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Specifications and requirements

1. @Time: 2021-1-16

2. @Author: Hiroaki Wagatsuma

3. @Site: https://github.com/hirowgit/1B0_matla_optmization_course

4. @IDE: MATLAB R2018a

5. @File: A3_Objects_and_Path_Normal.m

Main program

clear all

clc

A1_ExcelRead_and_Plot_Normal;

```
\mathtt{contr} = [-0.15, 0.15, 0.7, 0.7, -0.7, -0.7, -0.15, -0.15, 0.15, 0.15; 1, 1, 1, -1, -1, 1, 1, -1, -1, 1]
qAnq=@(x1,y1,x2,y2) atan2(y2-y1,x2-x1);
RotM=@(theta) [cos(theta),-sin(theta);sin(theta),cos(theta)];
% Pcontr=RotM(gAng(x1,y1,x2,y2))*contr+repmat([x1;y1],
[1,size(contr,2)]);
% ~~~~~MakeQTMovie <initialize> (start)~~~~~~~~~~
% You need to place "MakeQTMovie.m" (c) Copyright Malcolm Slaney,
Interval Research, March 1999.
% in the same folder of this file
Flag write Movie=1;
Nm=1; % the serial number of the movie
f_folder='movie'; % the output folder of the movie
if ~isdir(f_folder); mkdir(f_folder); end
f_prefix='outputMoviePath'; % the output file name
if Flag write Movie == 1
    MovieFileName = strcat(f_prefix,num2str(Nm),'.mov');
    fprintf('Creating the movie file %s.\n',
 fullfile(f_folder,MovieFileName));
    MakeQTMovie('start',fullfile(f_folder,MovieFileName));
    MakeQTMovie('size', [480 360]);
    MakeQTMovie('quality', 1.0);
    fps = 10;
    fps = 30;
end
% ~~~~~MakeQTMovie (end)~~~~~~
marginR=[-20 20];
for j=1:Lsize
    figure(1); clf
 plot(sTraj_full(:,1),sTraj_full(:,2),'.-','lineWidth',2,'MarkerSize',20);
    axis equal;
    grid on;
    title(['Trajectory: ',num2str(j)]);
    xlabel('x'); ylabel('y');
    sTraj_full=lineD2{j};
    figure(31);clf;
    plot(sTraj full, '.-');
    grid on;
    title(['x and y positions in the trajectory: ',num2str(j)]);
    xlabel('x'); ylabel('y');
    figure(4); clf;
    for k=1:size(sTraj full,1)-1
        x1=sTraj_full(k,1); y1=sTraj_full(k,2);
        x2=sTraj_full(k+1,1); y2=sTraj_full(k+1,2);
```

```
Pcontr=RotM(gAng(x1,y1,x2,y2))*contr+repmat([x1;y1],
[1,size(contr,2)]);
plot(Pcontr(1,:),Pcontr(2,:),'.-','lineWidth',2,'MarkerSize',20),hold on;
       set(gca,'xlim',[min(sTraj_full(:,1))
max(sTraj_full(:,1))]+marginR,'ylim',[min(sTraj_full(:,2))
max(sTraj_full(:,2))]+marginR);
plot(sTraj_full(:,1),sTraj_full(:,2),'.-','lineWidth',2,'MarkerSize',20);
       plot([x1,x2],[y1,y2],'k.-','lineWidth',2,'MarkerSize',20);
       axis equal; grid on; xlabel('x'); ylabel('y');
       title(['Object movement in the trajectory: ',num2str(j)]);
       % ~~~~~~MakeQTMovie <add a frame> (start)~~~~~~~~~~
       if Flag_write_Movie == 1
           MakeQTMovie('addfigure');
       end
       % ~~~~~MakeQTMovie (end)~~~~~~
         pause(0.2);
         drawnow;
       hold off
    end
end
% ~~~~~MakeQTMovie <finalize> (start)~~~~~~~
if Flag_write_Movie == 1
   MakeQTMovie('framerate', fps);
   MakeQTMovie('finish');
% ~~~~~MakeQTMovie (end)~~~~~~
strMessage=sprintf('Please find the generated mov file in the folder
"%s" as filename "%s"',f folder,MovieFileName);
disp(strMessage);
% ~~~~~MakeQTMovie <comment>~~~~~~
% The generated mov file is recommended to open QuickTime Player 7 in
the first place and resave a new mov file by the player.
% The new mov file generated by the player can be opened with a recent
version of the QuickTime Player.
% ~~~~~MakeQTMovie (end)~~~~~~
ans =
  struct with fields:
            Description: ''
               UserData: []
         DimensionNames: {'Row' 'Variables'}
```

```
VariableNames: {1×9 cell}
    VariableDescriptions: {}
           VariableUnits: { }
      VariableContinuity: []
                RowNames: { }
ans =
   202
          9
varnames =
  1x9 cell array
 Columns 1 through 7
               \{'x1'\} \{'y1'\} \{'x2'\} \{'y2'\} \{'x3'\}
   {'Var1'}
 {'y3'}
 Columns 8 through 9
    \{'x4'\} \{'y4'\}
x1 =
  72.0000
  72.0000
  72.0000
   73.0141
  74.0282
  75.0423
   76.0563
   77.0704
   78.0845
   79.0986
   80.1127
   81.1268
   82.1408
   83.1549
   84.1690
   85.1831
   86.1972
   87.2113
   88.2254
   89.2394
   90.2535
   91.2676
   92.2817
   93.2958
  94.3099
   95.3239
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102.4225	
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104.4507	
105.4648	
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108.5070	
109.5211	
110.5352	
111.5493	
112.5634	
113.5775	
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62.0366			
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64.0357			
65.1372			
66.2963			
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68.7545			
70.0370			
71.3443			
72.6680			
74.0000			
75.3320			
76.6557			
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80.4952			
81.7037			
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115.3521	
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135.6338	
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139.6901	
140.7042	
141.7183	
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147.8028	
148.8169	
149.8310	
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152.8732	
153.8873	
154.9014	
155.9155	
156.9296	
157.9437	

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  159.9718
  160.9859
  162.0000
lineD =
  1x1 cell array
    {202×1 double}
lineD =
  1×1 cell array
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x2 =
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   72.0000
   72.0000
   73.0141
   74.0282
   75.0423
   76.0563
   77.0704
   78.0845
   79.0986
   80.1127
   81.1268
   82.1408
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102.4225		
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lineD =
  1×2 cell array
    {202×2 double}
                      {202×1 double}
lineD =
  1×2 cell array
    \{202\times2\ double\}
                      {202×2 double}
x3 =
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  180.0000
  180.0000
  179.9722
  179.8900
  179.7553
  179.5698
  179.3354
  179.0538
  178.7269
  178.3566
  177.9445
  177.4925
  177.0025
  176.4763
  175.9155
  175.3222
  174.6981
  174.0449
  173.3646
  172.6589
  171.9296
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  169.6185
  168.8131
  167.9932
  167.1606
  166.3171
  165.4645
  164.6047
  163.7395
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  160.5803
  159.1684
  157.7723
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*y*3 = 126.0000 126.0000 126.0000 125.1290 124.2581 123.3871 122.5161 121.6452 120.7742 119.9032 119.0323 118.1613 117.2903 116.4194 115.5484 114.6774 113.8065 112.9355 112.0645 111.1935 110.3226 109.4516 108.5806 107.7097 106.8387 105.9677 105.0968 104.2258 103.3548 102.4839 101.6129 100.7419 99.8710 99.0000 99.0000 97.6524 96.4466 95.3745 94.4285 93.6005 92.8828 92.2674 91.7465 91.3121 90.9566 90.6718 90.4501

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lineD =
  1×3 cell array
                          \{202\times2 \text{ double}\} \{202\times1 \text{ double}\}
     \{202\times2\ double\}
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```
lineD =
  1×3 cell array
    {202×2 double}
                       \{202\times2\ double\}
                                          {202×2 double}
x4 =
   72.0000
   72.0000
   72.0000
   73.0141
   74.0282
   75.0423
   76.0563
   77.0704
   78.0845
   79.0986
   80.1127
   81.1268
   82.1408
   83.1549
   84.1690
   85.1831
   86.1972
   87.2113
   88.2254
   89.2394
   90.2535
   91.2676
   92.2817
   93.2958
   94.3099
   95.3239
   96.3380
   97.3521
   98.3662
   99.3803
  100.3944
  101.4085
  102.4225
  103.4366
  104.4507
  105.4648
  106.4789
  107.4930
  108.5070
  109.5211
  110.5352
  111.5493
  112.5634
  113.5775
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116.6197
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120.6761
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126.7606
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138.9296
139.9437
140.9577
141.9718
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164.6047

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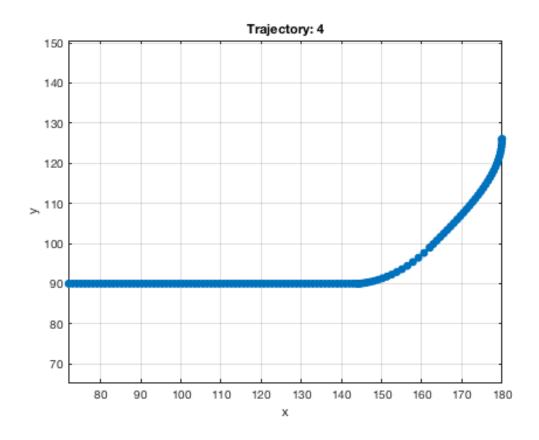
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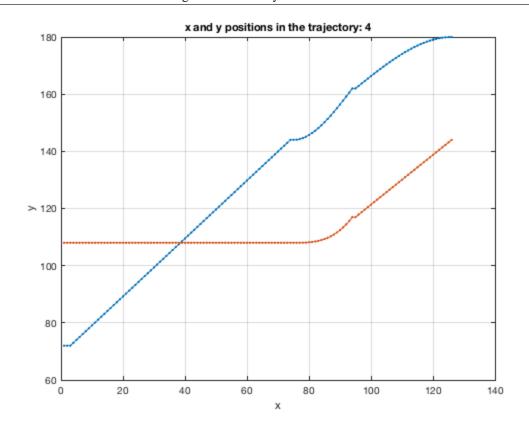
```
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lineD =
  1×4 cell array
     \{202\times2 \text{ double}\} \{202\times2 \text{ double}\} \{202\times2 \text{ double}\} \{202\times1 \text{ double}\}
double}
lineD =
  1×4 cell array
```

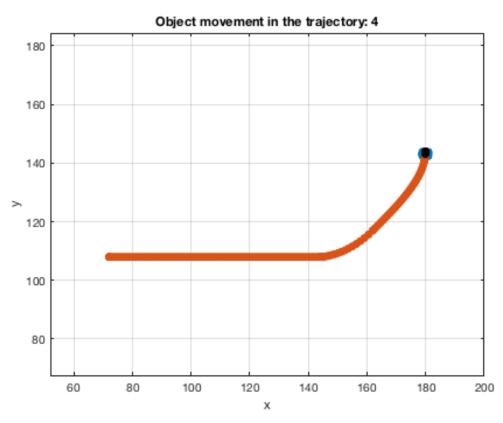
 $\{202\times2\ double\}$ $\{202\times2\ double\}$ $\{202\times2\ double\}$ $\{202\times2\ double\}$

Creating the movie file movie/outputMoviePath1.mov.

Please find the generated mov file in the folder "movie" as filename
"outputMoviePath1.mov"







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