

Image Filtering & Edge Detection Techniques

Image Processing Techniques

In this Repository we present a variety of Image processing Techniques implemented from scratch using Numpy and Pure Python. Each Category of Algorithms is presented in its tab in the UI which we will discover next.

Implementations Added:

1. Noise Functions (Simulation of Different Noise Types): Uniform, Gaussian and Salt & Pepper.
2. Edge Detection Techniques: Prewitt, Sobel and Roberts.
3. Image Histogram Equalization and Normalization.
4. Local and Global Thresholding
5. Transformation to Gray Scale
6. Frequency Domain Filters: Low Pass and High Pass Filters

In addition to histogram and distribution curve drawing for the loaded image and the option to mix 2 input images.

Results:

Our UI present a tab for each category of the implemented algorithms. We first load our image and apply the selected algorithm.

1. Noise Addition :

1. 1. Uniform Noise



2. Gaussian Noise

Noisy Image



3. Salt & Pepper

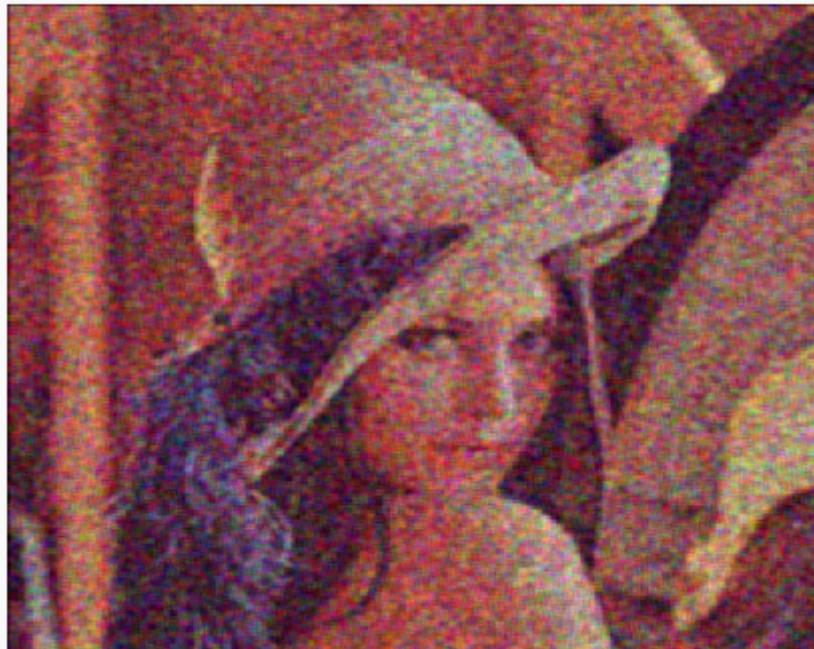
Noisy Image



2. Noise Filtration:

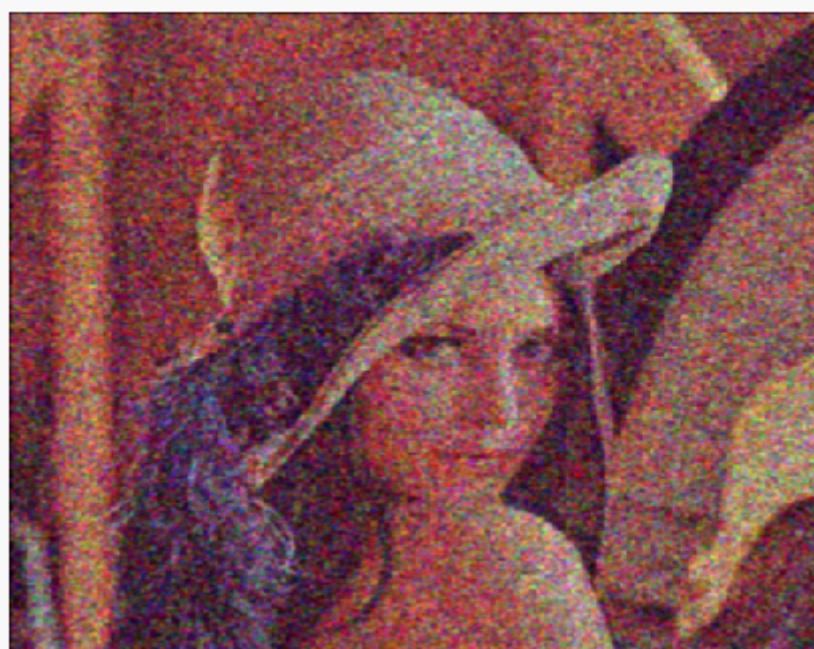
1. Average Filter (Applied on Gaussian Noise)

Filtered Image



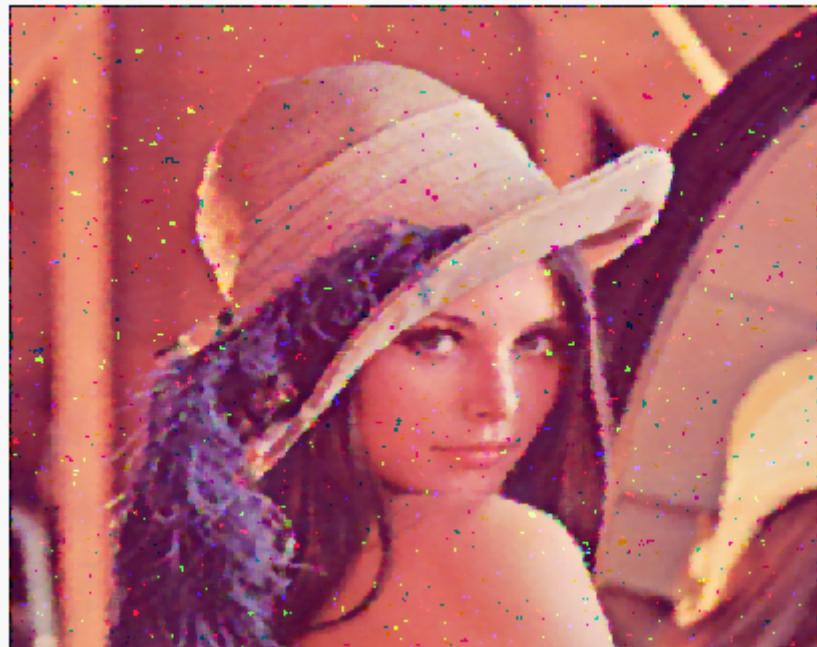
2. Gaussian Filter (Applied on Gaussian Noise)

Filtered Image



3. Median Filter (Applied on a Salt & Pepper Noisy Image)

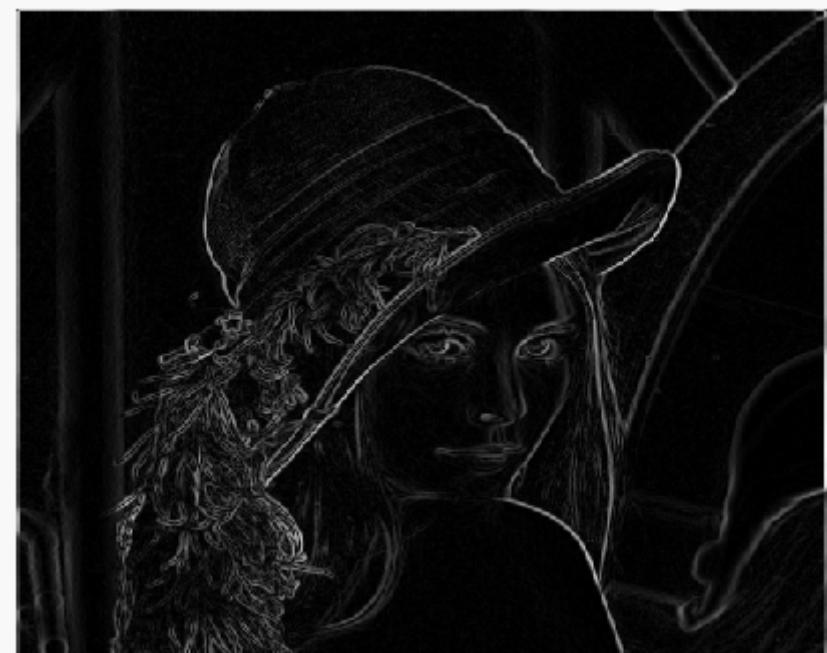
Filtered Image



3. Edge Detection Techniques:

1. 1. Sobel

Edge Detection Image



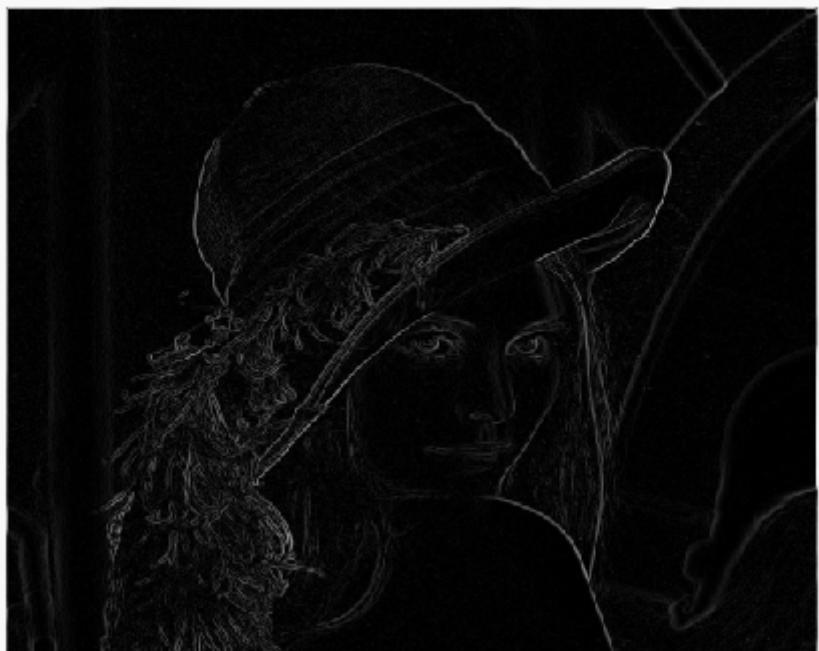
2. Prewitt

Edge Detection Image

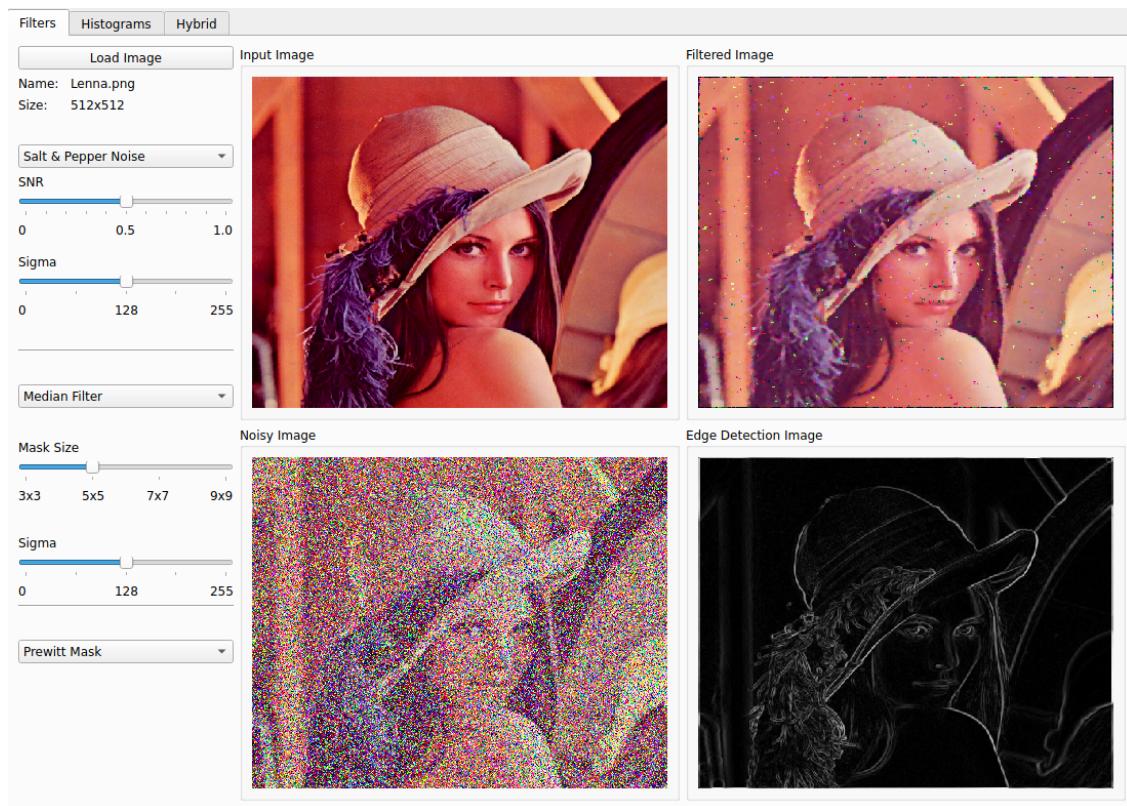


3. Roberts

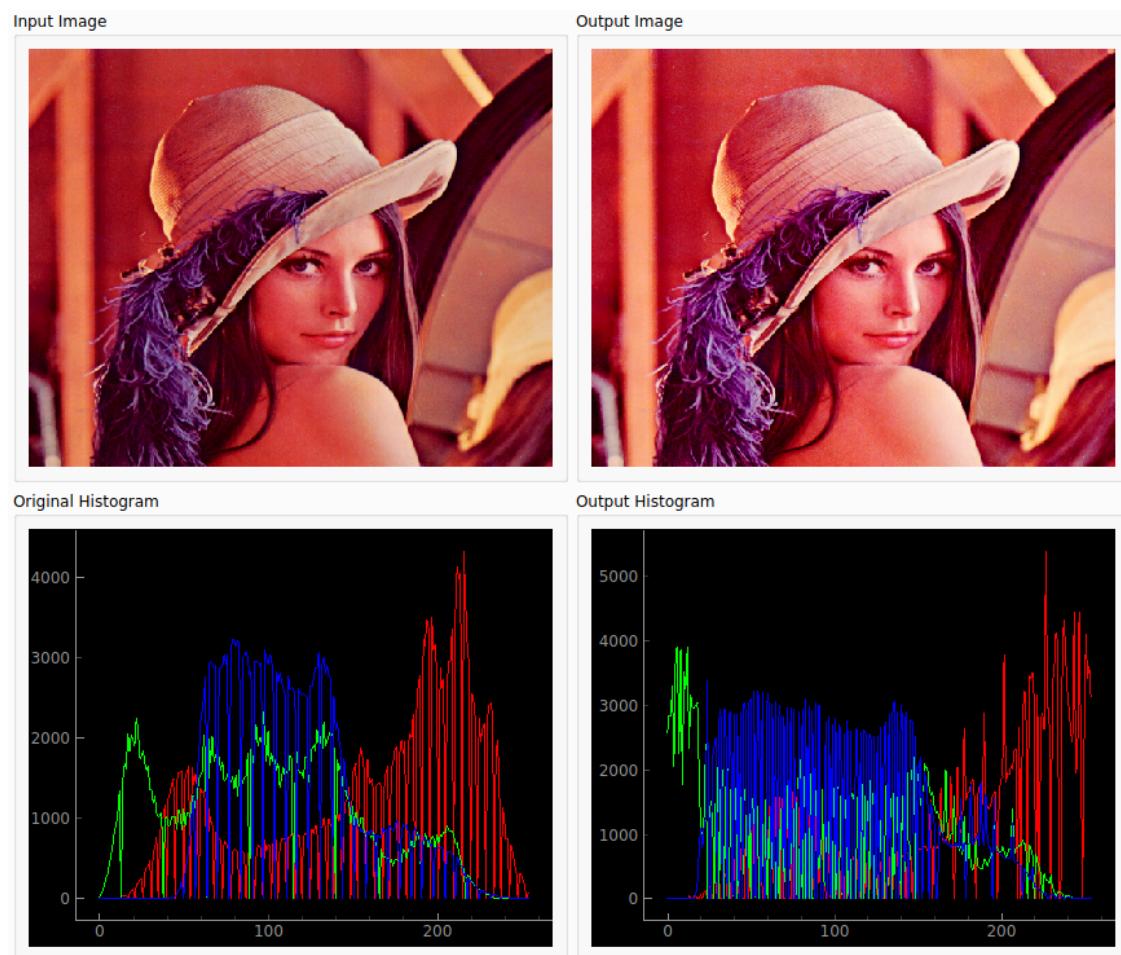
Edge Detection Image



You can apply different SNR ratios and choose the Sigma of Each Algorithm implemented from the sliders added on the left, each cell is marked with its contents and the application of the change in the sliders is instant.



4. Histogram Equalization with input and output histograms



5. Local and Global Thresholding

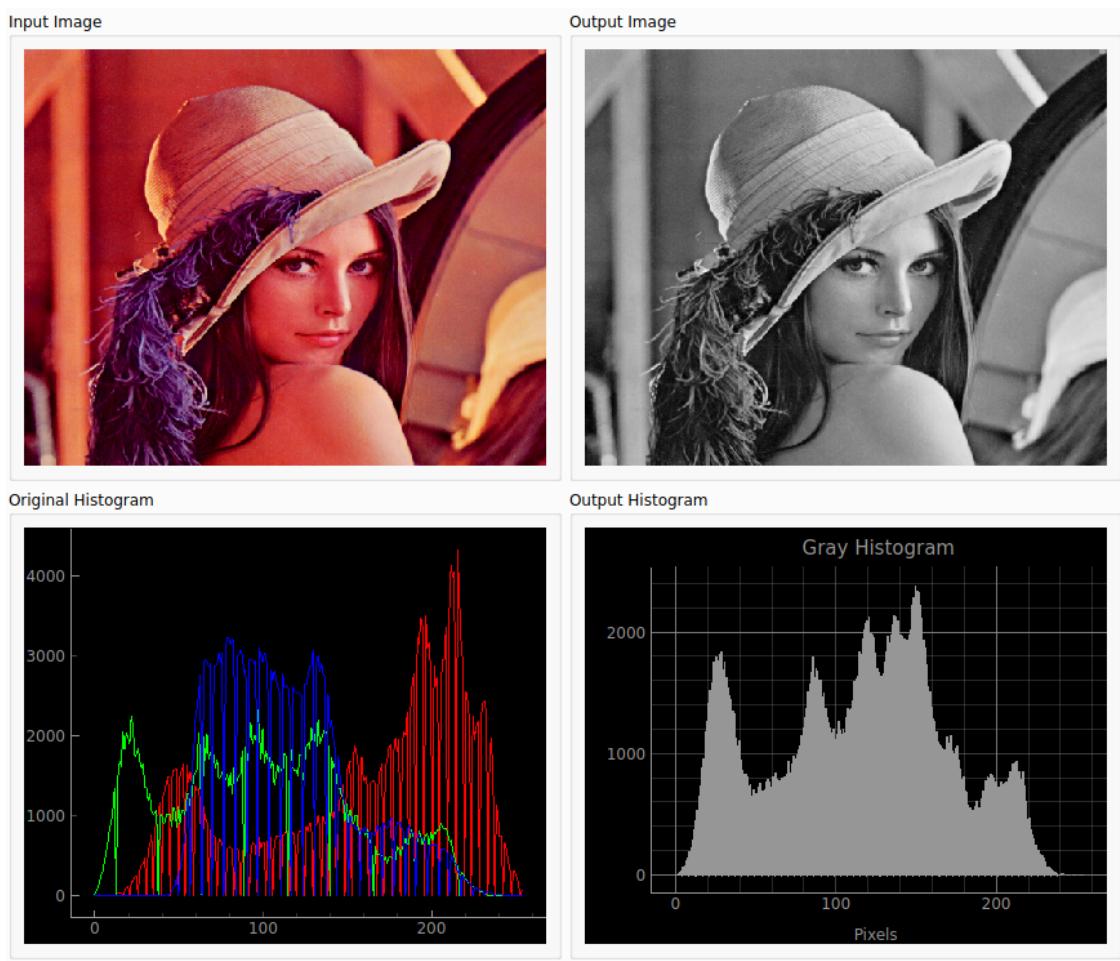
Output Image



Output Image



6. Gray Scale Transformation



7. Frequency Domain Mixing

