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

Table of Contents

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 : lec0b_step4.m

Main program

```
NofD=5;
maxD=5;

rM=rand(NofD,NofD);
```

```
binaryM=(rM>0.5);

disp('binaryM');
disp(binaryM);
key=find(~binaryM);

doubleM=double(binaryM);
doubleM(key)=3;
disp('doubleM');
disp(doubleM);

intM=floor(rM*maxD)+1;
disp('intM');
disp(intM);

key=find(intM<5);
intM2=intM;
intM2(key)=0;
disp('intM2');
disp(intM2);

s_intM=sort(intM);
disp('s_intM');
disp(s_intM);


% s_intM=[
%      1     2     1     1     2
%      3     2     2     1     4
%      4     2     2     2     4
%      4     2     3     2     4
%      4     2     4     5     5];

% s_intM=[
%      1     2     1     1     1
%      2     3     2     2     1
%      2     3     3     2     1
%      4     5     3     2     3
%      5     5     5     2     5];

s_intM=[
     1     1     1     1     1
     1     2     1     2     3
     1     2     1     3     5
     1     4     3     4     5
     1     5     5     5     5];
s_intM=[
     1     1     1     1     5
     1     2     1     2     5
     1     2     1     3     5
     1     4     3     4     5
     1     5     5     5     5];
disp(s_intM);
```

```
dM=diff(s_intM);

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

LackNum=setdiff([1:NofD],unique(kj));

sM=sortrows([[zeros(length(LackNum),1); ki] [LackNum';kj]],2);
ki=sM(:,1); kj=sM(:,2);

mD=max(max(dM));
ti2=[]; tj2=[];
for i=2:mD
    [ti tj]=find(dM==i);
    if ~isempty(ti)
        sM=sortrows([[repmat(ti,[i-1,1]);ti2] [repmat(tj,[i-1,1]);tj2]],2);
        ti2=sM(:,1); tj2=sM(:,2);
    end

end

if ~isempty(ti2)
        sM=sortrows([[ti2; ki] [tj2; kj]],2);
        ki=sM(:,1); kj=sM(:,2);
end

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_data=cellfun(@(x) sort(ki(x(1):x(2))),sect_eg,'UniformOutput',false);
key=cell2mat(cellfun(@(x) length(x)<=1 &
 sum(x)==0,sect_data,'UniformOutput',false));
% [ 1     1     1     1     1] # {[  1 1]} # {[       0]} the same position
% [ 5     5     5     5     5] # {[14 14]} # {[       0]} the same position
if sum(key)>0
    sect_data(key)={[]};
end
% disp(sect_data)

NofE_data=cellfun(@(x) diff([0 x' NofD]),sect_data,'UniformOutput',false);
zeroS=cell(size(NofE_data));
zeroE=cell(size(NofE_data));

keyL=find(cell2mat(cellfun(@(x)
 length(x)<maxD,NofE_data,'UniformOutput',false)));
if ~isempty(keyL)
    terM=cell2mat(sect_eg(keyL));

    terM1=terM(:,1);
    trNum=mat2cell(s_intM(1,kj(terM1))',ones(1,length(kj(terM1))));
    zeroS(kj(terM1))=cellfun(@(x) zeros(1,x-1),trNum,'UniformOutput',false);

    trNum=mat2cell(s_intM(NofD,kj(terM1))',ones(1,length(kj(terM1))));
```

```
    zeroE(kj(terM1))=cellfun(@(x) zeros(1,NofD-
x),trNum,'UniformOutput',false);

    NofE_data2=cellfun(@(x,y,z) [x, y,
 z],zeroS,NofE_data,zeroE,'UniformOutput',false);
else
    NofE_data2=NofE_data;
end

NofE_data_m=cell2mat(NofE_data2);
```

binaryM

```
   0   0   0   0   1
   0   0   1   1   0
   0   1   0   0   1
   0   1   0   0   1
   0   0   1   1   0
```

doubleM

```
     3     3     3     3     1
     3     3     1     1     3
     3     1     3     3     1
     3     1     3     3     1
     3     3     1     1     3
```

intM

```
     2     2     3     1     4
     1     2     3     5     1
     2     5     3     1     5
     3     5     2     2     3
     2     2     5     4     2
```

intM2

```
     0     0     0     0     0
     0     0     0     5     0
     0     5     0     0     5
     0     5     0     0     0
     0     0     5     0     0
```

s_intM

```
     1     2     2     1     1
     2     2     3     1     2
     2     2     3     2     3
     2     5     3     4     4
     3     5     5     5     5

     1     1     1     1     5
     1     2     1     2     5
     1     2     1     3     5
     1     4     3     4     5
     1     5     5     5     5
```

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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