HW4

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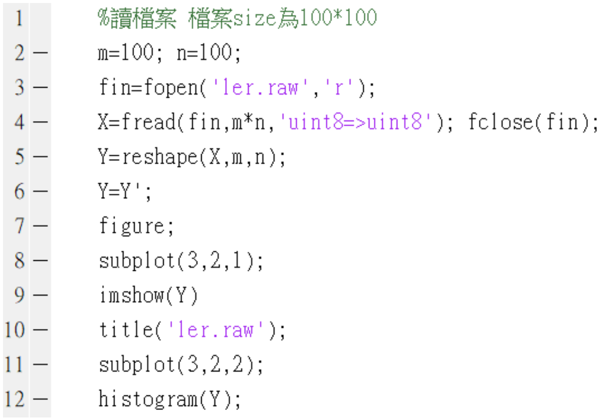
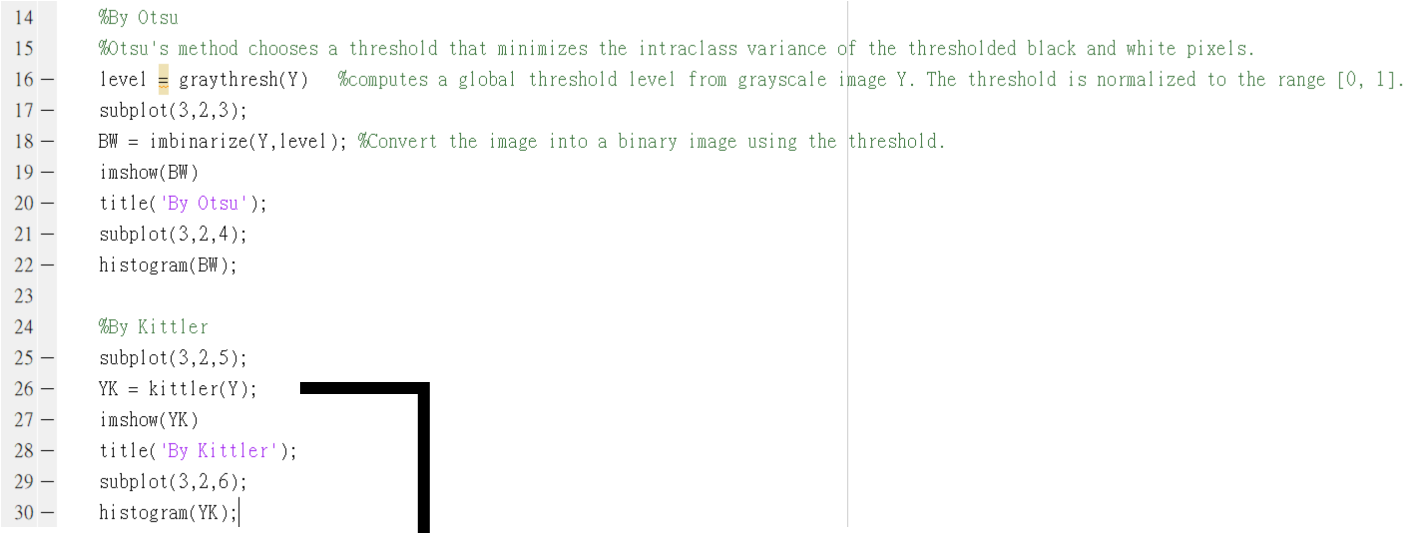
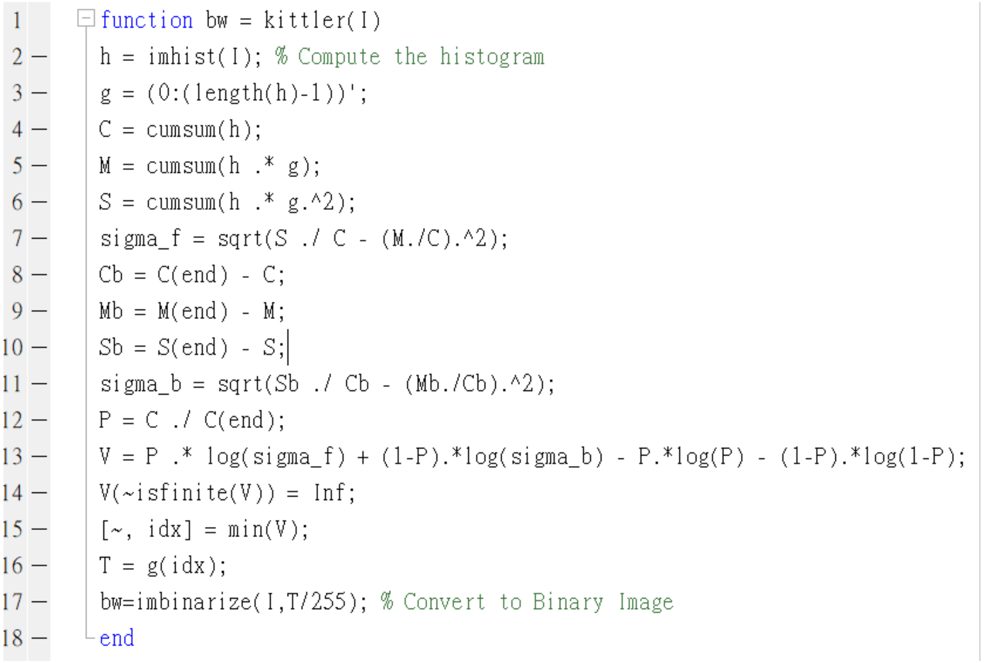


```
%讀檔案 檔案size為100*100
m=100; n=100;
fin=fopen('ler.raw','r');
X=fread(fin,m*n,'uint8=>uint8'); fclose(fin);
Y=reshape(X,m,n);
Y=Y';
figure;
subplot(3,2,1);
imshow(Y)
title('ler.raw');
subplot(3,2,2);
histogram(Y);
```

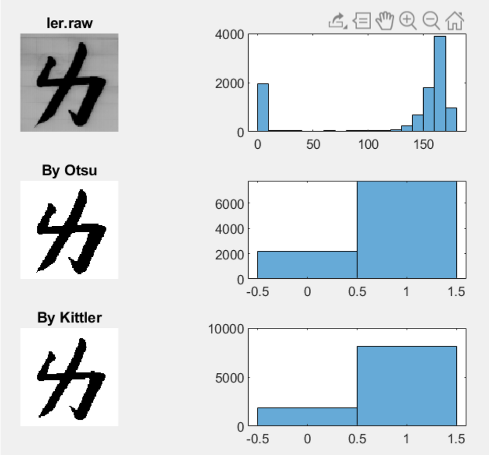


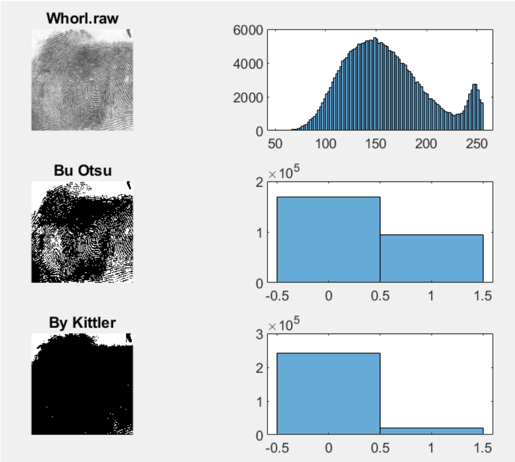
```
%By Otsu
%Otsu's method chooses a threshold that minimizes the intraclass variance of the thresholded black and white pixels.
level = graythresh(Y)   %computes a global threshold level from grayscale image Y. The threshold is normalized to the range [0, 1].
subplot(3,2,3);
BW = imbinarize(Y,level); %Convert the image into a binary image using the threshold.
imshow(BW)
title('By Otsu');
subplot(3,2,4);
histogram(BW);

%By Kittler
subplot(3,2,5);
YK = kittler(Y);
imshow(YK)
title('By Kittler');
subplot(3,2,6);
histogram(YK);
```

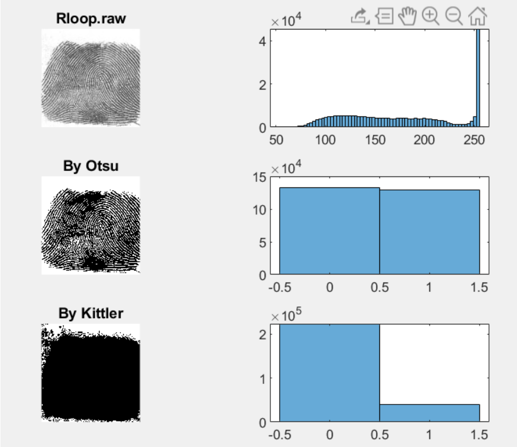
Kittler.m

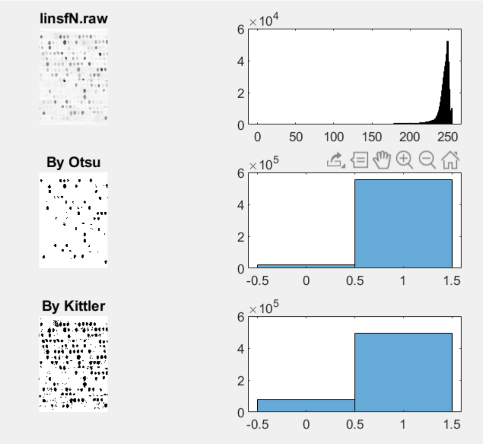


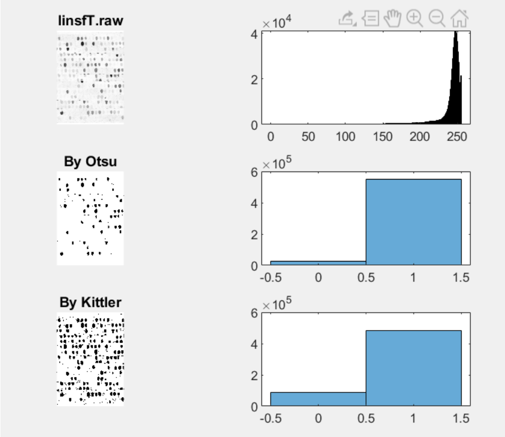
```
function bw = kittler(I)
h = imhist(I); % Compute the histogram
g = (0:(length(h)-1))';
C = cumsum(h);
M = cumsum(h .* g);
S = cumsum(h .* g.^2);
sigma_f = sqrt(S ./ C - (M./C).^2);
Cb = C(end) - C;
Mb = M(end) - M;
Sb = S(end) - S;
sigma_b = sqrt(Sb ./ Cb - (Mb./Cb).^2);
P = C ./ C(end);
V = P .* log(sigma_f) + (1-P).*log(sigma_b) - P.*log(P) - (1-P).*log(1-P);
V(~isfinite(V)) = Inf;
[~, idx] = min(V);
T = g(idx);
bw=imbinarize(I,T/255); % Convert to Binary Image
end
```

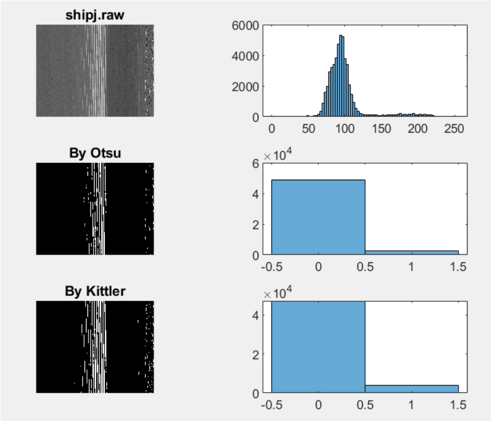

ler.raw
4000
2000
0
0 50 100 150
By Otsu
6000
4000
2000
0
-0.5 0 0.5 1 1.5
By Kittler
10000
5000
0
-0.5 0 0.5 1 1.5

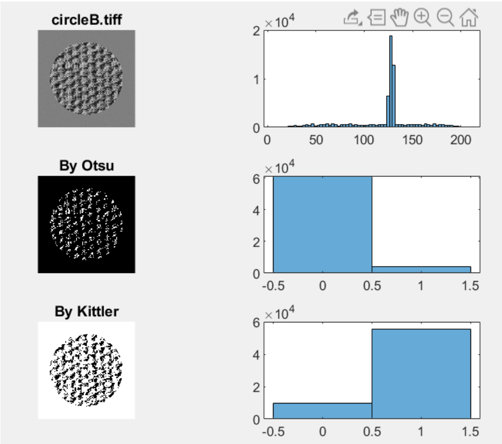

Whorl.raw
6000
4000
2000
0
50 100 150 200 250
Bu Otsu
×10^5
2
1
0
-0.5 0 0.5 1 1.5
By Kittler
×10^5
3
2
1
0
-0.5 0 0.5 1 1.5

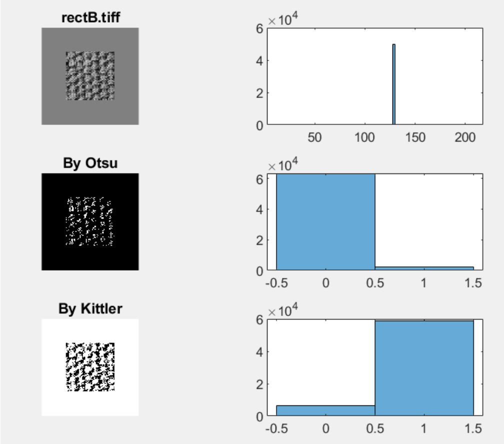

Rloop.raw
×10^4
4
2
0
50 100 150 200 250
By Otsu
×10^4
15
10
5
0
-0.5 0 0.5 1 1.5
By Kittler
×10^5
2
1
0
-0.5 0 0.5 1 1.5


linsfN.raw
×10^4
6
4
2
0
0 50 100 150 200 250
By Otsu
×10^5
6
4
2
0
-0.5 0 0.5 1 1.5
By Kittler
×10^5
6
4
2
0
-0.5 0 0.5 1 1.5


linsfT.raw
×10^4
4
2
0
0 50 100 150 200 250
By Otsu
×10^5
6
4
2
0
-0.5 0 0.5 1 1.5
By Kittler
×10^5
6
4
2
0
-0.5 0 0.5 1 1.5


shipj.raw
6000
4000
2000
0
0 50 100 150 200 250
By Otsu
×10^4
6
4
2
0
-0.5 0 0.5 1 1.5
By Kittler
×10^4
4
2
0
-0.5 0 0.5 1 1.5


circleB.tiff
×10^4
2
1
0
0 50 100 150 200
By Otsu
×10^4
6
4
2
0
-0.5 0 0.5 1 1.5
By Kittler
×10^4
6
4
2
0
-0.5 0 0.5 1 1.5


rectB.tiff
×10^4
6
4
2
0
50 100 150 200
By Otsu
×10^4
6
4
2
0
-0.5 0 0.5 1 1.5
By Kittler
×10^4
6
4
2
0
-0.5 0 0.5 1 1.5