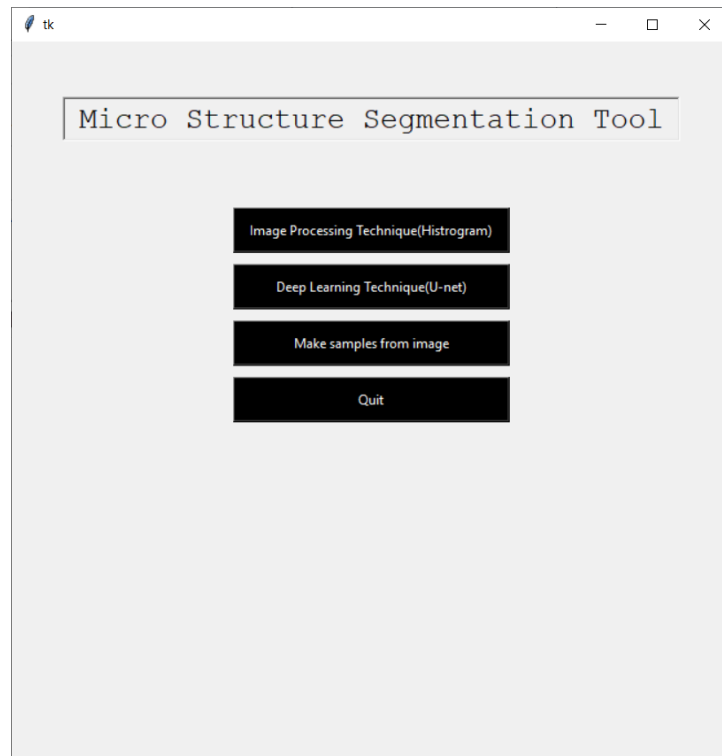
**2.** How to use the Microstructure -Segmentation tool

    1. Image Processing Technique (Histogram approach):

- To run this, one must first execute step 3 to generate sub-images of size 256x256.
- We have provided 5 sample images in the **HistogramInput** folder.
- Select one ground truth image from **HistogramInput/GroundTruthImages** folder.
- Select one corresponding id original image from **HistogramInput/OrignalImages** folder**.**
- Select the folder where you want to save the output image.
- Click on proceed Button
- After completion, the application provides a notification that the task is done
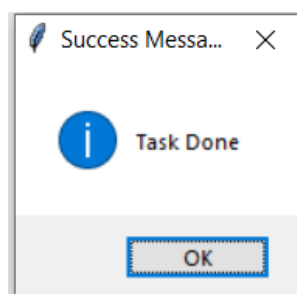
## 2. Deep Learning Technique (UNET approach):
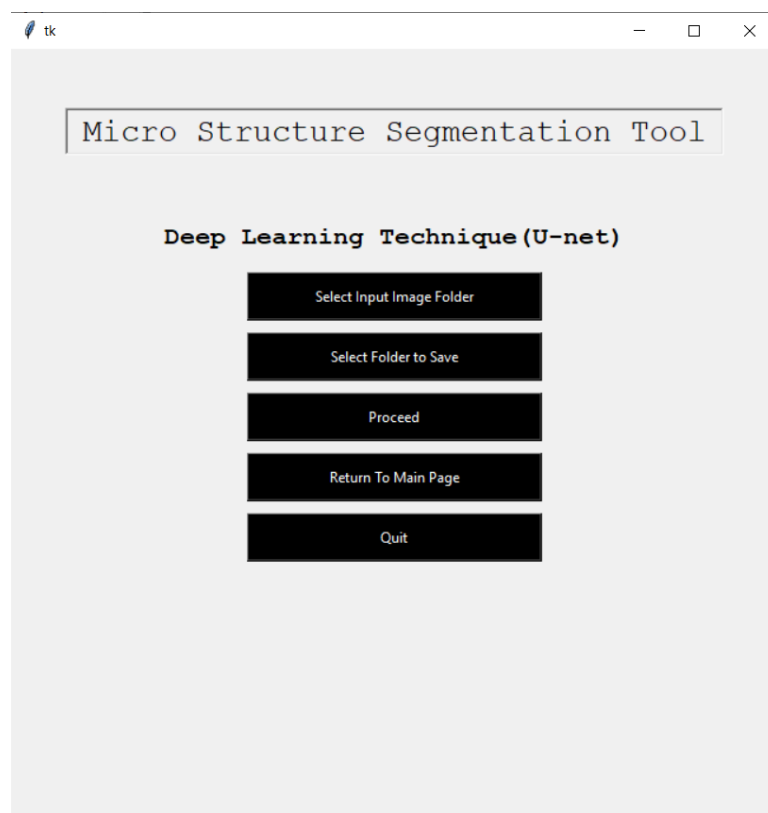
- Click on Select Input Image Folder to select the folder containing all the image files for segmentation.
  (Note: This technique is designed to perform segmentation on multiple images at once. Hence, the folder containing the image file/files must be provided as input. This technique reads all images present in the input folder. The images must be of size 256x256) We have provided 5 sample images in the **UnetInput** folder.

- Click on Select Folder to Save to browse through your computer and specify the folder where the segmented images can be stored.
- Next, hit Proceed to start the segmentation process.

- You may refer to the log showing the number of input images processed. This is displayed on command prompt for the application

```
Unet Implementation for user input
Segmenting image 1/11
Segmenting image 2/11
Segmenting image 3/11
Segmenting image 4/11
Segmenting image 5/11
Segmenting image 6/11
Segmenting image 7/11
Segmenting image 8/11
Segmenting image 9/11
Segmenting image 10/11
Segmenting image 11/11
```

- After completion, the application provides a notification that the task is done
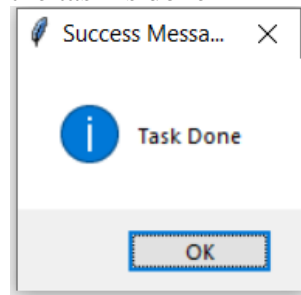
3. **Make samples from image:**

   Owing to data confidentiality, we cannot provide the main image that was used to create sub-images. However, you can check the working of this module by selecting **.tif** image.
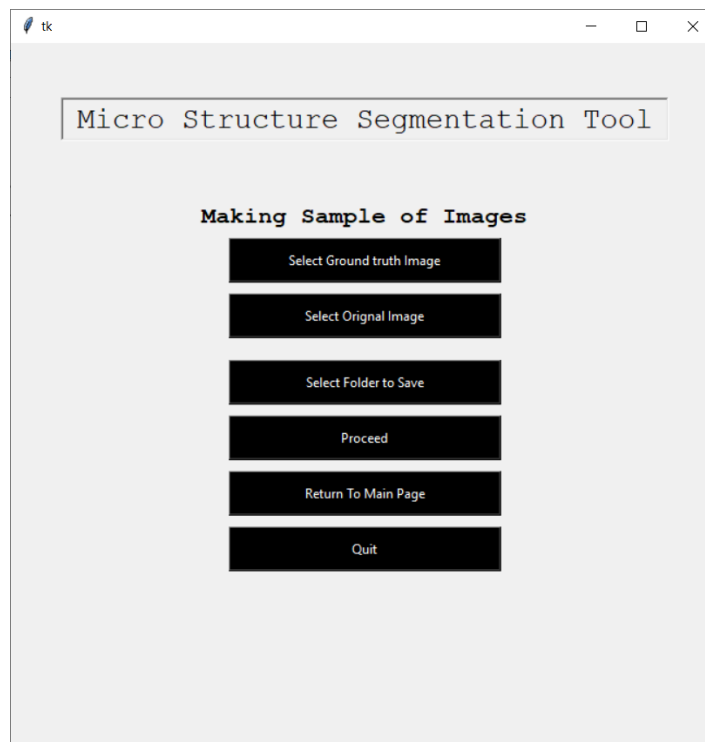
4. **Click "Quit" to close the application**