clc

clear all

close all

PperM = 1389.52/(7\*12e-3);

fid = fopen('C:\Users\banv20\OneDrive - University of Bath\Bath - Postgraduate\Post FYP\X\_Drive\FEA\_results.txt', 'wt');

for n = 1:114

%% ORIGINAL IMAGE

left = 'C:\Users\banv20\OneDrive - University of Bath\Bath - Postgraduate\Post FYP\X\_Drive\FEA Images\';

right = '.png';

join\_name = join([left, num2str(n), right]);

carrot = imread(join\_name);

%% ISOLATING COLOUR CHANNELS AND GETTING THERE GREYSCALE EQUIVALENCE, AND APPLY OTSU THRESHOLDING:

% BLUE CHANNEL

blue = carrot(:,:,3);

levelB = graythresh(blue);

otsublue = levelB\*255;

binarycarrotB = im2bw(blue,levelB);

% RED CHANNEL

red = carrot(:,:,1);

levelR = graythresh(red);

otsured = levelR\*255;

binarycarrotR = im2bw(red,levelR);

%% IMAGE PROCESSING

% Inverting binary

binarycarrotBi = 1 - binarycarrotB;

binarycarrot = binarycarrotBi.\*binarycarrotR;

imshow(binarycarrot);

SE = strel('diamond',7);

CI = imerode(binarycarrot,SE);

CI = imdilate(CI,SE);

%% KEEPING THE LARGEST BLOB

x = imbinarize(CI);

[a bc]=bwlabel(x);

b=[];

temp=0;

gk=1;

[f g]=size(a);

for i=1:bc

for wk=1:f

for tk=1:g

if(a(wk,tk)==gk)

temp=temp+1;

end

end

end

b=[b temp];

temp=0;

gk=gk+1;

end

[m n]=max(b);

output=[];

for i=1:f

for j=1:g

if(a(i,j)==n)

output(i,j)=1;

else

output(i,j)=0;

end

end

end

subplot(1,2,1);

imshow(x);

title('Original Image');

subplot(1,2,2);

imshow(output);

title('Keeping largest object in the binary image');

%% GET THE UPPER EDGE OF BLOB

[sizey, sizex] = size(output);

xpix = 1:sizex;

ypix = zeros(1,sizex);

for n = 1:sizex

if sum(output(:,n)) > 1

ypix(n) = find(output(:,n) == 1, 1, 'first');

end

end

%correct plot for the image size in meters

xval = (xpix/PperM);

yval = ((sizey - ypix)/PperM);

%Check the plot

figure(11)

plot(xval,yval,'r')

xlim([0 (sizex/(PperM))])

ylim([0 (sizey/(PperM))])

%find the region that the carrot occupies

datmin = find(ypix ~= 0, 1, 'first');

datmax = find(ypix ~= 0, 1, 'last');

ytrue = yval(datmin:datmax);

xtrue = xval(datmin:datmax)-xval(datmin);

%Check the plot

figure(11)

plot(xtrue(1:6),ytrue(1:6),'g','linewidth',2)

hold on

plot(xtrue(6:end),ytrue(6:end),'r','linewidth',2)

xlim([0 (sizex/(PperM))])

ylim([0 (sizey/(PperM))])

hold off

%% Fit Circle

x=xtrue(:); y=ytrue(:);

a=[x y ones(size(x))]\[-(x.^2+y.^2)];

xc = -.5\*a(1);

yc = -.5\*a(2);

R\_auto = sqrt((a(1)^2+a(2)^2)/4-a(3));

p = nsidedpoly(1000, 'Center', [xc yc], 'Radius', R\_auto);

hold on

plot(p, 'FaceColor', 'b')

hold off

fprintf(fid, '%s', num2str(R\_auto));

fprintf(fid, '\n');

end