דוח מכין 4
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Q1

Convert Intensity Image to Binary Image Using Level Threshold

Read a grayscale image into the workspace.

```
I = imread('coins.png');
```

Calculate a threshold using `graythresh`. The threshold is normalized to the range [0, 1].

```
level = graythresh(I)
```

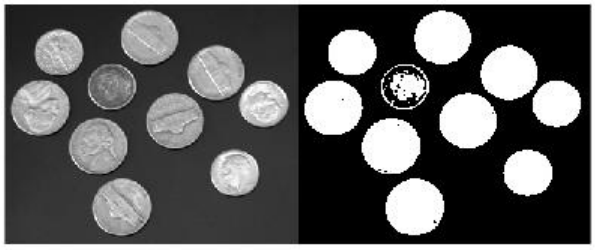
```
level = 0.4941
```

Convert the image into a binary image using the threshold.

```
BW = imbinarize(I,level);
```

Display the original image next to the binary image.

```
imshowpair(I,BW,'montage')
```



Calculate Centroids and Superimpose Locations on Image

Read a binary image into workspace.

```
BW = imread('text.png');
```

Calculate centroids for connected components in the image using `regionprops`. The `regionprops` function returns the centroids in a structure array.

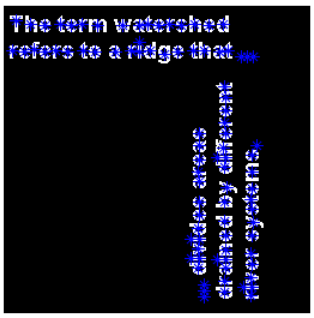
```
s = regionprops(BW,'centroid');
```

Store the *x*- and *y*-coordinates of the centroids into a two-column matrix.

```
centroids = cat(1,s.Centroid);
```

Display the binary image with the centroid locations superimposed.

```
imshow(BW)
hold on
plot(centroids(:,1),centroids(:,2),'b*')
hold off
```



Label Components Using 4-connected Objects

Create a small binary image.

```
BW = logical ([1     1     1     0     0     0     0     0
               1     1     1     0     1     1     0     0
               1     1     1     0     1     1     0     0
               1     1     1     0     0     0     1     0
               1     1     1     0     0     0     1     0
               1     1     1     0     0     0     1     0
               1     1     1     0     0     1     1     0
               1     1     1     0     0     0     0     0]);
```

Create the label matrix using 4-connected objects.

```
L = bwlabel(BW,4)
```

```
L = 8×8
     1     1     1     0     0     0     0     0
     1     1     1     0     2     2     0     0
     1     1     1     0     2     2     0     0
     1     1     1     0     0     0     3     0
     1     1     1     0     0     0     3     0
     1     1     1     0     0     0     3     0
     1     1     1     0     0     3     3     0
     1     1     1     0     0     0     0     0
```

Use the `find` command to get the row and column coordinates of the object labeled "2".

```
[r, c] = find(L==2);
rc = [r c]
```

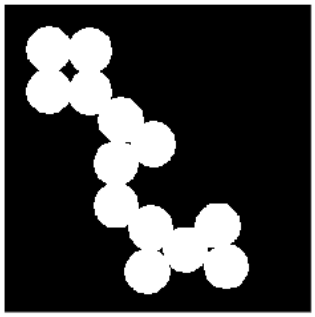
```
rc = 4×2
     2     5
```

```
     3     5
     2     6
     3     6
```


Calculate Area of Objects in Binary Image

Read a binary image and display it.

```
BW = imread('circles.png');
imshow(BW)
```



Calculate the area of objects in the image.

```
bwarea(BW)
```

```
ans = 1.4187e+04
```


Select Objects in Binary Image

Select objects in a binary image and create a new image containing only those objects.

Read binary image into the workspace.

```
BW = imread('text.png');
```

Specify the locations of objects in the image using row and column indices.

```
c = [43 185 212];
r = [38 68 181];
```

Create a new binary image containing only the selected objects. This example specifies 4-connected objects.

```
BW2 = bwselect(BW,c,r,4);
```

Display the original image and the new image side-by-side.

```
imshowpair(BW,BW2,'montage');
```

Truth Table

Create a truth table for the logical AND operation.

```
A = uint8([0 1; 0 1]);
B = uint8([0 0; 1 1]);
TTable = bitand(A, B)
```

```
TTable = 2×2 uint8 matrix
    0    0
    0    1
```

`bitand` returns 1 only if both bit-wise inputs are 1.

Truth Table

Create a truth table for the logical OR operation.

```
A = uint8([0 1; 0 1]);
B = uint8([0 0; 1 1]);
TTable = bitor(A, B)
```

```
TTable = 2×2 uint8 matrix
    0    1
    1    1
```

`bitor` returns 1 if either bit-wise input is 1.

Truth Table

Create a truth table for the logical XOR operation.

```
A = uint8([0 1; 0 1]);
B = uint8([0 0; 1 1]);
TTable = bitxor(A, B)
```

```
TTable = 2×2 uint8 matrix
    0    1
    1    0
```

`bitxor` returns 0 if both bit-wise inputs are equal.

Complement of a Negative Integer

```
A = int8(-11);
cmp = bitcmp(A);
```

You can see the complement operation when the numbers are shown in binary.

```
original = bitget(A,8:-1:1)
```

```
original = 1×8 int8 row vector
    1    1    1    1    0    1    0    1
```

```
complement = bitget(bitcmp(A),8:-1:1)
```

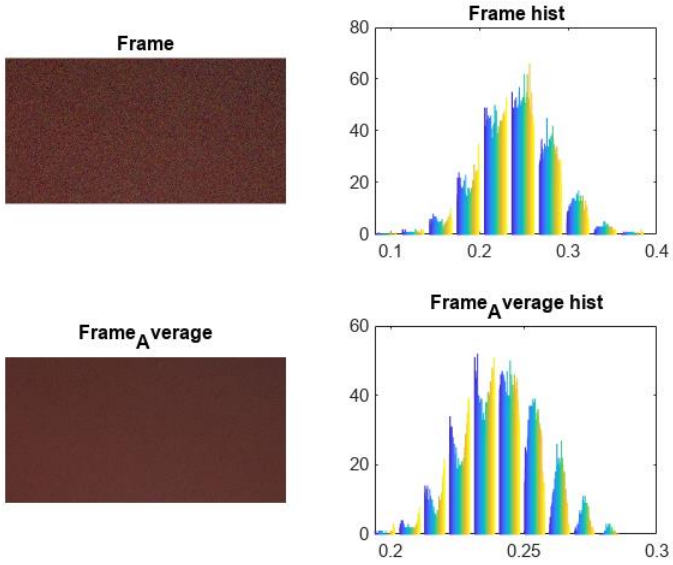
```
complement = 1×8 int8 row vector
    0    0    0    0    1    0    1    0
```


q2

```
vidobj = VideoReader('Weather_Cam.avi');
numFrames = get(vidobj, 'NumberOfFrames');
Frame_Avrg=im2double(read(vidobj,1));
```

```
N_avg=16;
for i=2:N_avg
Frame=im2double(read(vidobj, i));
Frame_Avrg= Frame_Avrg+Frame;
end
Frame_Avrg= Frame_Avrg/N_avg;
figure
montage({Frame,Frame_Avrg})
title('Average Frame after 16 interaction');
```


```
%rect = imrect;
%position = wait(rect);
position = [53 44 258 133];
roi1 = imcrop(Frame, position);
roi2 = imcrop(Frame_Avrg, position);
figure;
subplot(2,2,1);
imshow(roi1);title("Frame");
gray_roi1 = rgb2gray(roi1);
subplot(2,2,3);
imshow(roi2);title("Frame_Average");
gray_roi2 = rgb2gray(roi2);
subplot(2,2,2);
hist(gray_roi1);title("Frame hist");
subplot(2,2,4);
hist(gray_roi2);title("Frame_Average hist");
```



ניתן לראות שההיסטוגרמה הפכה לצרה יותר לאחר המיצוע ובכך ניתן להבין שנפטרנו מהרעש הלא רצוי כמו כן ניתן לראות שערכי ההיסטוגרמה נמוכים יותר.

Q3

```
figure;
frame=rgb2gray(Frame_Avrg);
dx=-4; %pixels
dy=-4; %pixels
theta = -3;
tform = affine2d([ ...
cosd(theta) sind(theta) 0;...
-sind(theta) cosd(theta) 0; ...
dx dy 1])
```

```
tform =
  affine2d with properties:

                T: [3×3 double]
    Dimensionality: 2
```

```
OutputView = affineOutputView(size(frame),tform,'BoundsStyle','sameAsInput');
Gframe = imwarp(frame,tform, 'FillValues',0,'OutputView',OutputView);
montage({frame,Gframe});
```

אפשר לראות שהקוד סיבב את התמונה כמו שצפינו.

Q4

Create 2-D Affine Transformation

Define a 3-by-3 geometric transformation matrix. This example specifies a matrix for an affine transformation consisting of vertical shear and horizontal stretch.

```
A = [2 0 0; 0.33 1 0; 0 0 1];
tform = affinetform2d(A)
```

```
tform =
  affinetform2d with properties:

    Dimensionality: 2
                 A: [3×3 double]
```

```
I = imread("pout.tif");
imshow(I)
```

```
J = imwarp(I,tform);
imshow(J);
```

Apply Horizontal Shear to Image

Read and display a grayscale image.

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

Create a 2-D affine transformation.

```
A = [1 0.5 0; 0 1 0; 0 0 1];
tform = affinetform2d(A);
```

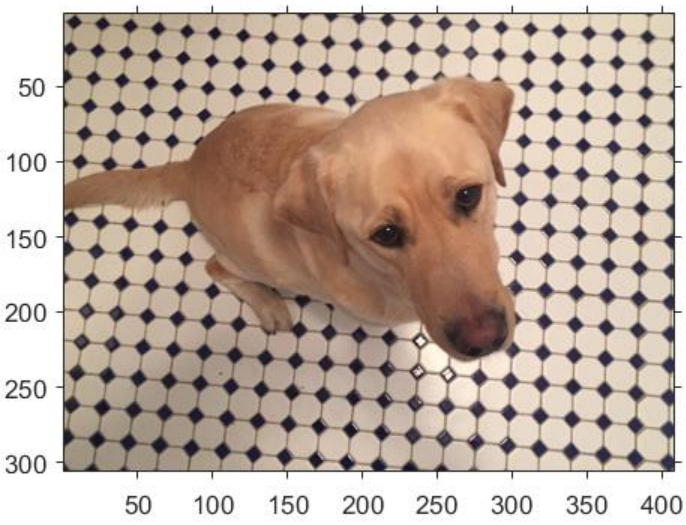
Apply the transformation to the image.

```
J = imwarp(I,tform);
imshow(J)
```

Warp Image Using Different Output View Styles

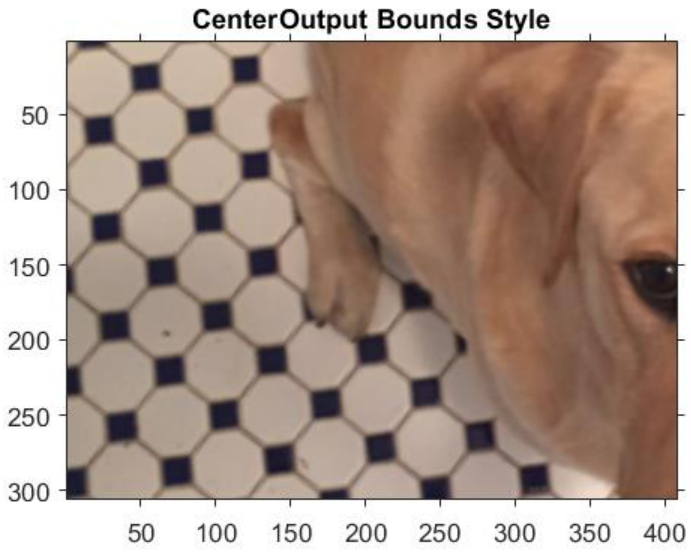
Read and display an image. To see the spatial extents of the image, make the axes visible.

```
A = imread("kobi.png");
A = imresize(A,0.25);
iptsetpref("ImshowAxesVisible","on")
imshow(A)
```

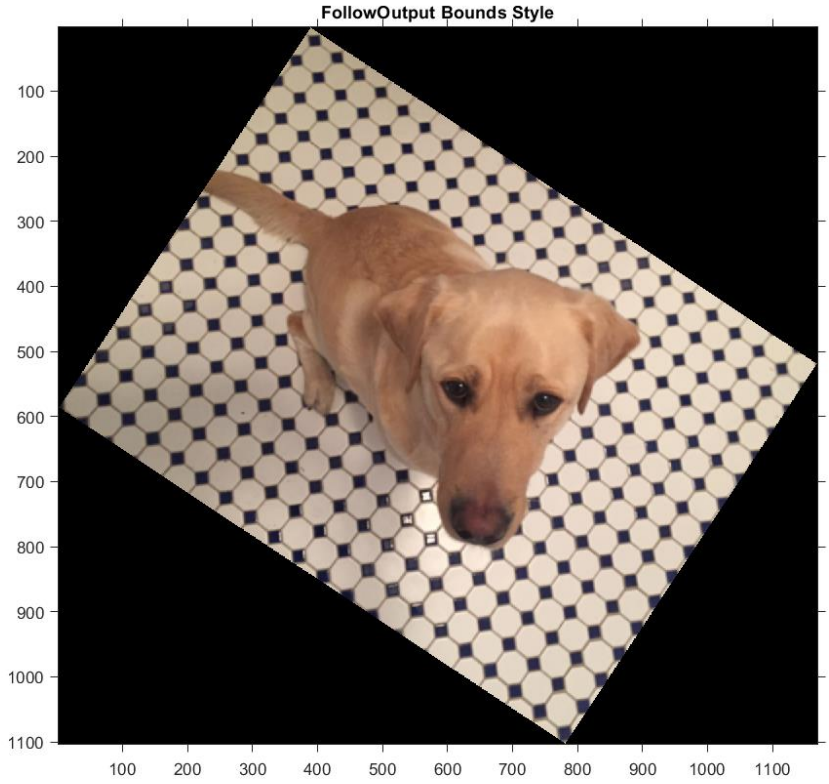


Create a 2-D affine transformation. This example creates a randomized transformation that consists of scale by a factor in the range [1.2, 2.4], rotation by an angle in the range [-45, 45] degrees, and horizontal translation by a distance in the range [100, 200] pixels.

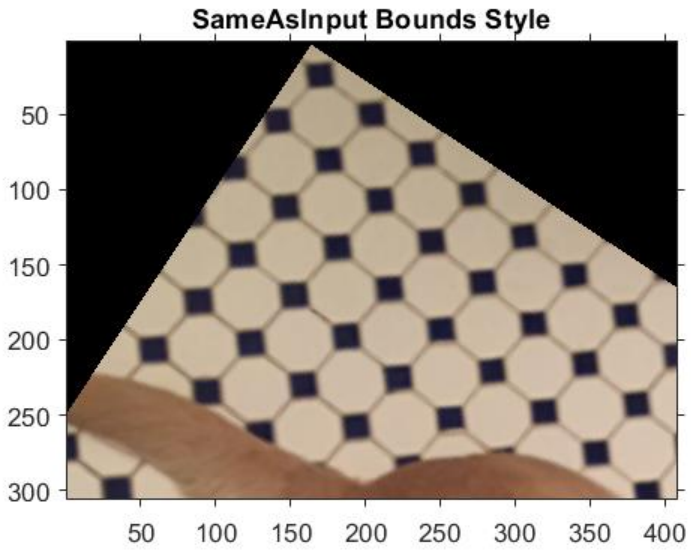
```
tform = randomAffine2d("Scale",[1.2,2.4],"XTranslation",[100 200],"Rotation",[-
45,45]);
centerOutput = affineOutputView(size(A),tform,"BoundsStyle","CenterOutput");
followOutput = affineOutputView(size(A),tform,"BoundsStyle","FollowOutput");
sameAsInput = affineOutputView(size(A),tform,"BoundsStyle","SameAsInput");
BCenterOutput = imwarp(A,tform,"OutputView",centerOutput);
BFollowOutput = imwarp(A,tform,"OutputView",followOutput);
BSameAsInput = imwarp(A,tform,"OutputView",sameAsInput);
imshow(BCenterOutput)
title("CenterOutput Bounds Style");
```




```
imshow(BFollowOutput)
title("FollowOutput Bounds Style");
```




```
imshow(BSameAsInput)
title("SameAsInput Bounds Style");
```




```
iptsetpref("ImshowAxesVisible","off")
```

הפונקציה *affineOutputView* מחשבת את גודל התמונה החדשה לאחר הטרנספורמציה הגיאומטרית בהינתן גודל התמונה המקורית והטרנספורמציה הגיאומטרית הרצויה, כך שהתמונה לא תיחתך או תאבד מידע רצוי עקב הטרנספורמציה.