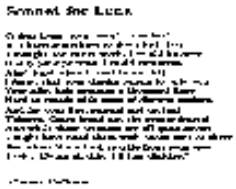
```
function orientation()
   clc
   clear all
   close all
   findAngle(imread('test-images-for-q2/son3.gif'));
   findAngle(imread('test-images-for-q2/son3rot1.gif'));
   findAngle(imread('test-images-for-q2/son3rot2.gif'));
   findAngle(imread('test-images-for-q2/son3rot3.gif'));

end


function findAngle(img1)

    %shifted fourier transform of image
    img1fft = fftshift(fft2(img1));

    %magnitude of transform
    absimg1 = abs(img1fft);

    %binary image of magnitude
    b = im2bw(mat2gray(absimg1),0.05);

    %connected components of binary image
    cc = bwconncomp(b,8);
    ms = regionprops(cc, 'BoundingBox');

    %list cc based on size of cc in descending order
    pixelCount = cellfun(@numel,cc.PixelIdxList);
    [sorted,idx] = sort(pixelCount, 'descend');


    %draw bounding boxes around all blobs
    figure;
    subplot(221),imshow(img1,[]);
    title('Original Image');
    subplot(222), imshow(b);
    title('Clusters of highest frequency');
    hold on;

    %find top 3 largest ccs and their centers
    I = zeros(1,3);
    J = zeros(1,3);
    for blobNumber = 1:3
        recCoords =  ms(idx(blobNumber)).BoundingBox;
        rectangle('Position', recCoords, 'EdgeColor', 'r', 'LineWidth', 2);
        J(blobNumber) = recCoords(1) + recCoords(3)/2;
        I(blobNumber) = recCoords(2) + recCoords(4)/2;

    end

   %fit a line around the centers of top 3 largest ccs
```

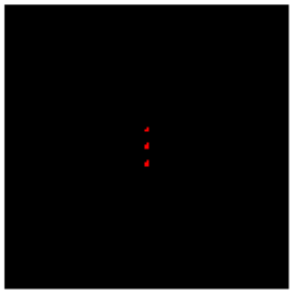
```
    line = fit(I',J','poly1');

    %slope of the line is the orientation of the image
    angle = round(atan(line.p1)*180/pi)
    subplot(223), plot(line,I, J);
    title(['Orientation of image ' num2str(angle)]);


end
```

```
angle =

     0


angle =

   -45

Warning: Equation is badly conditioned. Remove repeated data points or try
centering and scaling.

angle =

    90


angle =

    46
```

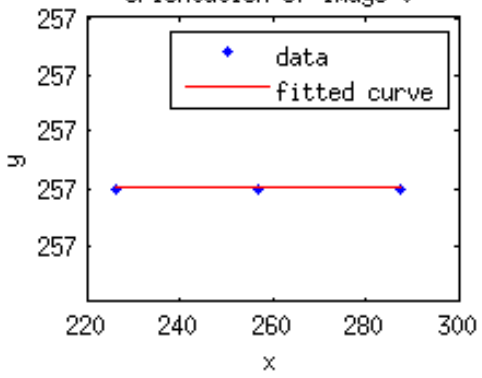
Original Image



Clusters of highest frequency

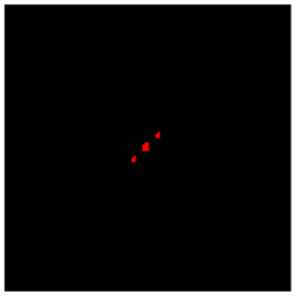


Orientation of image 0

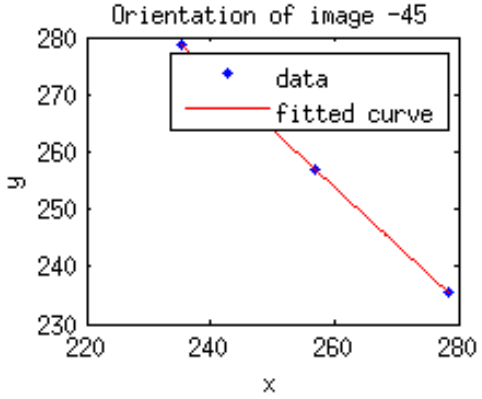


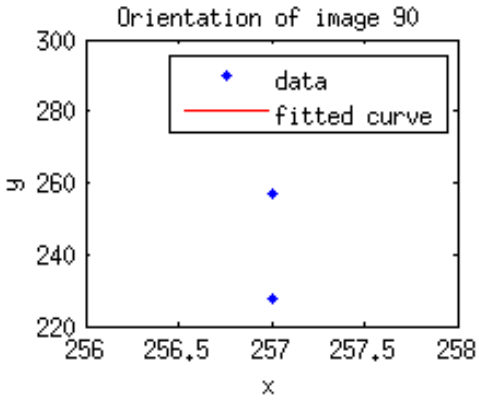
Original Image

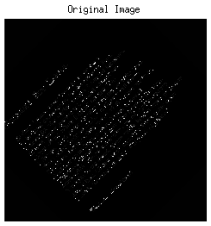
Clusters of highest frequency

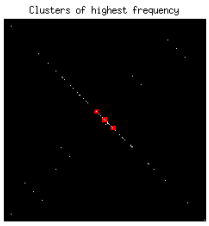


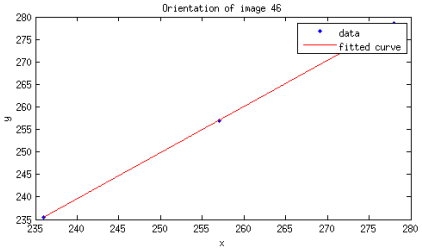
Orientation of image -45











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