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for sinuosity

```
clc;
close;
clear all;
```

folder direc

```
folder='/data2/nacere/Processing/XG03/Binary_images/';
files=dir(fullfile(folder, 'binary*.png'));
widths_all=cell(length(files),1);
```

strat looping

```
for imgNum=1:length(files)
```

```
    imgpath=fullfile(folder,files(imgNum).name);
    img=imread(imgpath);
    [height,width]=size(img);
    % height of white channel
    height_channel=regionprops(img, 'BoundingBox');
    boundingbox=[height_channel.BoundingBox];
    heights=boundingbox(4:4:end);

    %figure; imshow(img);
    %getting x and y coordinates
    [y,x]=find(img);
    xy=[x,y]; %here column1=x and column 2=y;
```

then lets get average of y values

```
%first get unique x

unique_x=unique(x);
for i=1:length(unique_x)
    avg_y(i)=mean(y(x==unique_x(i)));
end
```

```

p=0.01;
fine_x=linspace(min(unique_x),max(unique_x),500);
spline_ft=csaps(unique_x,avg_y,p);
smoothery=fval(spline_ft, fine_x);
figure;
%imshow(img);
%hold on;
%plot(unique_x,avg_y);
plot(fine_x,smoothery,'b-', 'LineWidth',4);
%hold off;
%arc length
dx=diff(fine_x);
dy=diff(smoothery);
total_length=sum(sqrt(dx.^2+dy.^2));
%straightline
straight=sqrt((fine_x(end)-fine_x(1))^2+(smoothery(end)-smoothery(1))^2);
sinuo=(total_length/straight);
sinuosity(imgNum)=sinuo;
avg_y=[];

```

```
end
```

plot

```

figure;
plot(1:length(sinuosity),sinuosity,'-o');

```

Unrecognized function or variable 'sinuosity'.

Error in sinuosity_bestversion (line 54)
 plot(1:length(sinuosity),sinuosity,'-o');

find average

```

for i=1:length(sinuosity)
    avgr_sinu(i)=mean(sinuosity(i));
end

```

saving for each xg

```
save(fullfile(folder,'sinuosity003.mat'),'avgr_sinu');
```

plotting as a function of xanthan gum

```

xg=[0;1;2;3;4;5];
data1=load('sinuosity0.mat');
data2=load('sinuosity01.mat');
data3=load('sinuosity02.mat');
data4=load('sinuosity003.mat');
data5=load('sinuosity004.mat');
data6=load('sinuosity005.mat');

sinu0=data1.avgr_sinu;
sinu1=data2.avgr_sinu;
sinu2=data3.avgr_sinu;

```

```
sinu3=data4.avgr_sinu;  
sinu4=data5.avgr_sinu;  
sinu5=data6.avgr_sinu;
```

PLOtting

```
set(0, 'DefaultAxesFontName', 'TimesNewRoman');  
sinuo_avg=[mean(sinu0),mean(sinu1),mean(sinu2),mean(sinu3),mean(sinu4),mean(sinu5)];  
allsinu_std = [std(sinu0), std(sinu1), std(sinu2),nanstd(sinu3), std(sinu4), std(sinu5)];  
  
% Plot  
figure;  
errorbar(xg, sinuo_avg, allsinu_std, 'k', 'LineStyle', 'none', 'LineWidth', 1,'HandleVisibility', 'off');  
hold on  
plot(xg(1),sinuo_avg(1),'ko','LineWidth',1.2,'MarkerSize',6,'DisplayName','0% Xanthan Gum');  
plot(xg(2),sinuo_avg(2),'ks','LineWidth',1.2,'MarkerSize',6,'DisplayName','0.1% Xanthan Gum');  
plot(xg(3),sinuo_avg(3),'kd','LineWidth',1.2,'MarkerSize',6,'DisplayName','0.2% Xanthan Gum');  
plot(xg(4),sinuo_avg(4),'k^','LineWidth',1.2,'MarkerSize',6,'DisplayName','0.3% Xanthan Gum');  
plot(xg(5),sinuo_avg(5),'kp','LineWidth',1.2,'MarkerSize',6,'DisplayName','0.4% Xanthan Gum');  
plot(xg(6),sinuo_avg(6),'kx','LineWidth',1.2,'MarkerSize',6,'DisplayName','0.5% Xanthan Gum');  
hold off;  
set(gca,'FontSize',12);  
xlabel('% Xanthan Gum', 'FontSize', 12, 'FontWeight', 'normal');  
ylabel('Time and Space Averaged Sinuosity', 'FontSize', 11, 'FontWeight', 'normal');  
%title('Average Channel Widths vs Time for Different Xanthan Gum Concentrations', 'FontSize', 8, 'FontWeight', 'bold');  
%legend('show', 'Location', 'best');  
grid on;  
grid minor;  
box on;  
saveas(gcf, 'sinuosity_figurenolegend.png');  
hold off
```