First Homework of CMPE 362

Report

Code(Problem 1 to 8): 4 on the left 4 on the right

```
% Problem 1:
x = -100:100;
figure(1);

subplot(4,2,1);
y1 = sin(x);
plot(x,y1);
title('y1');

subplot(4,2,2);
y2 = sin(50*x);
plot(x,y2);
title('y2');

subplot(4,2,3);
y3 = 50*sin(x);
plot(x,y3);
title('y3');

subplot(4,2,4);
y4 = sin(x)+50;
plot(x,y4);
title('y4');

subplot(4,2,5);
y5 = sin(x+50);
plot(x,y5);
title('y5');

subplot(4,2,6);
y6 = 50*sin(50*x);
plot(x,y6);
title('y6');

subplot(4,2,7);
y7 = x.*sin(x);
plot(x,y7);
title('y7');

subplot(4,2,8);
y8 = sin(x)./x;
plot(x,y8);
title('y8');
```

```
%Problem 5:
figure(5);

r1=randn(10000,1);
r2=2.*randn(10000,1);
r3=4.*randn(10000,1);
r4=16.*randn(10000,1);

subplot(2,2,1);
hist(r1);
title('r1');

subplot(2,2,2);
hist(r2);
title('r2');

subplot(2,2,3);
hist(r3);
title('r3');

subplot(2,2,4);
hist(r4);
title('r4');
% Problem 6:
figure(6);

r6=10+randn(10000,1);
r7=20+2.*randn(10000,1);
r8=-10+randn(10000,1);
r9=-20+2.*randn(10000,1);

subplot(2,2,1);
hist(r6);
title('r6');

subplot(2,2,2);
hist(r7);
title('r7');

subplot(2,2,3);
hist(r8);
title('r8');
```

```
hold on;
% Problem 2:
x = -20:20;
figure(2);

y1 = sin(x);
y2 = sin(50*x);
y3 = 50*sin(x);
y4 = sin(x)+50;
y5 = sin(x+50);
y6 = 50*sin(50*x);
y7 = x.*sin(x);
y8 = sin(x)./x;
y9=y1+y2+y3+y4+y5+y6+y7+y8;

subplot(5,2,1);
plot(x,y1);
title('y1');


subplot(5,2,2);
plot(x,y2);
title('y2');

subplot(5,2,3);
plot(x,y3);
title('y3');

subplot(5,2,4);
plot(x,y4);
title('y4');

subplot(5,2,5);
plot(x,y5);
title('y5');

subplot(5,2,6);
plot(x,y6);
title('y6');

subplot(5,2,7);
plot(x,y7);
title('y7');

subplot(5,2,8);
plot(x,y8);
title('y8');

subplot(5,2,9);
plot(x,y9);
title('y9');
```

```
subplot(2,2,4);
hist(r9);
title('r9');

% Problem 7:
figure(7);

r11=-sqrt(3) + (2*sqrt(3)).*rand(10000,1);
r21=-2*sqrt(3) + (4*sqrt(3)).*rand(10000,1);
r31=-4*sqrt(3) + (8*sqrt(3)).*rand(10000,1);
r41=-16*sqrt(3) + (32*sqrt(3)).*rand(10000,1);

subplot(2,2,1);
hist(r11);
title('r11');

subplot(2,2,2);
hist(r21);
title('r21');

subplot(2,2,3);
hist(r31);
title('r31');

subplot(2,2,4);
hist(r41);
title('r41');

% Problem 8:
r61=(10+sqrt(3)) + (-2*sqrt(3)).*rand(10000,1);
r71=(10+2*sqrt(3)) + (-
4*sqrt(3)).*rand(10000,1);
r81=-1*(10+sqrt(3)) +
(2*sqrt(3)).*rand(10000,1);
r91=-1*(10+2*sqrt(3)) +
(4*sqrt(3)).*rand(10000,1);

subplot(2,2,1);
hist(r61);
title('r61');

subplot(2,2,2);
hist(r71);
title('r71');

subplot(2,2,3);
hist(r81);
title('r81');

subplot(2,2,4);
hist(r91);
```

```
% Problem 3:
figure(3);

z = randn(41,1);

y10 = z;
subplot(5,2,1);
plot(x,y10);
title('y10');

y11 = z + x;
subplot(5,2,2);
plot(x,y11);
title('y11');

y12 = z + sin(x);
subplot(5,2,3);
plot(x,y12);
title('y12');

y13 = z .* sin(x);
subplot(5,2,4);
plot(x,y13);
title('y13');

y14 = x.* sin(z);
subplot(5,2,5);
plot(x,y14);
title('y14');

y15 = sin(x+z);
subplot(5,2,6);
plot(x,y15);
title('y15');

y16 = z.*sin(50*x);
subplot(5,2,7);
plot(x,y16);
title('y16');

y17 = sin(50*z + x);
subplot(5,2,8);
plot(x,y17);
title('y17');

y18 = sin(x) ./ z;
subplot(5,2,9);
plot(x,y18);
title('y18');

y19 = y11+y12+y13+y14+y15+y16+y17+y18;
title('r91');
```

```
subplot(5,2,10);
plot(x,y19);
title('y19');
% Problem 4:
figure(4);

z = rand(41,1);

y20 = z;
subplot(5,2,1);
plot(x,y20);
title('y20');

y21 = z + x;
subplot(5,2,2);
plot(x,y21);
title('y21');

y22 = z + sin(x);
subplot(5,2,3);
plot(x,y22);
title('y22');

y23 = z .* sin(x);
subplot(5,2,4);
plot(x,y23);
title('y23');

y24 = x.* sin(z);
subplot(5,2,5);
plot(x,y24);
title('y24');

y25 = sin(x+z);
subplot(5,2,6);
plot(x,y25);
title('y25');

y26 = z.*sin(50*x);
subplot(5,2,7);
plot(x,y26);
title('y26');

y27 = sin(50*z + x);
subplot(5,2,8);
plot(x,y27);
title('y27');

y28 = sin(x) ./ z;
subplot(5,2,9);
plot(x,y28);
```

```
title('y28');

y29 = y11+y12+y13+y14+y15+y16+y17+y18;
subplot(5,2,10);
plot(x,y29);
title('y29');
```

Problem 9 on the left Problem 10 on the right:

```
%% Import data from text file.
% Script for importing data from the following
text file:
%
%
/home/serkan/git/362_hw1/HW1_material/exa
mpleSignal.csv
%
% To extend the code to different selected data
or a different text file,
% generate a function instead of a script.

% Auto-generated by MATLAB on 2019/03/04
11:22:45

%% Initialize variables.
filename =
'/home/serkan/git/362_hw1/HW1_material/ex
ampleSignal.csv';
delimiter = {''};
startRow = 2;

%% Format for each line of text:
%   column1: double (%f)
% For more information, see the TEXTSCAN
documentation.
formatSpec = '%f%[^\n\r]';

%% Open the text file.
fileID = fopen(filename,'r');

%% Read columns of data according to the
format.
% This call is based on the structure of the file
used to generate this
```

```
% We have proble 9 in problem10.m according
to the description.
% Ok, let's put problem 10 here then.

% Problem 10:

lena =imread('lena.png');
lena_gray=rgb2gray(lena);
m = mean(lena_gray,'all');
sd = sqrt((var(double(lena_gray),1,'all')));
mx=max(max(lena_gray));
[mx_r,mx_c] = find(lena_gray==mx);
mn=min(min(lena_gray));
[mn_r,mn_c] = find(lena_gray==mn);

disp('mean is : ');
disp(m);
disp('standart deviation is : ');
disp(sd);
disp('min is : ');
disp(mn);
disp('location of min is : ');
disp([mn_r,mn_c]);
disp('max is : ');
disp(mx);
disp('location of max is : ');
disp([mx_r,mx_c]);
```

```
% code. If an error occurs for a different file, try regenerating the code
% from the Import Tool.
dataArray = textscan(fileID, formatSpec, 'Delimiter', delimiter, 'TextType', 'string', 'EmptyValue', NaN, 'HeaderLines' ,startRow-1, 'ReturnOnError', false, 'EndOfLine', '\r\n');

%% Close the text file.
fclose(fileID);

%% Post processing for unimportable data.
% No unimportable data rules were applied during the import, so no post
% processing code is included. To generate code which works for
% unimportable data, select unimportable cells in a file and regenerate the
% script.

%% Allocate imported array to column variable names
VarName1 = dataArray{:, 1};


%% Clear temporary variables
clearvars filename delimiter startRow formatSpec fileID dataArray ans;

findpeaks(VarName1);
```

Comments and explanations:

Matlab can plot a data if its axises are given together. I used subplot function to plot several plots in a figure. That helps me to see the differences between several plots easily.

Findpeaks method is used to find peaks in the example signal csv file. However, it did not show whole peaks because, as stated in help document of findpeaks:

1- it finds only those peaks that are greater than the minimum peak height

2- it finds peaks guaranteed

to have a vertical drop of more than MPP from the peak on both sides without encountering either the end of the signal or a larger intervening peak.

3- it finds peaks that are at least greater than both adjacent samples by the threshold, TH. TH is a real-valued scalar greater than or equal to zero.

4- it finds peaks whose width is at least MINW.

5- it finds peaks whose width is at most MAXW. The default value of MAXW is Inf.

6- it finds peaks separated by more than the minimum peak distance, MPD. This parameter may be specified to ignore smaller peaks that may occur in close proximity to a large local peak.

Feelings:

I enjoyed using matlab, especially the plotting part of it is very nice. And because dealing with matrices is too easy with matlab, it becomes a great tool for image and signal processing. Thanks for giving this homework to us.

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