I = imread ('Plasmo^5.001.jpg');

I=I(:,:,1); % auf einen Farbkanal reduziert

figure(1);

imshow (I);

I = im2double(I);

%Gaussmaske

%H = fspecial('disk',10);

H=[1 2 1;2 4 2;1 2 1]\*1/16;

blurred = imfilter(I,H,'replicate');

figure(2);

imshow(blurred);

%Sobelfilter

sobelx = [1 0 -1; 2 0 -2; 1 0 -1];

sobely = [1 2 1; 0 0 0; -1 -2 -1];

%sobeld1 = [0 1 2; -1 0 1; -2 -1 0];

%sobeld2 = [-2 -1 0; -1 0 1; 0 1 2];

%Faltung Gaussbild mit x,y,d1,d2

gx = conv2(blurred, sobelx, 'same');

gy = conv2(blurred, sobely, 'same');

%d1 = conv2(blurred, sobeld1, 'same');

%d2 = conv2(blurred, sobeld2, 'same');

%imtool(gx);

%imtool(gy);

%Höhe und Breite zählen

[height, width,~ ] = size(I);

for i = 1:height

for k=1:width;

I(i,k) = sqrt(gx(i,k)^2+gy(i,k)^2);

end

end

for i = 1:height

for k=1:width;

I(i,k) = atan2(gx(i,k),gy(i,k))/pi\*180;

end

end

imtool(I,[0,255]);

for i = 1:height

for k=1:width;

if I(i,k)<= 112.5 && I(i,k)>= 65.5 || I(i,k)>= -112.5 && I(i,k)<= -65.5

I(i,k)=0;

elseif I(i,k) <= -157.5 && I(i,k)>= -180 || I(i,k)>= 157.5 && I(i,k)<=180 || I(i,k) >= -22.5 && I(i,k) <= 22.5

I(i,k)=90;

elseif I(i,k)<= 157.5 && I(i,k)>= 112.5 || I(i,k) >= -67.5 && I(i,k) <= -22.5

I(i,k)=45;

elseif I(i,k)<= -112.5 && I(i,k)>= -157.5 || I(i,k)<= 67.5 && I(i,k)>= 22.5

I(i,k)=-45;

end

end

end

imtool(I,[0,255]);