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…21.. February 2018
…10:00-11:50…

# Lab6 **Neighborhood Processing**

Neighborhood processing is simply of moving the center of the filter mask *w* from point to point in an image, *f* for enhancement. In this Lab, we will use matlab to design program for processing the neighborhood pixels.

## Procedure

1. Read the image file, "saturn.tif" and assign to *u* variable.

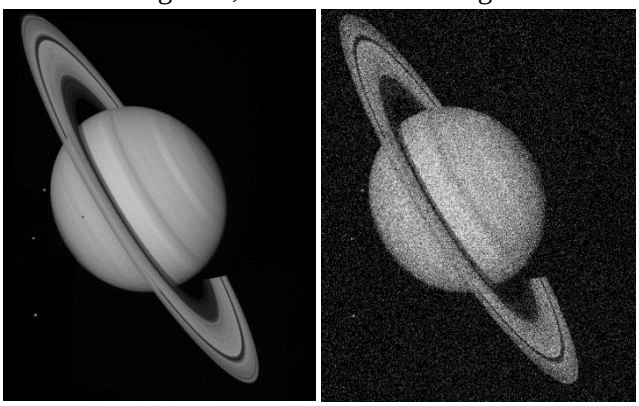

Fig. 1 (a) Saturn image (b) Gaussian noise image

2. Add Gaussian noise to the image *u* and assign to *f* by the following:
   $f = u + n$
   where $n$ is the Gaussian noise with the noisy parameters, $\mu = 0 \; and \; \sigma^2 = 0.025$ and It can implement by imnoise as the following:
   >> *f* = imnoise(f, 'gaussian', 0, 0.025); % The noisy image *f* is shown in Fig. 1(b)

3. Get the noisy image data from 250th row to process with the window as given by:
   3.1 w = [1/3 1/3 1/3]
   3.2 w = [1/5 1/5 1/5 1/5 1/5]
   3.3 Median filter, w = [-1 0 1]
   3.4 Median filter, w = [-2 -1 0 1 2]
   Let design functions:
   function g = Average1D(f, w)
   function g = Median1D(f, w)

   where f is array of the image data from 250th row and w is the given windows.

```
%Some program example
function g = Average1D(f, w)
% f is input signals
% w is window
   N = numel(f);
   m = numel(w);
   m = floor(m/2);
   f = double(f);
   g = f;
   for i=1+m:N-m
      x = f(i-m:i+m);
      g(i) = sum(x.*w);
   end
   figure, plot(1:N, g, '--r');
   hold on
   plot(1:N, f);
end
```

4. Modify Average1D to operate the noisy image in Fig. 1(b) by using 3×3 average window.
5. Operate the following statements by varying the window size n=3, 7, 11

```
>> hn = fspecial('average', n);
>> g = imfilter(u, hn);
```

Analyze (by considering the error values between noise and noise free images) the image results by the following statements.

```
>> e = g-u;
>> error = sum(sqrt(e.^2)/N);
```