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1. dir: list files and folders in current folder
2. dir('\*.txt'): find txt files in current folder
3. pwd: show current folder
4. cd: change current folder
5. delete('filename'): delete file
6. **movefile**('oldpath/oldname','newpath/newname'): rename or move file
7. what: list Matlab/simulink files in current folder
8. **more on**: display output one screen at a time, space to continue, q to quit
9. **more off**: display output continuously
10. **warning off**: turn off warning
11. ('\*.txt'): Find the files with extension “txt”
12. ('\*motor\*'): Find the files with “motor” in the file name

Table . Some rules of the regular expression by 1

| Code | Meaning |
| --- | --- |
|  | Match any characters |
|  | Match any single character |
|  | Match a word character (letter/digit/underscore/Chinese character) |
|  | Match a single space |
|  | Match a single digit |
|  | Match a single word boundary (Namely the beginning/end of a word) |
|  | Match the beginning of a line |
|  | Match the end of a line |

h = legend(legend1,legend2);% for instance, legend1 = $x\_1$  
h.Interpreter = 'latex';  
h.FontSize = fontsize;  
h.Location = 'northeast';  
h.Orientation = 'horizon';  
title('nameoftitle','interpreter','latex')% for instance, name = $V\_o$

title({'This is the first line'; 'This is the second line'});

saveas(gcf,'filename','png'); % No resolution ratio option  
print(gcf,'-dpng', '-r300', 'filename'); % 300 dpi png

Match the data with the simulation time vector .

1. Original data:
2. New data:

iL1out = interp1(t,iL1out,toutSIM)

1. Original data:
2. Wanted point:

iL1 = interp1(t,iL1out,t1)

1. gcd(a,b): The greatest common divisor of a and b
2. lcm(a,b): The least common multiple of a and b

clc,clear,close all  
  
SimulinkModel = 'DCMotorPID'; % Simulink model name, case-insensitive.  
open(SimulinkModel);  
fun = @GATestFun;  
nvars = 4;  
lb = [0;0;0;20000];  
ub = [.1;.1;.1;40000];  
MaxGen = 1;  
PopSize = 10; % Large size brings better result, but takes more time.  
options = optimoptions('ga', 'PopulationSize', PopSize, 'MaxGenerations', MaxGen, 'Display', 'iter');  
[x,fval,exitflag] = ga(fun, nvars, [], [], [], [], lb, ub, [], options);  
  
  
%------------------------------------------  
%--- Display the parameters tuned by GA ---  
%------------------------------------------  
  
kp = x(1)  
ki = x(2)  
kd = x(3)  
fN = x(4)  
  
  
%------------------------------------------  
%--- Show the result ---  
%------------------------------------------  
  
hws = get\_param(SimulinkModel,'modelworkspace');  
hws.assignin('kp',kp);  
hws.assignin('ki',ki);  
hws.assignin('kd',kd);  
hws.assignin('fN',fN);  
  
simout = sim(SimulinkModel);  
  
t = simout.simout.Time;  
SpeedError = simout.simout.Data;  
plot(t,SpeedError,'LineWidth',1.5)  
title('$Tracking Error$','interpreter','latex')  
grid on  
  
%-----------------------------------------------  
%--- The cost function to evaluate the error ---  
%-----------------------------------------------  
  
function cost = GATestFun(inputpara)  
  
SimulinkModel = 'DCMotorPID';  
kp = inputpara(1);  
ki = inputpara(2);  
kd = inputpara(3);  
fN = inputpara(4);  
  
hws = get\_param(SimulinkModel, 'modelworkspace');  
hws.assignin('kp',kp)  
hws.assignin('ki',ki)  
hws.assignin('kd',kd)  
hws.assignin('fN',fN)  
simout = sim(SimulinkModel);  
cost = rms(simout);  
end

image Figure 1. Simulink Model

Table 1. Parameters in the Simulink Model

| Parameters | Values | Parameters | Values |
| --- | --- | --- | --- |
|  | 0.1 |  | 0.1 |
|  | \* 30 / pi |  | 0.001 |
|  | 0.005 |  | 0.01 |
|  | 0.1 |  | 0 |

Suppose there is a data set obtained from SIMULINK, we want to resample it to reduce the data size:

told = simuout.out.simout.Time;  
VRLold = simuout.out.simout.Data(:,1);  
  
dtold = mean(diff(t)); % Original sampling time  
dtnew = .2e-3; % New even sampling time  
Q = round(dtnew/dtold); % Resample rate  
tnew = t(1):dtnew:length(VRL);  
VRLnew = resample(simuout.out.simout.Data(:,1),1,Q);

syms x  
eq = x^2 == 1;  
solve(eq,x)

syms x  
eq = sin(x)^2 == 1;  
vpasolve(eq,x,5) % 5 digits, default is 32 digitss

syms x  
solSym = solve(x^2 == 1,x)  
solNum = vpa(solSym,5) % 5 digits, default is 32 digits

syms x  
subs(x^2,x,2)

syms x  
SymVar = int(x^2,x,0,1);  
VpaVar = vpa(SymVar,5); % 5 digits, default is 32 digits  
DblVar = double(VpaVar);

x = 0:0.1:.5;  
y = sin(x);  
p = polyfit(x,y,1); % 1st order polynomial fit  
  
plot(x,y)  
hold on  
plot(x,p(1) \* x + p(2))

Q: SIMULINK does not work properly even with identical parameters.

A: Check the workspace priority, making sure variables are well defined and no other higher priority variables with the same name.

* Model workspace.
* Base workspace.