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…31.. Jan 2018
…10:00-11:50…

Lab 3. Intensity transformation

1. Design function to improve brightness of the 8-bits image with the following function

$$g(x,y)=T(f(x,y))$$

where $f(x,y)$ represents Cameraman.tif and pout.tif. The designed function has $f(x,y)$ as the input argument. Let *r* be intensity value of the 8-bits image; thus, *r* = 0, 1, 2, ..., 255 and $f(x,y) \in r$. Analyze the transfer function, *T*, which uses to map the input intensity *r* to *s* $(g(x,y) \in s)$ as given by:

1.1 $T(f(x,y)) = INT\left\{255\left[\frac{f(x,y)}{255}\right]^{\frac{1}{\gamma}}\right\}$, where $\gamma = -1, 0.5, 1$

1.2 $T(f(x,y)) = INT\left\{255\frac{\log[f(x,y)+1]}{\log(256)}\right\}$

1.3 $T(f(x,y)) = \frac{1}{1+(m/f(x,y))^{E}}$; whiere *m* = 127, *E*=2

Note: use plot(r,s), hold on, and legend to show the relation between r and s as the following example instructions

```
r = 0:255;
s1 = 255*(r/255).^2;
s2 = 255*(r/255).^4;
s3 = 255*(r/255).^0.5;
plot(r,s1, '--');
hold on
plot(r,s2, 'r');
plot(r,s3, 'g');
legend('gamma=2', 'gamma=4', 'gamma=0.5')
```

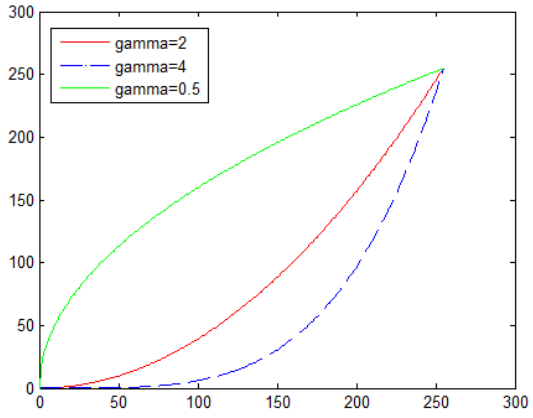


Fig. 1 Intensity transformation by gamma

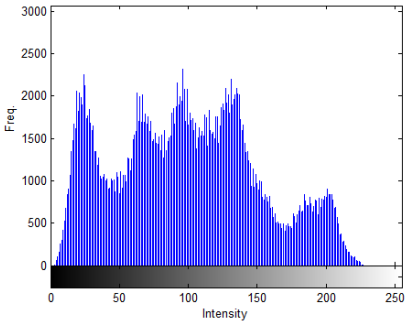
To transform the image, $\mathbf{f(x,y)}$, with the function, T, use for-loop to convert pixel by pixel as the following

```
for x=1:M
    for y=1:N
        g(x,y) = s1(f(x,y));
    end
end
```

2. Use imadjust and stretchlim functions (helpwin imadjust) to operate the input images from the previous problem with the parameter gamma, $\gamma = -1, 0.5, 1$.

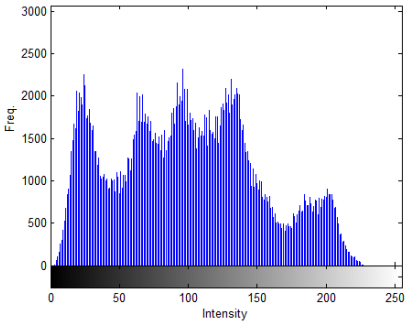
Note: To show the results as illustrated in Fig. 2, use subplot(2,2,1), …, subplot(2,2,4) and imhist for display the image histogram.

Input image



Input histogram

Output image



Output histogram

Fig. 2 The image results