IMAGE ANALYSIS

ASSIGNMENT-1

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cameraman

reference6

Q1

```
I = imread('cameraman.tif');

thresh1 = multithresh(I,1);

thresh2 = multithresh(I,3);

thresh3 = multithresh(I,7);

seg_I1 = imquantize(I,thresh1);

seg_I2 = imquantize(I,thresh2);

seg_I3 = imquantize(I,thresh3);

figure(1); imshow(seg_I1,[])
figure(2); imshow(seg_I2,[])

figure(3); imshow(seg_I3,[])
```

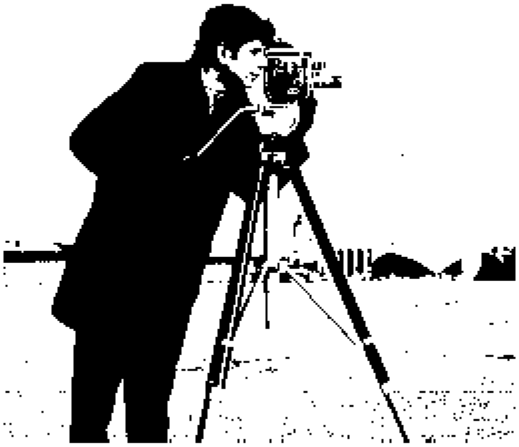


Figure-1

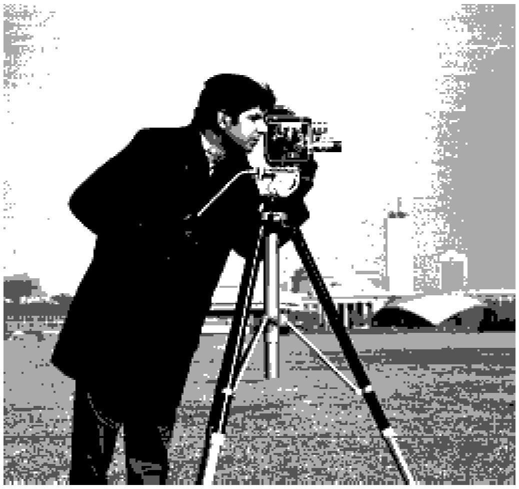


Figure-2

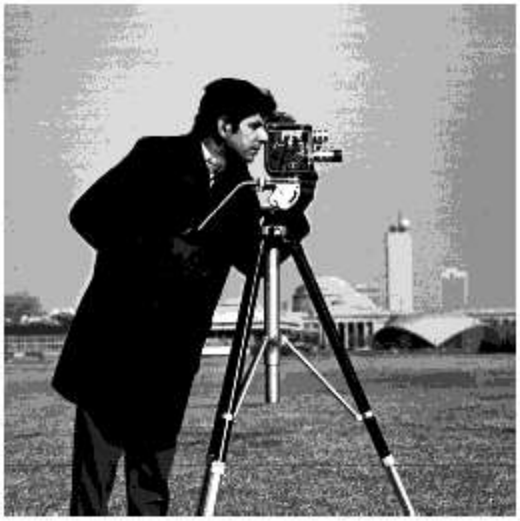


Figure-3

OBSERVATION

It is clearly seen from the three images above that as we limit the number of bits we can see less intensity values in the image. We have limited the bits to 1, 2 and 3 in figure 1, 2 and 3 respectively and thus we can notice only 2 intensity in figure-1, 4 in figure-2 and 8 in figure-3 and we can clearly count them. In the original image we have complete 8 bits so there is 0-255 intensity range.

Q2

```
I=imread('cameraman.tif');

T=[1 0 0;0 1 0;10 10 1];

S=[2 0 0;0 2 0;0 0 1];

R=[cos(0.1) sin(0.1) 0; -sin(0.1) cos(0.1) 0; 0 0 1];

Output=T*S*R;

Affine_Output=affine2d(Output);

Final=imwarp(I,Affine_Output);

figure(1),imshow(Final,[])
```

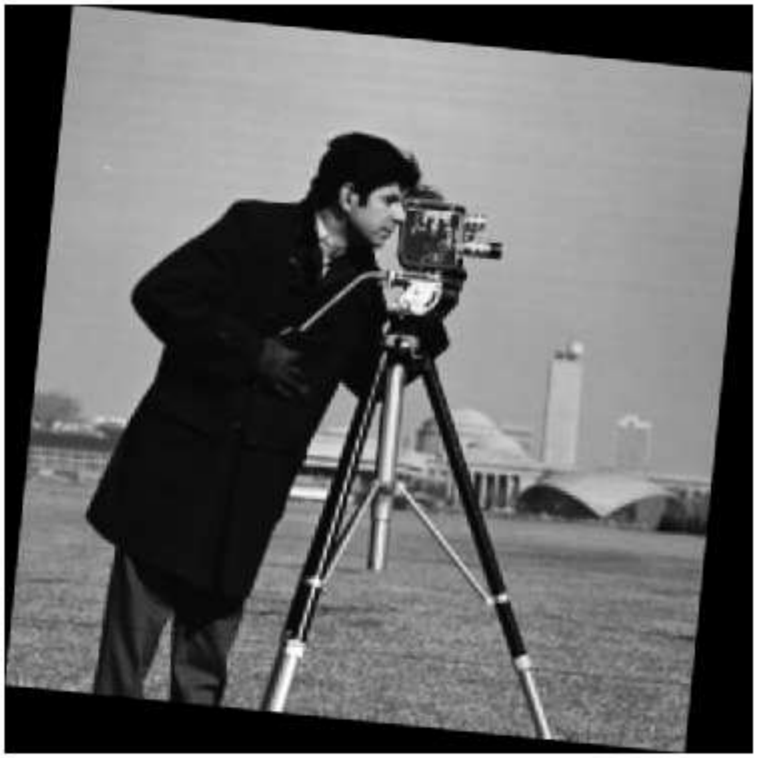


Figure-1

OBSERVATION

In this we have performed geometric transformation on the original image,As we can see from the output image it is scales by the factor 2 ,transformed by the factor 10 in both x and y and also rotated by 0.1 radian in clockwise direction.And the rest of the region turned black due to 0 intensity value there.

Q3

```
I=imread('cameraman.tif');

[M N]=size(I);

[u,v]=meshgrid(1:M,1:N);

T=[1 0 0;0 1 0;10 10 1];

S=[2 0 0;0 2 0;0 0 1];

p=((S(1)*(u+T(3))).*cos(0.1)-(S(5)*(v+T(6))).*sin(0.1));

q=((S(1)*(u+T(3))).*sin(0.1)+(S(5)*(v+T(6))).*cos(0.1));

[p1,q1]=meshgrid(-40:S(1)*M+80,-40:S(5)*N+80);

Vq = griddata(p,q,double(I),p1,q1);

figure(1), imshow(Vq,[])
```

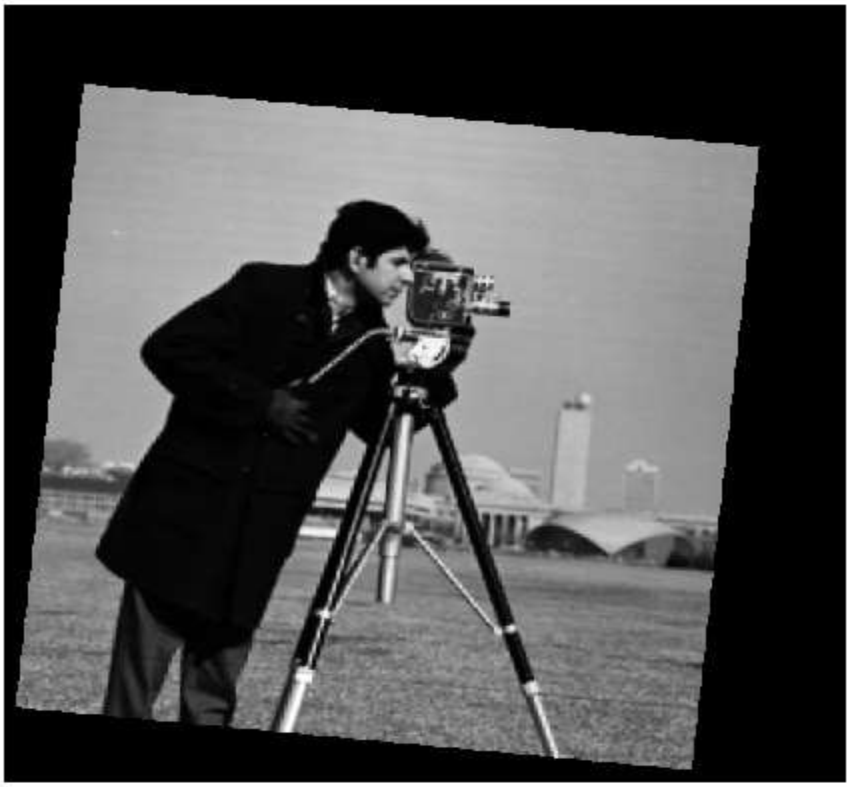


Figure-1

OBSERVATION

We have done the same as above part here, but here we have used grid data though the result was same but as we can see in the output it don’t have straight line or clear line at its boundary.

Q4

```
I=imread('cameraman.tif');

[M,N]=size(I);

S = [2.3 0 0;0 2 0; 0 0 1];

[u,v]=meshgrid(1:M,1:N);

p=(u).*S(1);

q=(v).*S(5);
```

```
[p1,q1]=meshgrid(-50:S(1)*M+50,-50:S(5)*N+50);

Vq = interp2(p,q,double(I),p1,q1);

imshow(Vq,[])
```

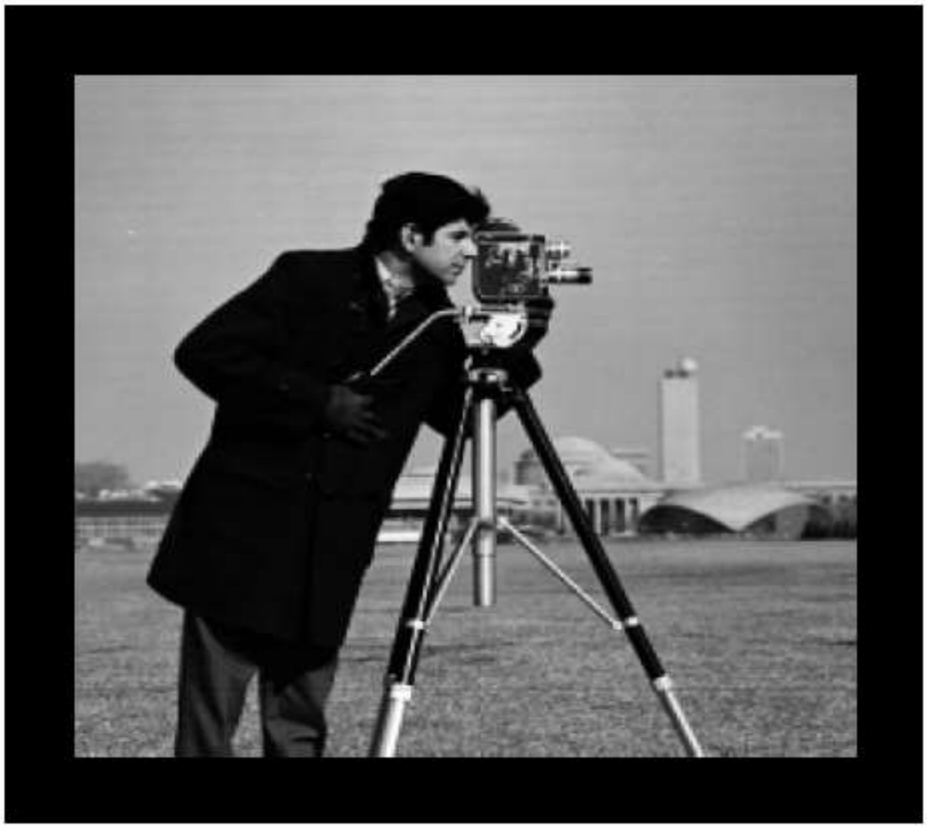


Figure-1

OBSERVATION

In this we have just scaled the image by the factor of 2.3 in the x axis and 2 in the y axis, the value of the coordinates are scales by those factor i.e. (1, 1) in the original become (2.3, 2) in the new one and the rest of the coordinated values were the result of interpolation.

Q5

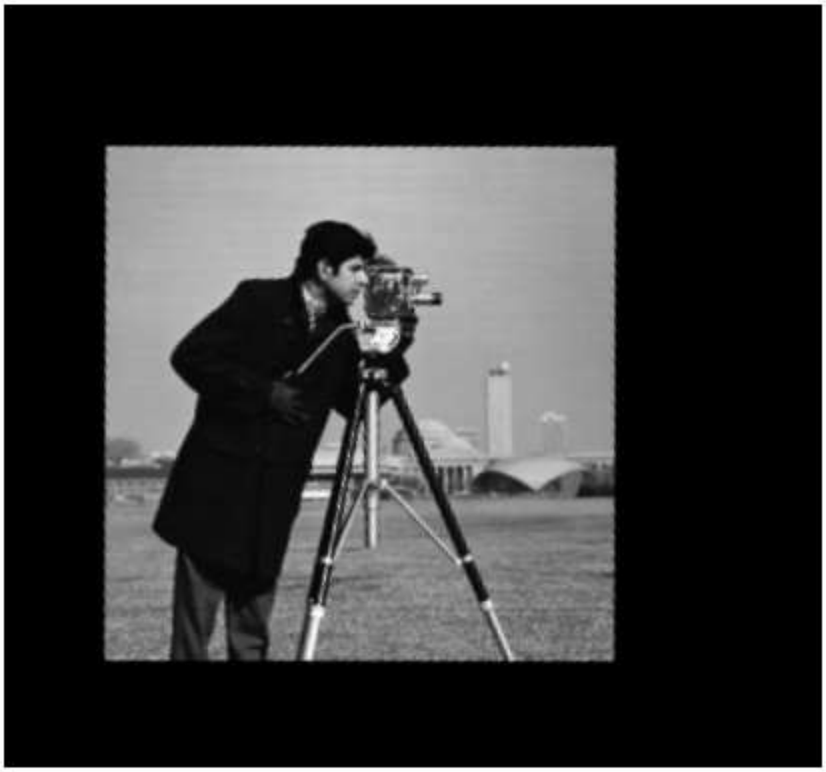
```
cpselect('reference6.jpg','cameraman.tif')

trans=cp2tform(input_points,base_points,'affine');

K=imread('reference.jpg');

J = imtransform(K,trans);

imshow(K,[]),figure(),imshow(J,[])
```



Registered Image

OBSERVATION

In this we were able to form the original image form the reference image by finding the transformation matrix(trans) ,as we know reference image=original image * trans, so by this knowledge and finding the transformation matrix (by selecting 5 pair of points and observing the pattern) we were able to register the image back to original one.

Q6

```
I = imread('cameraman.tif');
d = im2double(I);
figure, imshow(d);
%log on domain [0,1]
f = d;
c = 1/log(1+1);
j1 = c*log(1+f);
figure, imshow(j1);
%log on domain [0, 255]
f = d*255;
c = 1/log(1+255);
j2 = c*log(1+f);
figure, imshow(j2);
%log on domain [0, 2^16]
f = d*2^16;
c = 1/log(1+2^16);
j3 = c*log(1+f);
figure, imshow(j3);
%log on domain [0, 2^4]
f = d*2^4;
c = 1/log(1+2^4);
j4 = c*log(1+f);
figure, imshow(j4);
```

NOTE: Below the figures are in order form 1 to 5

OBSERVATION

As we can see from the output as we are varying the domain the output image are changing, the first image is the input image but in double format.As the value of c become large ,the intensity value go beyond 255 so we make all the pixel value that are beyond 255 as 255 only and those who are close to 0 i.e 0.002 as 0 .That's why when we make the domain [0,2^16] the image is quite whitish and but the 2nd and 5th one are quite same as 1st which was out input image ,though they are still somewhat different(as they are also whitish as compared to input one).