# Laboratory 3 Spatial Transforms and Filtering

1. Implement the histogram equalization to the input images Q3_1_1.tif and Q3_1_2.tif . The implementation is developed in a form of

```
def hist_equ_学号(input_image):

    # Insert code here

    return (output_image, output_hist, input_hist)
```

2. **Specify a histogram** for image Q3_2.tif, such that by matching the histogram of Q3_2.tif to the specified one, the image is enhanced. **Implement the specified histogram matching** to the input image Q3_2.tif. You may refer to the histogram given in the Lecture Notes 3 page 49, but not necessary to use the same one. **Illustrate your specified histogram graphically and numerically** in your report. The implementation is developed in a form of

```
def hist_match_学号(input_image, spec_hist):

    # Insert code here

    return (output_image, output_hist, input_hist)
```

3. Implement the local histogram equalization to the input images Q3_3.tif. The implementation is developed in a form of

```
def local_hist_equ_学号(input_image, m_size):

    # Insert code here

    return (output_image, output_hist, input_hist)
```

4. Implement an algorithm to reduce the salt-and-pepper noise of an image. The input image is Q3_4.tif. The implementation is developed in a form of

```
def reduce_SAP_学号(input_image, n_size):

    # Insert code here

    return output_image
```

In the above, `input_image` is the file name of the input image, `output_image` is the file name of the output image, `input_hist` and `output_hist` are lists containing the histogram of the input image and output image, and `spec_hist` is a list containing a specified histogram of the input image; `m_size` is the scale of the neighborhood size, and `n_size` is the scale of the filter size.

## Submission:

Submit your report, codes, and image to Blackboard.
The report requirement is the same as that of Laboratory 2.
**Naming rules** for files to be submitted:

| | |
|---|---|
| function_name_学号.py: | The python codes of the above 4 algorithms. |
| output_image_name_学号.tif: | The file names of the output images. |