COMP 478/6771 (FALL 2020)

Digital Image Processing

Digital Image Enhancement in Spatial Domain (cont.)

Instrutor: Prof. Yiming Xiao

Tutors:

Materials provided by Dr. T. D. Bui

Median filter

```
function [J]  = median_filter(I, window_size)

m = size(I,1);
n = size(I,2);
hN =  (window_size - 1) / 2;


K = zeros(m + window_size - 1 , n + window_size - 1);
J = zeros(m, n);

K(1 + hN : m + hN, 1 + hN : n + hN) = I;
```

```
for i= 1 : m
    for j = 1 : n
        wind = K(i : i +  window_size - 1 , j : j +
           window_size - 1);

        wind_vector = reshape(wind, window_size *
    window_size, 1);

        wind_sorted = sort(wind_vector);
        median_w = wind_sorted((end + 1) / 2);
        J(i,j) = median_w;
    end
end

J = uint8(J);
```

Test median filter

- We can add noise with imnoise function

- `J = imnoise(I,'salt & pepper',0.02);`
- `K = median_filter(J, window_size);`
- `imshow(J), figure, imshow(K)`

- You can compare your result with medfilt2() function.

Edge function

- BW = edge(I,'sobel')
- BW = edge(I,'prewitt')
- BW = edge(I,'roberts')
- BW = edge(I,'log')

Edge detection

- Create filter with this command
- h = fspecial(*type*)

Value	Description
average	Averaging filter
disk	Circular averaging filter (pillbox)
gaussian	Gaussian lowpass filter
laplacian	Approximates the two-dimensional Laplacian operator
log	Laplacian of Gaussian filter
motion	Approximates the linear motion of a camera
prewitt	Prewitt horizontal edge-emphasizing filter
sobel	Sobel horizontal edge-emphasizing filter

Apply filter H

- J = imfilter(A, H)
- J =conv2(A,H,'same')

Exercise

- Write a function to Apply Sobel, Prewitt and Laplacian filter to the sample image.

- Reference : http://www.mathworks.com