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

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Specifications and requirements

1. @Time : 2022-8-10

2. @Author : Hiroaki Wagatsuma

3. @Site : https://github.com/hirowgit/1A1_matlab_intermediate_course

4. @IDE : MATLAB R2022a

5. @File : lec1_step7.m

Main program

```matlab
% a generator of the natural number sequence randomly aligned

tic
NofD=10;
% NofD=200;
```

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```matlab
% NofD=300;

setN=NofD*1000;
allData=[];
for k=1:setN

    flag=true(1,NofD+1);

    DataLine=[];
    tmp=floor(rand(1,1)*NofD)+1;

    while sum(flag(1:NofD))>0
        if flag(tmp)
            DataLine(end+1)=tmp;
            flag(tmp)=false;
        end
        tmp=floor(rand(1,1)*NofD)+1;
    end
    allData(k,:)=DataLine;
end

% allData=allData*10;

allData_s=sort(allData);

allData_d=diff(allData_s);

[ki kj]=find(allData_d>0);

sect_id=[0 find(diff(kj)>0)' length(kj)];
sect=[sect_id(1:end-1)+1; sect_id(2:end)];
sect_eg=mat2cell(sect',ones(1,NofD),2);

% sect_node=cellfun(@(x) kj(x(1):x(2)),sect_eg,'UniformOutput',false);
sect_data=cellfun(@(x) ki(x(1):x(2)),sect_eg,'UniformOutput',false);
NofE_data=cellfun(@(x) diff([0 x' setN])/
setN,sect_data,'UniformOutput',false);
NofE_data_m=cell2mat(NofE_data);

figure(1); clf;
imagesc(allData_s);

figure(2); clf;
% for k=1:NofD
%     plot(NofE_data{k},'.-'),hold on;
% end
plot(NofE_data_m','.-')
grid on;
xp=1:NofD;

set(gca,'ylim',[0 1],'ylim',[0 mean(mean(NofE_data_m))*3]);
str_lg=cellfun(@(x) ['id = ',num2str(x)],num2cell(xp),'UniformOutput',false);
legend(str_lg);
xticks(xp);
```
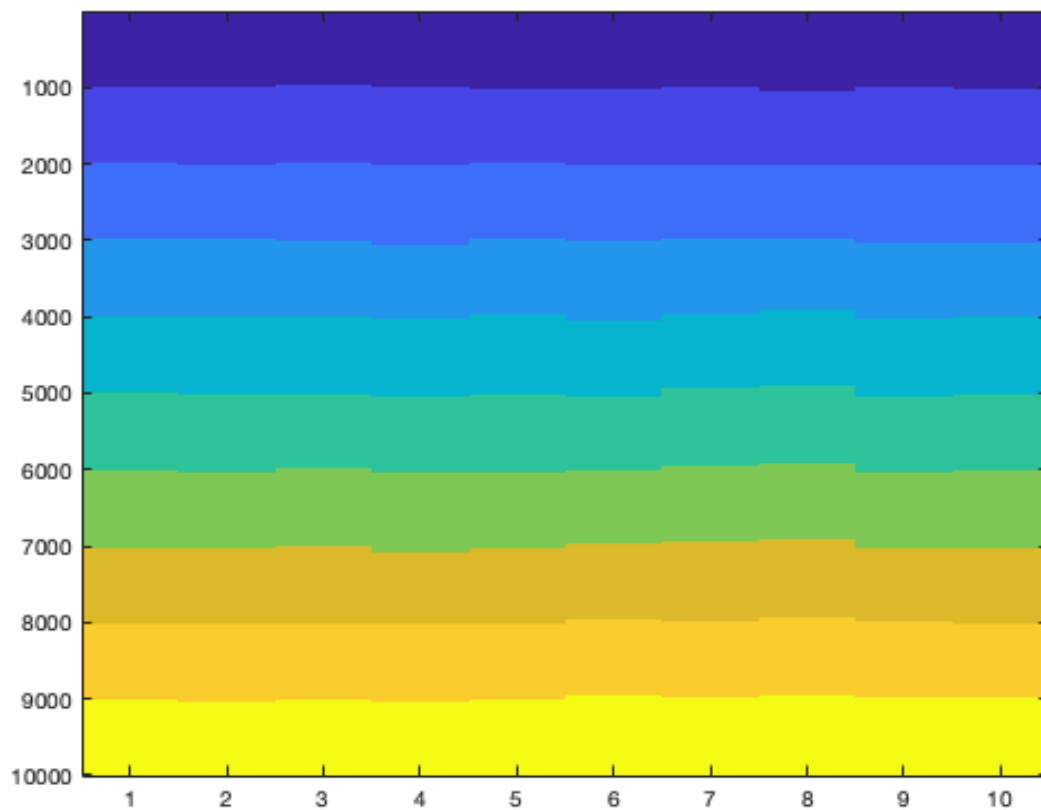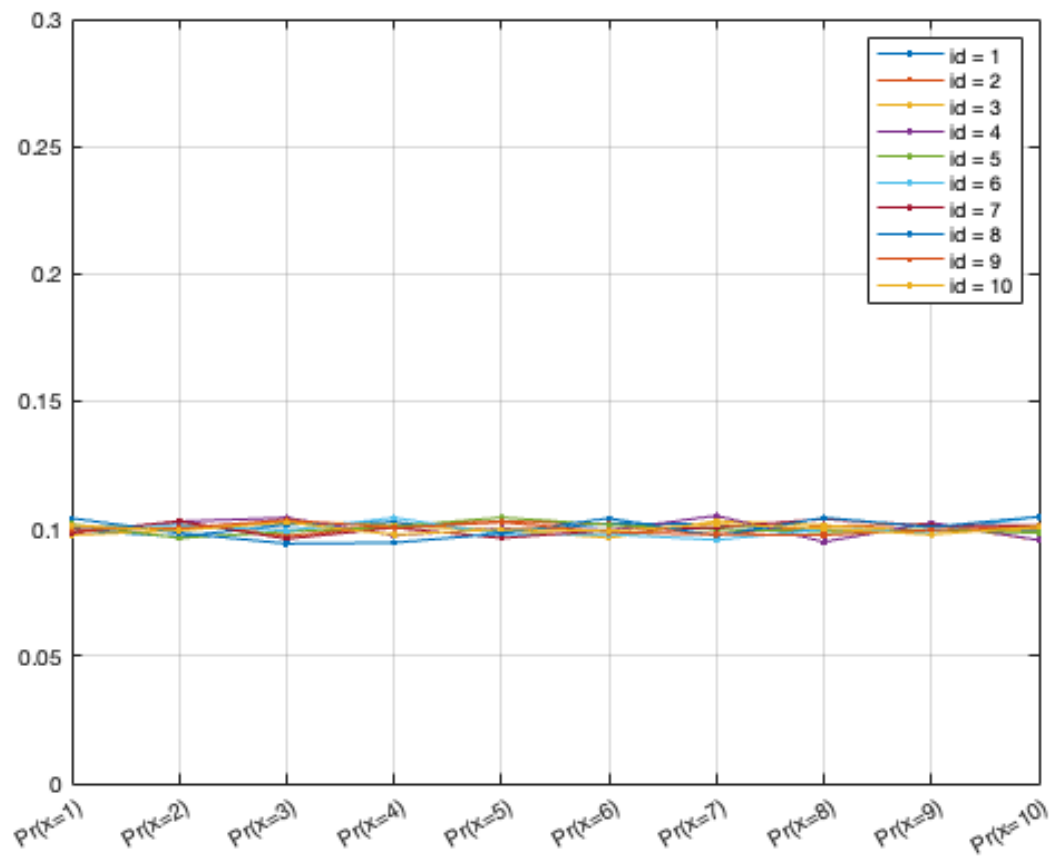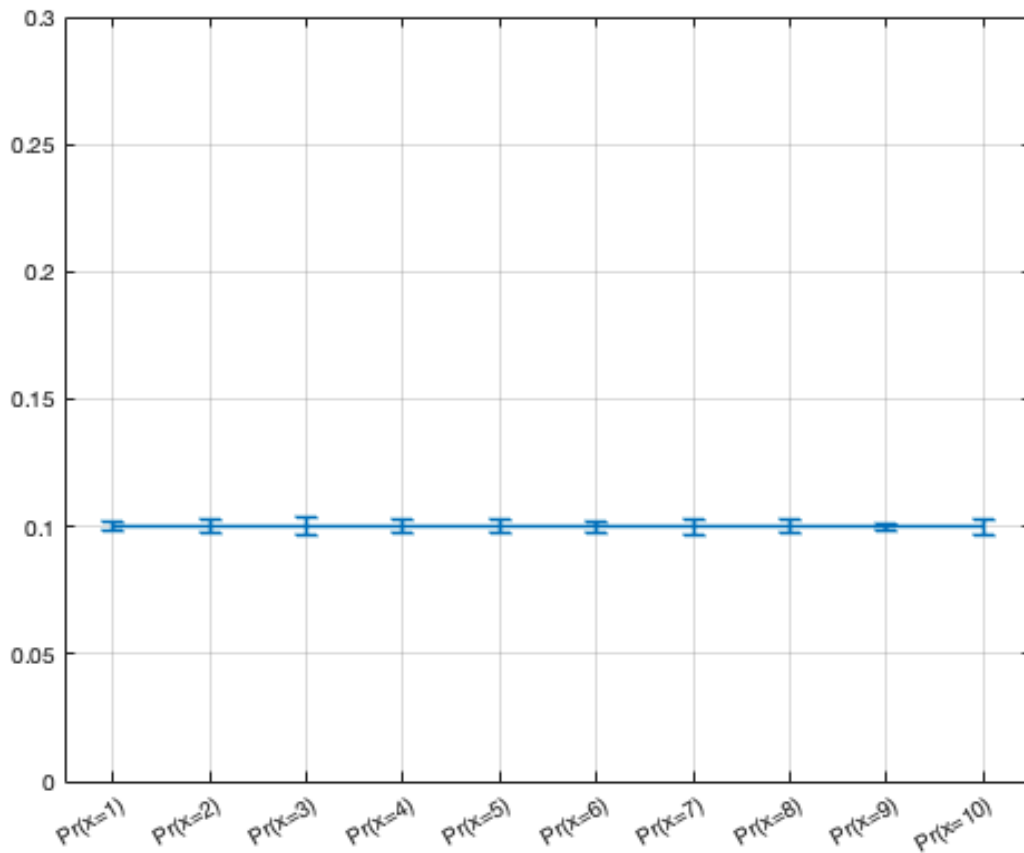
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```matlab
str_xtk=cellfun(@(x)
  ['Pr(x=',num2str(x),')'],num2cell(xp),'UniformOutput',false);
xticklabels(str_xtk);

figure(3); clf;
meanD = mean(NofE_data_m);
errD = std(NofE_data_m);
errorbar(xp,meanD,errD,'LineWidth',1.5,'MarkerSize',32);
set(gca,'xlim',[0.5 NofD+0.5],'ylim',[0 mean(meanD)*3]);
grid on;
xticks(xp);
xticklabels(str_xtk);
```

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Supplementary information to publish

If you want to make a pdf or html file on the code, you can use the code "x_publish_each_codes.m" in the same folder. Please change the file name as " this_file_tag='lec*_step*' " (* will be replaced to the number of the target file).

The code "x_publish_all_codes.m" works for such a publication applying to all codes in the same folder (Note: "x_publish_all_codes_sub.m" should be located in the same folder).

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