clear;

clc;

format compact;

% im\_org=double(imread('01.bmp'));

% im\_org=double(imread('05.bmp'));

% im\_org=double(imread('13.bmp'));

im\_org=double(imread('16.bmp'));

% im\_org=double(imread('17.bmp'));

% im\_org=double(imread('20.bmp'));

% im\_org=double(imread('23.bmp'));

% im\_org=double(imread('30.bmp'));

% im\_org=double(imread('35.bmp'));

% im\_org=double(imread('36.bmp'));

% im\_org=double(imread('40.bmp'));

size(im\_org)

im\_pro=im\_org-min(im\_org(:));

im\_pro=round(im\_pro\*(255/max(im\_pro(:))));

subplot(2,3,1);

imagesc(im\_pro);colormap(gray);axis image;axis off;

title('original');

sumOfVar=zeros(1,254);

for i=1:255

% t=i-0.5;

% Ib=im\_pro(im\_pro<t);

% Io=im\_pro(im\_pro>t);

%t=i-0.5;

%Ib=im\_pro(im\_pro<i);

%Io=im\_pro(im\_pro>i);

% sumOfVar(i)=var(Ib)+var(Io);

ni = i;

numrows = size(im\_org,1);

numcols = size(im\_org,2);

N = 255\*ones([numrows numcols], 'uint8');

Pi = ni./N;

w1 = sum(Pi);

w2 = 1 - w1;

Ia = 1./w1 .\* (sum ((((Pi+1) - Pi).^2)./Pi) );

Ib = 1./w2 .\* (sum ((((Pi+1) - Pi).^2)./Pi) );

It = (w1 .\* Ia) + ((1-w1) .\* Ib);

tOpt = angle(max(((w1.\*Ia) + ((1-w1).\*Ib))));

%sumOfVar(i)=var(Ib).\*numel(Ib)+var(Ia).\*numel(Ia);

end

t=find(It==min(It))-1;

imThresh=im\_pro;

imThresh(imThresh<mean(t))=0;

imThresh=sign(imThresh);

%

subplot(2,3,3);

imagesc(imThresh);colormap(gray);axis image;axis off;

title(['FI Measure ' num2str(t)]);

%

subplot(2,3,4);

I=im\_pro/255;

s=graythresh(I);

x=imbinarize(I,s);

imagesc(x);colormap(gray);axis image;axis off;

title(['Otsu ' num2str(255\*s)]);

x=im\_pro;

t=mean(x(:));

x(x<t)=0;

x=sign(x);

subplot(2,3,5);

imagesc(x);colormap(gray);axis image;axis off;

title(['Mean ' num2str(t)]);

h=zeros(1,256);

for i=0:255

temp=find(im\_pro==i);

h(i+1)=numel(temp);

end

h=h/sum(h);

%

entropy=zeros(1,254);

for i=2:255

x=h(1:i);

y=h(i:end);

z=[sum(x) sum(y)];

entropy(i)=-z\*log(z');

end

subplot(2,3,2);

plot(entropy);

title('Entropy');

t=find(entropy==max(entropy));

im\_pro(im\_pro<t)=0;

im\_pro=sign(im\_pro);

subplot(2,3,6);

imagesc(im\_pro);colormap(gray);axis image;axis off;

title(['Entropy ' num2str(t)]);