

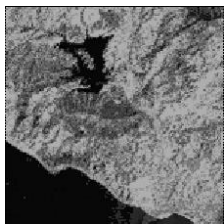
هدف

برای دو تصویر مشخص شده گسترش، یکنواخت سازی و منطبق کردن را انجام می‌دهیم و در هر مرحله هیستو گرام آن ها را مشاهده می‌نماییم.

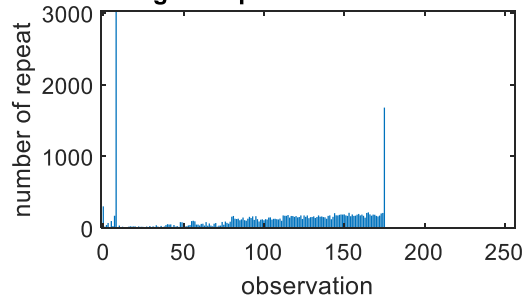
۱- گسترش:

stretch using Min Max scaling

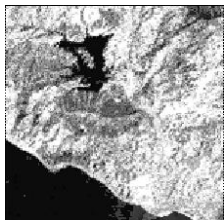
picture 1 before stretch



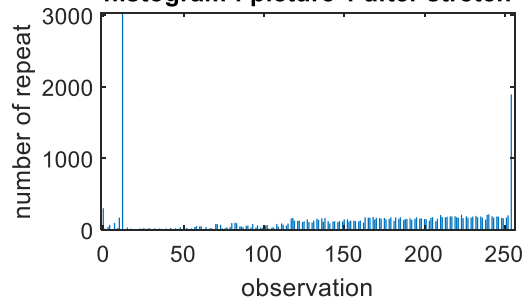
histogram : picture 1 before stretch



picture 1 after stretch



histogram : picture 1 after stretch

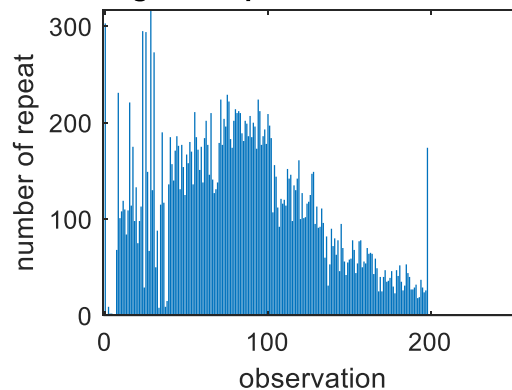


stretch using Min Max scaling

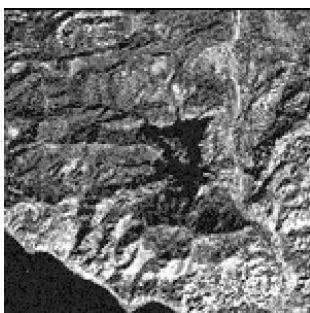
picture 2 before stretch



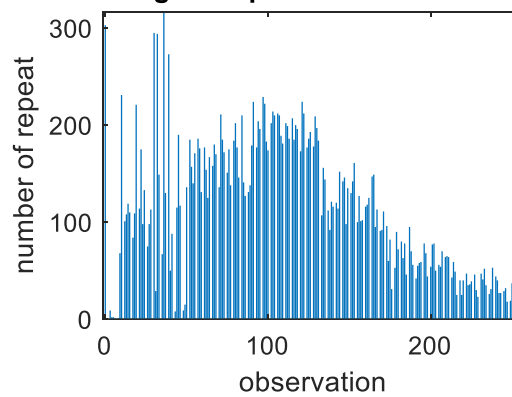
histogram of picture 2 before stretch



picture 2 after stretch



histogram : picture 2 after stretch

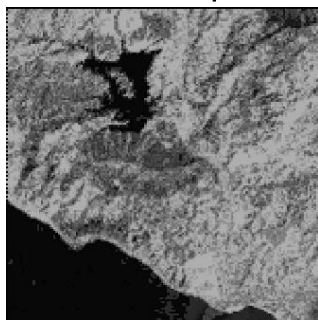


برای گسترش از متد min-max scaling استفاده شده است. که بهبود هر دو تصویر نیز کاملاً مشهود است.

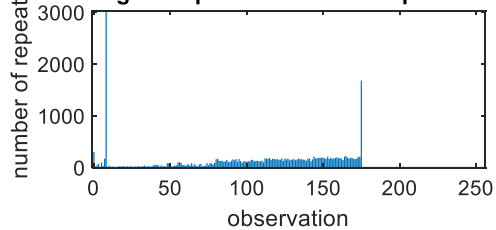
۲- یکنواخت سازی

Histogram Equalization

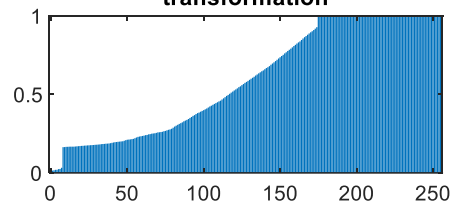
picture 1 before Equalization



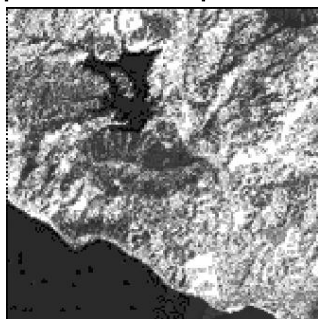
histogram : picture 1 before Equalization



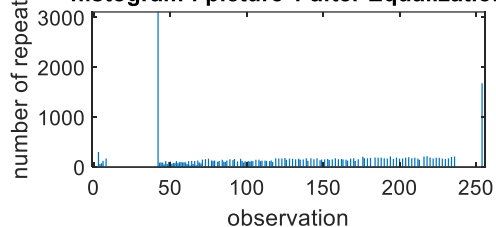
transformation



picture 1 after Equalization



histogram : picture 1 after Equalization

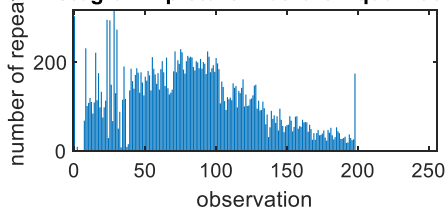


Histogram Equalization

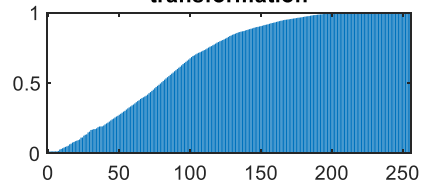
picture 2 before Equalization



histogram : picture 2 before Equalization



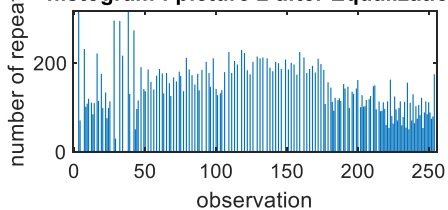
transformation



picture 2 after Equalization



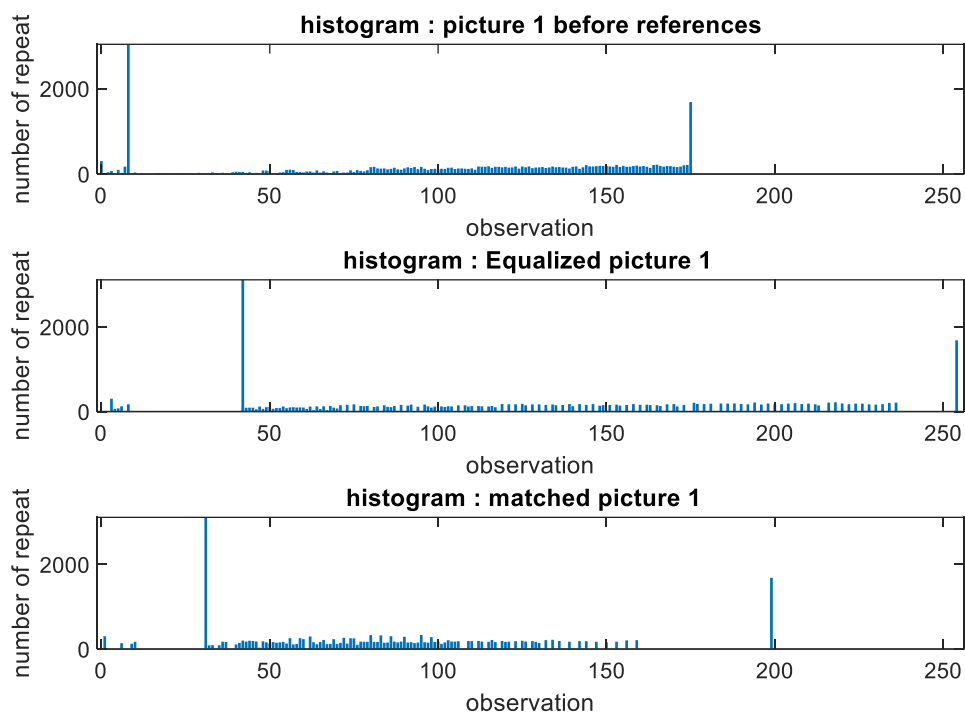
histogram : picture 2 after Equalization



باز هم در هر دو تصویر شاهد بهبود تصویر شده ایم. نتایج قابل مشاهده است و مشاهده میکنیم در یکنواخت سازی نقاطی از هیستوگرام که اندازه های بالایی دارند بعد از همسان سازی نیز مقادیر زیادی دارند که البته دور از ذهن نبود.

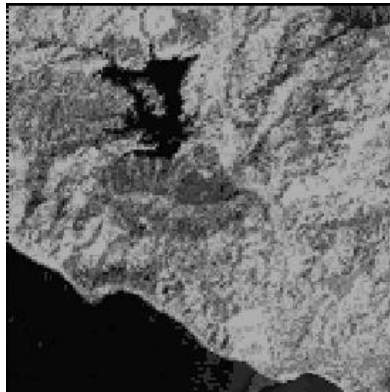
۳- تطبیق:

reference

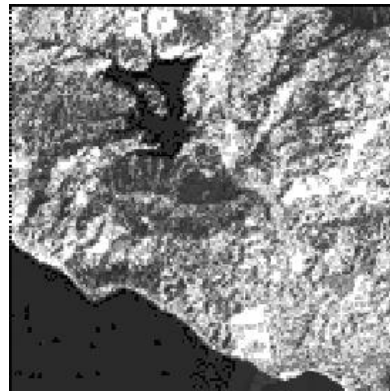


picture reference

picture 1



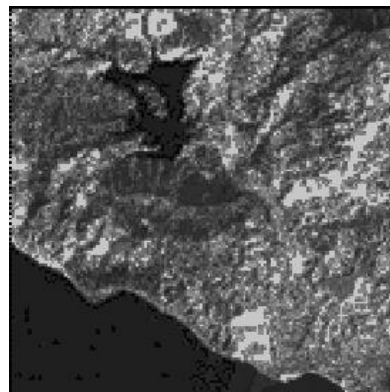
Equalied



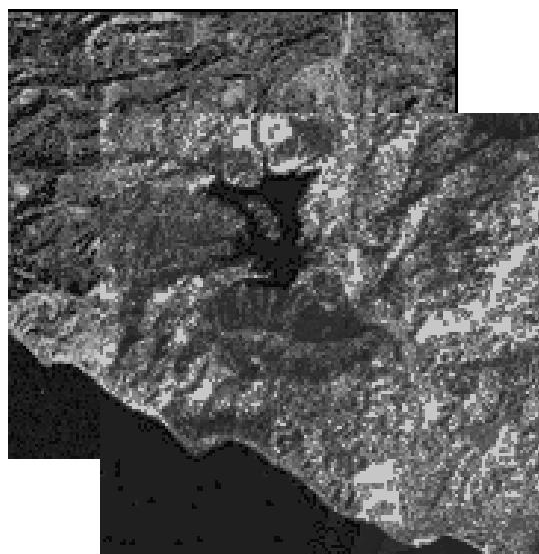
picture 2



matched picture



در تصویر پایین نیز دو تصویر را در یک تصویر نشان داده ایم دقت شود چون تصاویر یک حاشیه سیاه به اندازه یک پیکسل در ۴ طرف خود دارد در تصاویر پایین حاشیه های تصویر در حد نیاز پاک شده است.



توضیحات برنامه:

دو فایل متلب وجود دارد که فایل pichist.m یک فانکشن برای محاسبه هیستوگرام ها میباشد.

کد برنامه ها :

Pichist.m

```
function histo = pichist(p)
histo = zeros(1,256);
sizep = size(p);
pixels = sizep(1) * sizep(2);
for index = 1:pixels
    histo(p(index)+1) = histo(p(index)+1) +1;
end
bar((0:255),histo)
```

project1.m

```
clc
clear all
close all
%%
p1 = imread("Picture2.bmp");
p2 = imread("picture3.bmp");
size1 = size(p1);
pixels1 = size1(1)*size1(2);
```

```

size2 = size(p2);
pixels2 = size1(2)*size2(2);
figure
sgtitle("stretch using Min Max scaling")

subplot(2,2,1)
imshow(p1)
title("picture 1 before stretch")

subplot(2,2,2)
hist1 = pichist(p1);
title("histogram : picture 1 before stretch")
ylabel("number of repeat")
xlabel("observation")

figure
sgtitle("stretch using Min Max scaling")

subplot(2,2,1)
imshow(p2)
title("picture 2 before stretch")

subplot(2,2,2)
hist2 = pichist(p2);
title("histogram of picture 2 before stretch")
ylabel("number of repeat")
xlabel("observation")
%% section 1
% plcont = (log(double(p1))./double((max(max(p1)) - min(min(p1)))));
% plcont = plcont / max(max(plcont)) *255;
% figure
% imshow(uint8(plcont))
% pichist(uint8(plcont))
plcont1 = uint8((double(p1 - min(min(p1))) / double(max(max(p1)) -
min(min(p1)))) *255);
figure(1)
subplot(2,2,3)
imshow(plcont1)
title("picture 1 after stretch")

subplot(2,2,4)
hist1cont = pichist(plcont1);
title("histogram : picture 1 after stretch")
ylabel("number of repeat")
xlabel("observation")

plcont2 = uint8((double(p2 - min(min(p2))) / double(max(max(p2)) -
min(min(p2)))) *255);
figure(2)
subplot(2,2,3)
imshow(plcont2)
title("picture 2 after stretch")

subplot(2,2,4)
hist2cont = pichist(plcont2);
title("histogram : picture 2 after stretch")
ylabel("number of repeat")
xlabel("observation")

```

```

%% section 2
pp1 = hist1./pixels1;
Fpp1 = zeros(1,256);
for index = 1:256
    Fpp1(index) = sum(pp1(1:index)) ;
end
figure(3)
sgtitle("Histogram Equalization")
subplot('Position',[.1 .55 .35 .35])
imshow(p1)
title("picture 1 before Equalization")
subplot(3,2,2)
bar((0:255),hist1);
title("histogram : picture 1 before Equalization")
ylabel("number of repeat")
xlabel("observation")

subplot(3,2,4)
bar((0:255),Fpp1);
title("transformation")

Sk1 = uint8(round(Fpp1*255));
eqp1 = zeros(size1(1),size1(2));
for indexw = 1:size1(1)
    for indexl = 1:size1(2)
        eqp1(indexw,indexl) = Sk1(p1(indexw,indexl)+1);
    end
end
eqp1 = uint8(eqp1);

subplot('Position',[.1 .1 .35 .35])

imshow(eqp1)
title("picture 1 after Equalization")

subplot(3,2,6)
pichist(eqp1);
title("histogram : picture 1 after Equalization")
ylabel("number of repeat")
xlabel("observation")

pp2 = hist2./pixels2;
Fpp2 = zeros(1,256);
for index = 1:256
    Fpp2(index) = sum(pp2(1:index)) ;
end
figure(4)
sgtitle("Histogram Equalization")
subplot('Position',[.1 .55 .35 .35])
imshow(p2)
title("picture 2 before Equalization")
subplot(3,2,2)
bar((0:255),hist2);
title("histogram : picture 2 before Equalization")
ylabel("number of repeat")
xlabel("observation")

subplot(3,2,4)
bar((0:255),Fpp2);
title("transformation")
    
```



```

Sk2 = uint8(round(Fpp2*255));
eqp2 = zeros(size2(1),size2(2));
for indexw = 1:size2(1)
    for indexl = 1:size2(2)
        eqp2(indexw,indexl) = Sk2(p2(indexw,indexl)+1);
    end
end
eqp2 = uint8(eqp2);

subplot('Position',[.1 .1 .35 .35])

imshow(eqp2)
title("picture 2 after Equalization")

subplot(3,2,6)
pichist(eqp2);
title("histogram : picture 2 after Equalization")
ylabel("number of repeat")
xlabel("observation")

%%
plfromF2 = zeros(size1);
for indexw = 1:size1(1)
    for indexl = 1:size1(2)
        plfromF2(indexw,indexl) = mean (find(Sk2 ==
eqp1(indexw,indexl),1));
        if (isnan(plfromF2(indexw,indexl)))
            plfromF2(indexw,indexl) = mean(find(Sk2 == 1 +
eqp1(indexw,indexl),1));
        end
        if (isnan(plfromF2(indexw,indexl)))
            plfromF2(indexw,indexl) = mean(find(Sk2 == (-1) +
eqp1(indexw,indexl),1));
        end
    end
end
plfromF2 = uint8(plfromF2);

figure(5)
sgtitle("reference")
subplot(3,1,1)
pichist(p1);
title("histogram : picture 1 before references")
ylabel("number of repeat")
xlabel("observation")
subplot(3,1,2)
pichist(eqp1);
title("histogram : Equalized picture 1 ")
ylabel("number of repeat")
xlabel("observation")
subplot(3,1,3)
pichist(plfromF2);
title("histogram : matched picture 1 ")
ylabel("number of repeat")
xlabel("observation")

figure(6)
sgtitle("picture reference")
subplot(2,2,1)

```

```

imshow(p1)
title("picture 1")
subplot(2,2,2)
imshow(eqpl)
title("Equalied")
subplot(2,2,3)
imshow(p2)
title("picture 2")
subplot(2,2,4)

imshow(p1fromF2)
title("matched picture")

figure
psum = ones(200,200)*255;
psum(1:152,1:152) = p2;
d1 = 34;
d2 = 30;
psum(d1+2:152+d1,d2+2:152+d2) = p1fromF2(2:152,2:152);
imshow(uint8(psum))

```