MATLAB programming course for beginners, supported by Wagatsuma Lab@Kyutech

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Specifications and requirements

1. @Time : 2021-5-26
2. @Author : Hiroaki Wagatsuma
3. @Site : https://github.com/hirowgit/1B1_matlab_signal_analysis_course
4. @IDE : MATLAB R2018a
5. @File : lec2D_A1_lineHough_Plus.m

Main program

clear all

```
a=1; b=2;
% dT=0.25;
dT=0.75;
rdN=100;
dN=100;
% dNs=100;
```

```
dNs=20;
t=0:pi/dN:pi;
gridP=0:dNs;

rangeXY=[0 20; 0 20]; %[xmin, xmax; ymin, ymax];
labelF={'line','random','line+random','hough trans. for
 line','discrete vote','voting contour map'};
fignum=1;


x=0:dT:rangeXY(1,2);
lgen=@(x) a*x+b;


figure(fignum); clf
set(fignum,'name',labelF{fignum},'Position',[500   920   550   500]);
plot(x,lgen(x),'b.','MarkerSize',24);
title(labelF{fignum});
grid on;
axis equal;
fignum=fignum+1;

rdPos=repmat(diff(rangeXY'),[rdN
 1]).*rand(rdN,2)+repmat(rangeXY(:,1)',[rdN 1]);

figure(fignum); clf
set(fignum,'name',labelF{fignum},'Position',[1050   850   550   500]);

plot(rdPos(:,1),rdPos(:,2),'r.','MarkerSize',24);
set(gca,'xlim',rangeXY(1,:),'ylim',rangeXY(2,:));
title(labelF{fignum});
grid on;
axis equal;
fignum=fignum+1;

% mD=[x',lgen(x'); rdPos];
mD=[x',lgen(x'); ];

figure(fignum); clf
set(fignum,'name',strrep(labelF{fignum},'+','_'),'Position',[1600
 850   550   500]);

plot(mD(:,1),mD(:,2),'k.','MarkerSize',24);
set(gca,'xlim',rangeXY(1,:),'ylim',rangeXY(2,:));
title(labelF{fignum});
grid on;
axis equal;
fignum=fignum+1;

houghLD=repmat(mD(:,1)',[size(t,2) 1]).*repmat(cos(t'),[1
 size(mD,1)])+repmat(mD(:,2)',[size(t,2) 1]).*repmat(sin(t'),[1
 size(mD,1)]);
thetaD=repmat((t'),[1 size(mD,1)]);
mD2=[thetaD(:) houghLD(:)];
```

```
voteD(:,1)=floor(dNs.*(mD2(:,1)-min(mD2(:,1))./(max(mD2(:,1))-
min(mD2(:,1))))+1;
voteD(:,2)=floor(dNs.*(mD2(:,2)-min(mD2(:,2))./(max(mD2(:,2))-
min(mD2(:,2))))+1;
countD=zeros(dNs+1,dNs+1);
for i=1:size(voteD,1)
    countD(voteD(i,2),voteD(i,1))=countD(voteD(i,2),voteD(i,1))+1;
end

grX=((max(mD2(:,1))-min(mD2(:,1))).*(gridP)./dNs)+min(mD2(:,1));
grY=((max(mD2(:,2))-min(mD2(:,2))).*(gridP)./dNs)+min(mD2(:,2));

grXP=repmat(grX,[dNs+1 1]);
grYP=repmat(grY',[1 dNs+1]);

% disD=(sqrt(power(repmat(mD2(:,1),[1,size(mD2,1)])-repmat(mD2(:,1)',
[size(mD2,1),1]),2)+power(repmat(mD2(:,1),[1,size(mD2,1)])-
repmat(mD2(:,1)',[size(mD2,1),1]),2)));
% disD2=triu(disD)-triu(ones(size(disD)))';
% disD2f=disD2(:);
% key=find(disD2f>=0);
% sortedDis=sortrows([key disD2f(key)],2);

figure(fignum); clf
labelF2=strrep(labelF{fignum},'.','');
labelF2=strrep(labelF2,' ','_');
set(fignum,'name',labelF2,'Position',[500   270   550   500]);

plot(mD2(:,1),mD2(:,2),'k.');
xtickpoint=0:pi/4:2*pi;
xlabel={'0','\pi/4','\pi/2','3\pi/4','\pi','5\pi/4','3\pi/2','7\pi/4','2\pi'};
set(gca,'xtick',xtickpoint,'xticklabel',xlabel)
title(labelF{fignum});
grid on;
fignum=fignum+1;

figure(fignum); clf
labelF2=strrep(labelF{fignum},'.','');
labelF2=strrep(labelF2,' ','_');
set(fignum,'name',labelF2,'Position',[1050   270   550   500]);

plot(voteD(:,1),voteD(:,2),'k.'),hold on;
contour(countD);
% contourf(countD);
xtickpoint=0:pi/4:2*pi;
title(labelF{fignum});
grid on;
fignum=fignum+1;

figure(fignum); clf
labelF2=strrep(labelF{fignum},'.','');
labelF2=strrep(labelF2,' ','_');
set(fignum,'name',labelF2,'Position',[1600   270   550   500]);
```

```
contour3(grXP,grYP,countD,50,'lineWidth',3);
set(gca,'xtick',xtickpoint,'xticklabel',xlabel)
title(labelF{fignum});
grid on;
fignum=fignum+1;


% datafname='pict_res';
% save_fig;
```

```
Unable to perform assignment because the indices on the left side are
 not compatible with the size of the right side.

Error in lec2D_A1_lineHough_Plus (line 92)
voteD(:,1)=floor(dNs.*(mD2(:,1)-min(mD2(:,1))./(max(mD2(:,1))-
min(mD2(:,1))))+1;
```

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