TASK1:Evaluation work Assigment 1

time duration	6/8/2024	7/8/2024	8/8/2024
SVM	1day		
Preprocessing	DAX(Ta)	U30	U500
	EF1.1.1	EF1.1.2	EF1.1.3
Data Analysis(Forecast)			
Covid crash	EF1.2.1	EF1.2.2	EF1.2.3
Ukrainian Crash	EF1.3.1	EF1.3.2	EF1.3.3
Chinese Crash	EF1.4.1	EF1.4.2	EF1.4.3
Performance Test			
	EF1.5.1	EF1.5.2	EF1.5.3
Backtest			
	EF1.6.1	EF1.6.2	EF1.6.3

คะแนนการประเมินคุณภาพของงานและความถูกต้องของผลการรันของ RA
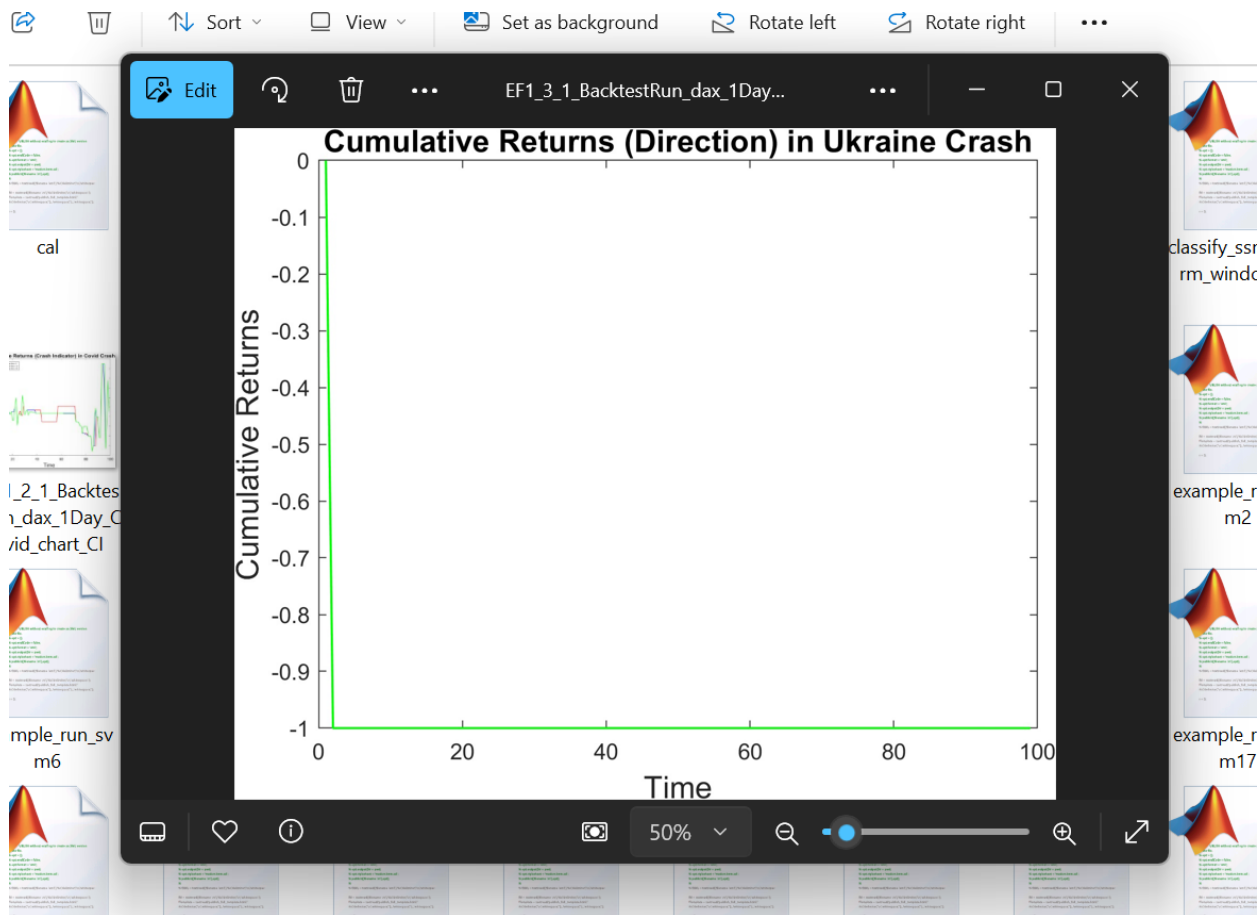
Name: Ta

Task: ให้ไปรัน SVM one day 3 crash DAX

Duration: 8 สิงหาคม (1 วันทำการ)

คะแนนรวม 8

899	13227.7	-0.00177	0.813718771	1	0																									
900	13241.9	0.00107	-1.607911025	0	0																									
901	12978.8	-0.01987	-19.50830085	0	1																									
902	13058.2	0.00612	-1.307904051	0	0																									
903	13143.9	0.00656	0.072782193	1	0																									
904	13077.7	-0.00504	-1.767425511	0	0																									
905	13171.7	0.00719	-2.427127442	0	0	1	0	0	1	1	1	0	1	0	0	1	1	1	0	1	0	0	1	1	1	0	0	0	0
906	13179.7	0.00061	-0.915501023	0	0	1	0	0	0	1	0	-1	1	0	0	1	0	0	-1	0	1	0	0	1	0	-1	-2.172767812	-2.172767812	-2.172767812
907	13068.6	-0.00843	-14.87907706	0	1	0	0	1	0	1	0	-1	0	0	1	0	1	0	-1	0	0	1	0	1	0	-1	-1.004257212	-1.004257212	-1.004257212
908	13068.2	-3.06E-05	-0.996369945	0	0	1	0	0	0	1	0	-1	1	0	0	0	1	0	-1	1	0	0	0	1	0	-1	-0.101474957	-0.101474957	-0.101474957
909	13152.6	0.00646	-212.0595098	0	1	1	0	0	1	1	1	-1	1	0	0	1	1	1	-1	1	0	0	1	1	1	-1	1.08063674	1.08063674	-0.101474957
910	13349.3	0.01496	1.315613522	1	0	1	0	0	1	1	1	-1	1	0	0	1	1	1	-1	0	1	0	0	0	1	-1	1.08063674	-1.46481477	-1.46481477
911	13304.7	-0.00334	-1.223400251	0	0	1	0	0	1	0	0	-1	1	0	0	0	1	0	-1	1	0	0	0	1	0	-1	-0.822234555	-0.822234555	-0.822234555
912	13321.7	0.00128	-1.382443624	0	0	1	0	0	0	1	0	-1	1	0	0	1	1	1	-1	1	0	0	1	1	1	-1	-0.822234555	-0.363994116	-0.363994116
913	13382.6	0.00457	2.577781291	1	0	0	0	1	1	0	0	-1	0	0	1	0	1	0	-1	0	0	1	0	1	0	-1	-2.067661148	-2.067661148	-2.067661148

ไม่มีหัวตารางบอกว่า crash covid หรือ Chinese หรือ Ukrain

Cumulative Returns (Crash Indicator) in Covid Crash

Cumulative Returns (Direction) in Ukraine Crash
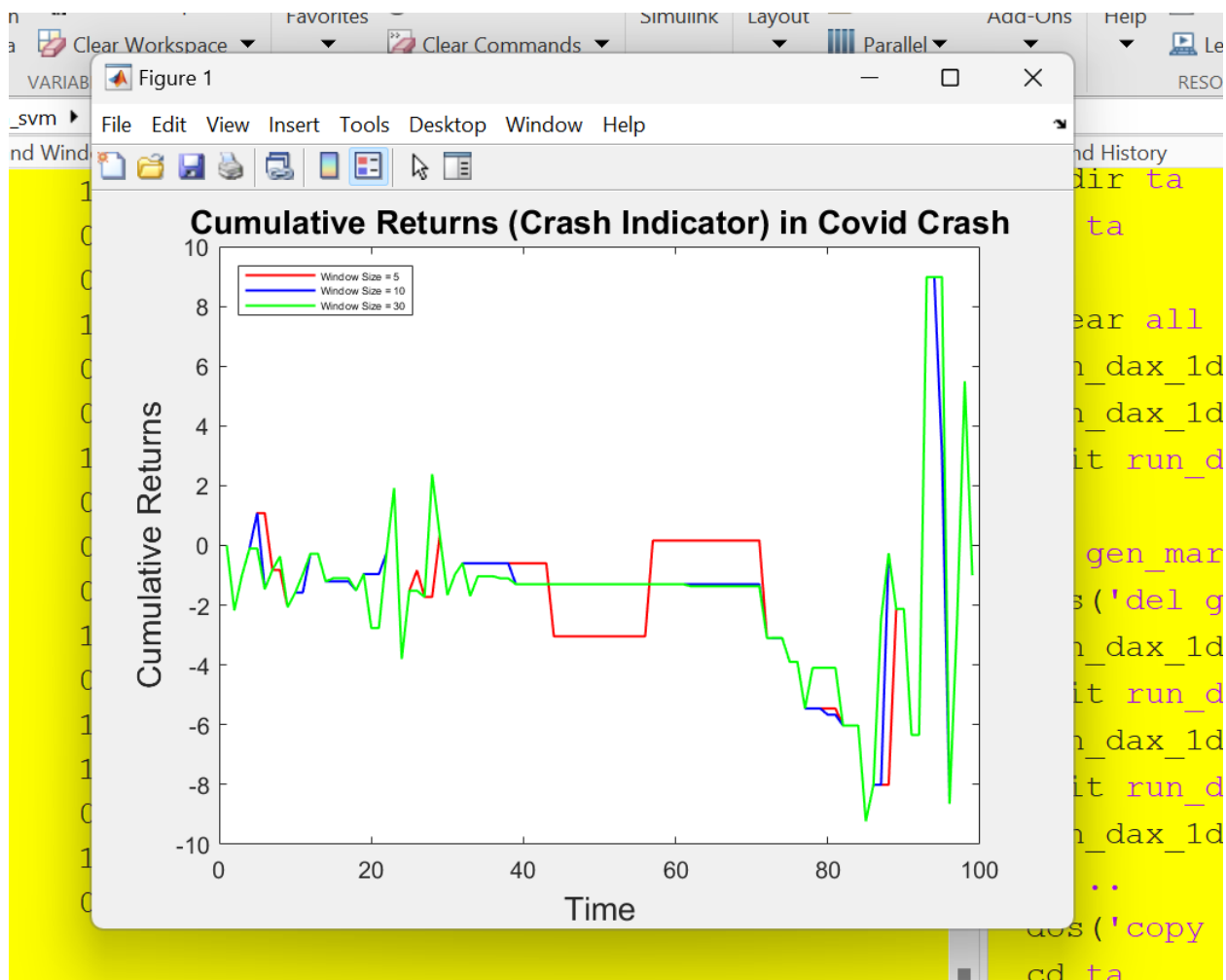
ตรง back test direction ว่าง

Source code m file รันไม่ได้

ถ้าแก้ตรงปิด gen market crash run ได้ back test
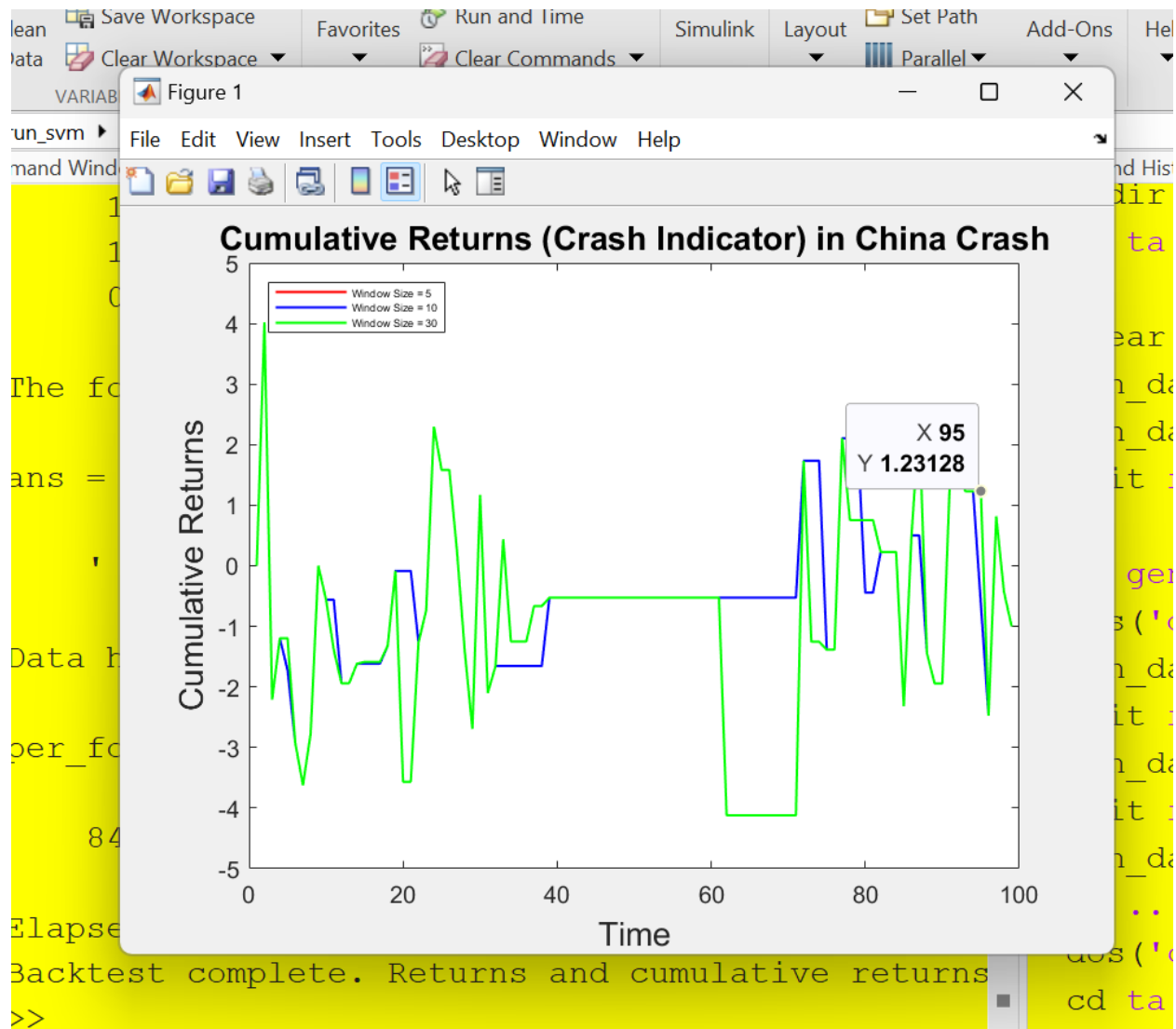
Figure 1

File Edit View Insert Tools Desktop Window Help

Cumulative Returns (Crash Indicator) in China Crash

Window Size = 5
Window Size = 10
Window Size = 30

X 95
Y 1.23128

Cumulative Returns

Time

Backtest complete. Returns and cumulative returns
>>

```
    if i == 1
        money(i) = price(1);
    elseif forecast(i) == 1 % Forecast is up
        money(i) = price(i); %ยังไม่ขาย เงินเปลี่ยนตามราคา
    elseif forecast(i) == 0 % Forecast is down
        money(i) = money(i-1); %ขาย เงินไม่เปลี่ยนตามราคา
    end

    % Calculate the cumulative return
    if i == 1
        cumulative_returns1_covid(i) = 0;
    elseif money(i+1) - money(1) == 0
        cumulative_returns1_covid(i) = cumulative_returns1_covid(i-1);
    else
        cumulative_returns1_covid(i) = (money(i+1) - money(1)) / money(1);
    end
nd
```

หัวข้อตรวจสอบความถูกต้อง	คะแนน	หมายเหตุ
1) Preprocessing EF1.1 วันที่ของ Covid crashEF1.1.1 Chinese crash EF.1.1.2 Ukrain crash EF1.1.3 ตรงกันทั้งสามคน	1	
2) EF1.6.1 Backtest ถูก	0.5	ผิดตรง direction กราฟว่าง
3) EF1.5.1 มีการคำนวน ค่า hit ratio และ	1	

cumulative return ค่าสุดท้าย		
4) ชื่อตัวแปรชื่อ mat file ชื่อ excel file ถูกต้อง	1	
5) ผลการรันถูกต้องตรง ช่องหัวข้อมีชื่อ column และมีการ ตกแต่งตารางหรือเอา ไปไว้ใน sheet ใหม่ เพื่อค้นหาได้ง่าย	0	
6) มีการใช้คำสั่ง matlab วาดกราฟ save graph ได้ถูก ขนาด fonts และมี ligand	1	
7) ผลการคำนวน ครบถ้วนถูกต้องตาม ต้องการ	1	
8) ชื่อตัวแปรมีคำว่า covid หรือ สื่อ ความหมายครบถ้วน ทุกตัว	1	

9) งานมีคุณภาพของการ ใช้ function matlab มากเป็น พิเศษเหนืองานที่ มอบหมายให้ (high quality work)	1	
10)ส่งงานได้ครบถ้วนและ ตรงเวลา	1	

ผลงาน code matlab

```matlab
%%% dax 1 day
%%% EF1.1.1
%%% forecast and do backtest

tic;


% Specify the file name and sheet name (if applicable)
fileName = 'dax_1day_backtest_EF1_1_1_Ta.xlsx';
my_sheet = 'back_test';
%%change excel name and market crash at data number..
end_day=2180;


%[target_dax_1day,HRT,returns_dax_1day] =
gen_market_crash_indicator2(10);

n = size(returns_dax_1day);
l = n(1);
for i=1:l
    direction(i) = sign(returns_dax_1day(i));
    if direction(i)==-1
        direction(i)=0;
    end
```

```matlab
end

writematrix(direction', fileName,'Sheet',my_sheet,'Range',
'F2:F2181');


%% Covid
% window5
m=1;

clear p;
clear cc;
clear cc_crash_window5_eurusd_chinese6;
clear target_eurusd;
clear ret_eurusd;
clear data;
clear target;
clear cc_crash_window5_dax_1day
clear pp_crash_window5_dax_1day
clear target2_crash_window5_dax_1day
clear cc_di_window5_dax_1day
clear pp_price_crash_window5_dax_1day
clear target2_price_crash_window5_dax_1day

% Read data from the Excel file
% data is return
data = readmatrix(fileName,'Sheet',my_sheet,'Range',
'E2:E2181');
% price is closed
price=readmatrix(fileName,'Sheet',my_sheet,'Range',
'D2:D2181');
% target is market cash
target=readmatrix(fileName,'Sheet',my_sheet,'Range',
'G2:G2181');
% Send read data to forecast module
ret_eurusd = data;
target_eurusd=target;

%%%covid crash
```

```matlab
% disp('Data has been successfully modified and written to
column B.');
    for i=1:100

[cc_covid_crash_window5_dax_1day(i),pp_covid_crash_window5_d
ax_1day(i),target2_covid_crash_window5_dax_1day(i)]=run_svm_
forecast_alarm3(ret_eurusd(1:end_day-
i),target_eurusd(1:end_day-i+1),200,m);
    end
    a=flip(cc_covid_crash_window5_dax_1day);
    b=flip(pp_covid_crash_window5_dax_1day);
    c=flip(target2_covid_crash_window5_dax_1day);

writematrix(a', fileName,'Sheet',my_sheet,'Range',
'H906:H1005');
writematrix(b', fileName,'Sheet',my_sheet,'Range',
'I906:I1005');
writematrix(c', fileName,'Sheet',my_sheet,'Range',
'J906:J1005');
%%forcast direction
for i=1:100

[cc_covid_di_window5_dax_1day(i),pp_price_covid_crash_window
5_dax_1day(i),target2_price_covid_crash_window5_dax_1day(i)]
=run_svm_forecast_direction3(price(1:end_day-
i),price(1:end_day-i+1),200,m);
end
 % price
    aa=flip(cc_covid_di_window5_dax_1day);
    bb=flip(pp_price_covid_crash_window5_dax_1day);
    cc=flip(target2_price_covid_crash_window5_dax_1day);
writematrix(aa', fileName,'Sheet',my_sheet,'Range',
'K906:K1005');
writematrix(bb', fileName,'Sheet',my_sheet,'Range',
'L906:L1005');
writematrix(cc', fileName,'Sheet',my_sheet,'Range',
'M906:M1005');
 %%chinese crash, we need to sort the output from backward
order to forward order.
```

```matlab
%%start date of forecast 2121-100=2021
%%end date of forecast 2121   =2121


disp('Data has been successfully modified and written to excel.');

 elapsedTime = toc;

% Convert the elapsed time from seconds to hours
elapsedTimeInHours = elapsedTime / 3600;
%per_form1_dax1day_window5=sum(cc_di_window5_dax_1day);
per_form2_dax1day_window5=sum(cc_covid_crash_window5_dax_1day);
% Display the elapsed time in hours
%fprintf('Elapsed time: %.6f hours\n performance 1:=%2f performance 2:=%2f  ', elapsedTimeInHours, per_form1_dax1day_window5,per_form2_dax1day_window5);
toc;

%% backtest

% Read data from columns A (price), B (forecast direction), and C (position)
price = readmatrix(fileName,'Sheet',my_sheet, 'Range', 'D906:D1005');
forecast = readmatrix(fileName,'Sheet',my_sheet,'Range', 'L906:L1005');
%position = readmatrix(fileName, 'Range', 'C1:C10');

% Initialize return and cumulative return arrays
cumulative_returns1_covid = zeros(99, 1);
money = zeros(100, 1);
% Perform the backtest
for i = 1:99
    % Check the forecast direction and determine the position

    if i == 1
```

```matlab
            money(i) = price(1);
        elseif forecast(i) == 1 % Forecast is up
            money(i) = price(i); %ยังไม่ขาย เงินเปลี่ยนตามราคา
        elseif forecast(i) == 0 % Forecast is down
            money(i) = money(i-1); %ขาย เงินไม่เปลี่ยนตามราคา
        end

        % Calculate the cumulative return
        if i == 1
            cumulative_returns1_covid(i) = 0;
        elseif money(i+1) - money(1) == 0
            cumulative_returns1_covid(i) =
cumulative_returns1_covid(i-1);
        else
            cumulative_returns1_covid(i) = (money(i+1) -
money(1)) / money(1);
        end
end

writematrix(cumulative_returns1_covid,
fileName,'Sheet',my_sheet, 'Range', 'N906:N1005');

target_forecast =
readmatrix(fileName,'Sheet',my_sheet,'Range', 'I906:I1005');
%position = readmatrix(fileName, 'Range', 'C1:C10');

% Initialize return and cumulative return arrays
cumulative_returns1_tar_covid = zeros(99, 1);
money_tar = zeros(100, 1);
% Perform the backtest
for i = 1:99
    % Check the forecast direction and determine the
position
    if i == 1
        money_tar(i) = price(1);
    elseif target_forecast(i) == 1 % Forecast is up
        money_tar(i) = price(i); %ยังไม่ขาย เงินเปลี่ยนตามราคา
    elseif target_forecast(i) == 0 % Forecast is down
```

```matlab
            money_tar(i) = money_tar(i-1); %ขาย เงินไม่เปลี่ยนตามราคา
    end

    % Calculate the cumulative return
    if i == 1
        cumulative_returns1_tar_covid(i) = 0;
    elseif money(i+1) - money(1) == 0
        cumulative_returns1_tar_covid(i) =
cumulative_returns1_tar_covid(i-1);
    else
        cumulative_returns1_tar_covid(i) = (money(i+1) -
money(1)) / money(1);
    end
end

% Write the results back to the Excel file
%writematrix(returns, fileName, 'Range', 'D1:D10');
writematrix(cumulative_returns1_tar_covid,
fileName,'Sheet',my_sheet, 'Range', 'AC906:AC1005');

disp('Backtest complete. Returns and cumulative returns have
been written to columns N.');

%%% Hit Ratio%%%%

total_sum = sum(a);
hit_ratio = total_sum / 100;

writematrix(hit_ratio, fileName, 'Sheet', 'hit_ratio',
'Range', 'A2');

total_sum_di = sum(aa);
hit_ratio_di = total_sum_di / 100;

writematrix(hit_ratio_di, fileName, 'Sheet', 'hit_ratio',
'Range', 'B2');
```

```matlab
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%window 10

m=2;
% Specify the file name and sheet name (if applicable)

clear p;
clear cc;
clear cc_crash_window10_eurusd_chinese6;
clear cc_crash_window10_dax_1day
clear pp_crash_window10_dax_1day
clear target2_crash_window10_dax_1day
clear cc_di_window10_dax_1day
clear pp_price_crash_window10_dax_1day
clear target2_price_crash_window10_dax_1day
clear price
clear total_sum
clear hit_ratio
clear total_sum_di
clear hit_ratio_di

%%%covid crash
price=readmatrix(fileName,'Sheet',my_sheet,'Range',
'D2:D2181');

disp('Data has been successfully modified and written to
column B.');
    for i=1:100

[cc_covid_crash_window10_dax_1day(i),pp_covid_crash_window10
_dax_1day(i),target2_covid_crash_window10_dax_1day(i)]=run_s
vm_forecast_alarm3(ret_eurusd(1:end_day-
i),target_eurusd(1:end_day-i+1),200,m);
    end
    d=flip(cc_covid_crash_window10_dax_1day);
    e=flip(pp_covid_crash_window10_dax_1day);
    f=flip(target2_covid_crash_window10_dax_1day);
```

```matlab
writematrix(d', fileName,'Sheet',my_sheet,'Range',
'O906:O1005');
writematrix(e', fileName,'Sheet',my_sheet,'Range',
'P906:P1005');
writematrix(f', fileName,'Sheet',my_sheet,'Range',
'Q906:Q1005');
%%forcast direction
for i=1:100

[cc_covid_di_window10_dax_1day(i),pp_price_covid_crash_windo
w10_dax_1day(i),target2_price_covid_crash_window10_dax_1day(
i)]=run_svm_forecast_direction3(price(1:end_day-
i),price(1:end_day-i+1),200,m);
end
    dd=flip(cc_covid_di_window10_dax_1day);
    ee=flip(pp_price_covid_crash_window10_dax_1day);
    ff=flip(target2_price_covid_crash_window10_dax_1day);
writematrix(dd', fileName,'Sheet',my_sheet,'Range',
'R906:R1005');
writematrix(ee', fileName,'Sheet',my_sheet,'Range',
'S906:S1005');
writematrix(ff', fileName,'Sheet',my_sheet,'Range',
'T906:T1005');
 %%chinese crash, we need to sort the output from backward
order to forward order.
 %%start date of forecast 2121-100=2021
 %%end date of forecast 2121    =2121

disp('Data has been successfully modified and written to
column B.');

 elapsedTime = toc;

% Convert the elapsed time from seconds to hours
elapsedTimeInHours = elapsedTime / 3600;
%per_form1_dax1day_window5=sum(cc_di_window5_dax_1day);
per_form2_dax1day_window10=sum(cc_covid_crash_window10_dax_1
day);
% Display the elapsed time in hours
```

```matlab
%fprintf('Elapsed time: %.6f hours\n performance 1:=%2f
performance 2:=%2f  ', elapsedTimeInHours,
per_form1_dax1day_window5,per_form2_dax1day_window5);
toc;

%%%backtest
% Specify the file name and sheet name (if applicable)

% Read data from columns A (price), B (forecast direction),
and C (position)
price = readmatrix(fileName,'Sheet',my_sheet, 'Range',
'D906:D1005');
forecast = readmatrix(fileName,'Sheet',my_sheet,'Range',
'S906:S1005');
%position = readmatrix(fileName, 'Range', 'C1:C10');

% Initialize return and cumulative return arrays
cumulative_returns2_covid = zeros(99, 1);
money = zeros(100, 1);
% Perform the backtest
for i = 1:99
    % Check the forecast direction and determine the
position
    if i == 1
        money(i) = price(1);
    elseif forecast(i) == 1 % Forecast is up
        money(i) = price(i); %ยังไม่ขาย เงินเปลี่ยนตามราคา
    elseif forecast(i) == 0 % Forecast is down
        money(i) = money(i-1); %ขาย เงินไม่เปลี่ยนตามราคา
    end

    % Calculate the cumulative return
    if i == 1
        cumulative_returns2_covid(i) = 0;
    elseif money(i+1) - money(1) == 0
        cumulative_returns2_covid(i) =
cumulative_returns2_covid(i-1);
    else
```

```matlab
        cumulative_returns2_covid(i) = (money(i+1) -
money(1)) / money(1);
    end
end

% Write the results back to the Excel file
%writematrix(returns, fileName, 'Range', 'D1:D10');
writematrix(cumulative_returns2_covid,
fileName,'Sheet',my_sheet, 'Range', 'U906:U1005');

target_forecast =
readmatrix(fileName,'Sheet',my_sheet,'Range', 'P906:P1005');
%position = readmatrix(fileName, 'Range', 'C1:C10');

cumulative_returns2_tar_covid = zeros(99, 1);
money_tar = zeros(100, 1);
% Perform the backtest
for i = 1:99
    % Check the forecast direction and determine the
position
    if i == 1
        money_tar(i) = price(1);
    elseif target_forecast(i) == 1 % Forecast is up
        money_tar(i) = price(i); %ยังไม่ขาย เงินเปลี่ยนตามราคา
    elseif target_forecast(i) == 0 % Forecast is down
        money_tar(i) = money_tar(i-1); %ขาย เงินไม่เปลี่ยนตามราคา
    end

    % Calculate the cumulative return
    if i == 1
        cumulative_returns2_tar_covid(i) = 0;
    elseif money(i+1) - money(1) == 0
        cumulative_returns2_tar_covid(i) =
cumulative_returns2_tar_covid(i-1);
    else
        cumulative_returns2_tar_covid(i) = (money(i+1) -
money(1)) / money(1);
    end
end
```

```matlab
% Write the results back to the Excel file
%writematrix(returns, fileName, 'Range', 'D1:D10');
writematrix(cumulative_returns2_tar_covid,
fileName,'Sheet',my_sheet, 'Range', 'AD906:AD1005');


disp('Backtest complete. Returns and cumulative returns have
been written to columns U.');

%%% Hit Ratio%%%%

total_sum = sum(d);
hit_ratio = total_sum / 100;

writematrix(hit_ratio, fileName, 'Sheet', 'hit_ratio',
'Range', 'C2');

total_sum_di = sum(dd);
hit_ratio_di = total_sum_di / 100;

writematrix(hit_ratio_di, fileName, 'Sheet', 'hit_ratio',
'Range', 'D2');

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

%%window 30
clear p;
clear cc;
clear cc_crash_window30_eurusd_chinese6;
clear cc_crash_window30_dax_1day
clear pp_crash_window30_dax_1day
clear target2_crash_window30_dax_1day
clear cc_di_window30_dax_1day
clear pp_price_crash_window30_dax_1day
clear target2_price_crash_window30_dax_1day
clear price
```

```matlab
clear total_sum
clear hit_ratio
clear total_sum_di
clear hit_ratio_di

m = 3;


%%%covid crash
price=readmatrix(fileName,'Sheet',my_sheet,'Range',
'D2:D2181');

disp('Data has been successfully modified and written to
column B.');
  for i=1:100

[cc_covid_crash_window30_dax_1day(i),pp_covid_crash_window30
_dax_1day(i),target2_covid_crash_window30_dax_1day(i)]=run_s
vm_forecast_alarm3(ret_eurusd(1:end_day-
i),target_eurusd(1:end_day-i+1),200,m);
  end
  g=flip(cc_covid_crash_window30_dax_1day);
  h=flip(pp_covid_crash_window30_dax_1day);
  t=flip(target2_covid_crash_window30_dax_1day);
writematrix(g', fileName,'Sheet',my_sheet,'Range',
'V906:V1005');
writematrix(h', fileName,'Sheet',my_sheet,'Range',
'W906:W1005');
writematrix(t', fileName,'Sheet',my_sheet,'Range',
'X906:X1005');
%%forcast direction
for i=1:100

[cc_covid_di_window30_dax_1day(i),pp_price_covid_crash_windo
w30_dax_1day(i),target2_price_covid_crash_window30_dax_1day(
i)]=run_svm_forecast_direction3(price(1:end_day-
i),price(1:end_day-i+1),200,m);
end
  gg=flip(cc_covid_di_window30_dax_1day);
```

```matlab
    hh=flip(pp_price_covid_crash_window30_dax_1day);
    tt=flip(target2_price_covid_crash_window30_dax_1day);
writematrix(gg', fileName,'Sheet',my_sheet,'Range',
'Y906:Y1005');
writematrix(hh', fileName,'Sheet',my_sheet,'Range',
'Z906:Z1005');
writematrix(tt', fileName,'Sheet',my_sheet,'Range',
'AA906:AA1005');

 %%chinese crash, we need to sort the output from backward
order to forward order.
 %%start date of forecast 2121-100=2021
 %%end date of forecast 2121    =2121


   %%

disp('Data has been successfully modified and written to
column B.');

 elapsedTime = toc;

% Convert the elapsed time from seconds to hours
elapsedTimeInHours = elapsedTime / 3600;
%per_form1_dax1day_window5=sum(cc_di_window5_dax_1day);
per_form2_dax1day_window30=sum(cc_covid_crash_window30_dax_1
day)
% Display the elapsed time in hours
%fprintf('Elapsed time: %.6f hours\n performance 1:=%2f
performance 2:=%2f  ', elapsedTimeInHours,
per_form1_dax1day_window5,per_form2_dax1day_window5);
toc;

%%%backtest
% Specify the file name and sheet name (if applicable)

% Read data from columns A (price), B (forecast direction),
and C (position)
```

```matlab
price = readmatrix(fileName,'Sheet',my_sheet, 'Range', ...
'D906:D1005');
forecast = readmatrix(fileName,'Sheet',my_sheet,'Range', ...
'Z906:Z1005');
%position = readmatrix(fileName, 'Range', 'C1:C10');

% Initialize return and cumulative return arrays
cumulative_returns3_covid = zeros(99, 1);
money = zeros(100, 1);
% Perform the backtest
for i = 1:99
    if i == 1
        money(i) = price(1);
    elseif forecast(i) == 1 % Forecast is up
        money(i) = price(i);  %ยังไม่ขาย เงินเปลี่ยนตามราคา
    elseif forecast(i) == 0 % Forecast is down
        money(i) = money(i-1);  %ขาย เงินไม่เปลี่ยนตามราคา
    end

    % Calculate the cumulative return
    if i == 1
        cumulative_returns3_covid(i) = 0;
    elseif money(i+1) - money(1) == 0
        cumulative_returns3_covid(i) =
cumulative_returns3_covid(i-1);
    else
        cumulative_returns3_covid(i) = (money(i+1) -
money(1)) / money(1);
    end
end

% Write the results back to the Excel file
%writematrix(returns, fileName, 'Range', 'D1:D10');
writematrix(cumulative_returns3_covid, ...
fileName,'Sheet',my_sheet, 'Range', 'AB906:AB1005');

target_forecast =
readmatrix(fileName,'Sheet',my_sheet,'Range', 'W906:W1005');
%position = readmatrix(fileName, 'Range', 'C1:C10');
```

```matlab
% Initialize return and cumulative return arrays
cumulative_returns3_tar_covid = zeros(99, 1);
money_tar = zeros(100, 1);
% Perform the backtest
for i = 1:99
    % Check the forecast direction and determine the
position
    if i == 1
        money_tar(i) = price(1);
    elseif target_forecast(i) == 1 % Forecast is up
        money_tar(i) = price(i); %ยังไม่ขาย เงินเปลี่ยนตามราคา
    elseif target_forecast(i) == 0 % Forecast is down
        money_tar(i) = money_tar(i-1); %ขาย เงินไม่เปลี่ยนตามราคา
    end

    % Calculate the cumulative return
    if i == 1
        cumulative_returns3_tar_covid(i) = 0;
    elseif money(i+1) - money(1) == 0
        cumulative_returns3_tar_covid(i) =
cumulative_returns3_tar_covid(i-1);
    else
        cumulative_returns3_tar_covid(i) = (money(i+1) -
money(1)) / money(1);
    end
end

% Write the results back to the Excel file
%writematrix(returns, fileName, 'Range', 'D1:D10');
writematrix(cumulative_returns3_tar_covid,
fileName,'Sheet',my_sheet, 'Range', 'AE906:AE1005');


disp('Backtest complete. Returns and cumulative returns have
been written to columns U.');

%%% Hit Ratio%%%%
```

```matlab
total_sum = sum(g);
hit_ratio = total_sum / 100;

writematrix(hit_ratio, fileName, 'Sheet', 'hit_ratio',
'Range', 'E2');

total_sum_di = sum(gg);
hit_ratio_di = total_sum_di / 100;

writematrix(hit_ratio_di, fileName, 'Sheet', 'hit_ratio',
'Range', 'F2');


clf;

% Plotting the cumulative returns
plot(cumulative_returns1_covid, 'DisplayName', 'Window Size
= 5', 'LineWidth', 1 , 'Color', 'r');
hold on;
plot(cumulative_returns2_covid, 'DisplayName', 'Window Size
= 10', 'LineWidth', 1 , 'Color', 'b');
hold on;
plot(cumulative_returns3_covid, 'DisplayName', 'Window Size
= 30', 'LineWidth', 1 , 'Color', 'g');

% Adding labels and title
xlabel('Time','FontSize', 14); % Label for x-axis
ylabel('Cumulative Returns','FontSize', 14); % Label for y-
axis
title('Cumulative Returns (Direction) in Covid
Crash','FontSize', 14); % Title of the plot

% Adding a legend to identify the curves
%legend('show', 'Location', 'southwest','FontSize', 8);

% Saving the plot as an image file
exportgraphics(gcf,
'BacktestRun_dax_1Day_Covid_chart_DI.jpg', 'Resolution',
300); % Set resolution to 300 DPI
```

```matlab
clf;
% Plotting the second set of cumulative returns

plot(cumulative_returns1_tar_covid, 'DisplayName', 'Window
Size = 5', 'LineWidth', 1 , 'Color', 'r');
hold on;
plot(cumulative_returns2_tar_covid, 'DisplayName', 'Window
Size = 10', 'LineWidth', 1 , 'Color', 'b');
hold on;
plot(cumulative_returns3_tar_covid, 'DisplayName', 'Window
Size = 30', 'LineWidth', 1 , 'Color', 'g');

% Adding labels and title for the second plot
xlabel('Time','FontSize', 14); % Label for x-axis
ylabel('Cumulative Returns','FontSize', 14); % Label for y-
axis
title('Cumulative Returns (Crash Indicator) in Covid
Crash','FontSize', 14); % Title of the plot

% Adding a legend to identify the curves
legend('show', 'Location', 'Northwest','FontSize', 4.5);

% Saving the second plot as an image file
%saveas(gcf, 'cumulative_returns_comparison_target.jpg');
exportgraphics(gcf,
'BacktestRun_dax_1Day_Covid_chart_CI.jpg', 'Resolution',
300); % Set resolution to 300 DPI

clf;

%% Ukraine
%%window5



clear p;
clear cc;
```

```matlab
clear cc_crash_window5_eurusd_chinese6;
clear target_eurusd;
clear ret_eurusd;
clear data;
clear target;
clear cc_crash_window5_dax_1day
clear pp_crash_window5_dax_1day
clear target2_crash_window5_dax_1day
clear cc_di_window5_dax_1day
clear pp_price_crash_window5_dax_1day
clear target2_price_crash_window5_dax_1day
clear cumulative_returns1
clear cumulative_returns2
clear cumulative_returns3
clear cumulative_returns1_tar
clear cumulative_returns2_tar
clear cumulative_returns3_tar
clear total_sum
clear hit_ratio
clear total_sum_di
clear hit_ratio_di

%%target =138691+1 since one day ahead!
% Read data from column A (range A1:A100) of the Excel file
%% data is return E
data = readmatrix(fileName,'Sheet',my_sheet,'Range',
'E2:E2181');
%% price is closed D
price=readmatrix(fileName,'Sheet',my_sheet,'Range',
'D2:D2181');
%% target is market cash
target=readmatrix(fileName,'Sheet',my_sheet,'Range',
'G2:G2181');
% Send read data to forecast module
ret_eurusd = data;
target_eurusd=target;

%%%covid crash
```

```matlab
% disp('Data has been successfully modified and written to
column B.');
  for i=1:100

[cc_Ukraine_crash_window5_dax_1day(i),pp_Ukraine_crash_windo
w5_dax_1day(i),target2_Ukraine_crash_window5_dax_1day(i)]=ru
n_svm_forecast_alarm3(ret_eurusd(1:end_day-
i),target_eurusd(1:end_day-i+1),200,m);
  end
  a=flip(cc_Ukraine_crash_window5_dax_1day);
  b=flip(pp_Ukraine_crash_window5_dax_1day);
  c=flip(target2_Ukraine_crash_window5_dax_1day);

writematrix(a', fileName,'Sheet',my_sheet,'Range',
'H1496:H1595');
writematrix(b', fileName,'Sheet',my_sheet,'Range',
'I1496:I1595');
writematrix(c', fileName,'Sheet',my_sheet,'Range',
'J1496:J1595');
%%forcast direction
for i=1:100

[cc_Ukraine_di_window5_dax_1day(i),pp_price_Ukraine_crash_wi
ndow5_dax_1day(i),target2_price_Ukraine_crash_window5_dax_1d
ay(i)]=run_svm_forecast_direction3(price(1:end_day-
i),price(1:end_day-i+1),200,m);
end
 % price
  aa=flip(cc_Ukraine_di_window5_dax_1day);
  bb=flip(pp_price_Ukraine_crash_window5_dax_1day);
  cc=flip(target2_price_Ukraine_crash_window5_dax_1day);
writematrix(aa', fileName,'Sheet',my_sheet,'Range',
'K1496:K1595');
writematrix(bb', fileName,'Sheet',my_sheet,'Range',
'L1496:L1595');
writematrix(cc', fileName,'Sheet',my_sheet,'Range',
'M1496:M1595');
 %%chinese crash, we need to sort the output from backward
order to forward order.
```

```matlab
%%start date of forecast 2121-100=2021
%%end date of forecast 2121   =2121


%%

disp('Data has been successfully modified and written to column B.');
  % Write the modified data to column B (range B1:B100) of the same Excel file

 elapsedTime = toc;

% Convert the elapsed time from seconds to hours
elapsedTimeInHours = elapsedTime / 3600;
%per_form1_dax1day_window5=sum(cc_di_window5_dax_1day);
per_form2_dax1day_window5=sum(cc_Ukraine_crash_window5_dax_1day)
% Display the elapsed time in hours
%fprintf('Elapsed time: %.6f hours\n performance 1:=%2f performance 2:=%2f  ', elapsedTimeInHours, per_form1_dax1day_window5,per_form2_dax1day_window5);
toc;

%%%backtest%%%%%%%%%%%%%%%%%%%%%%%%%%%
% Specify the file name and sheet name (if applicable)
%fileName = 'test5.xlsx';

% Read data from columns A (price), B (forecast direction), and C (position)
price = readmatrix(fileName,'Sheet',my_sheet, 'Range', 'D1496:D1595');
forecast = readmatrix(fileName,'Sheet',my_sheet,'Range', 'L1496:L11595');
%position = readmatrix(fileName, 'Range', 'C1:C10');

% Initialize return and cumulative return arrays
cumulative_returns1_Ukraine = zeros(99, 1);
money = zeros(100, 1);
```

```matlab
% Perform the backtest
for i = 1:99
    % Check the forecast direction and determine the
position
    if i == 1
        money(i) = price(1);
    elseif forecast(i) == 1 % Forecast is up
        money(i) = price(i); %ยังไม่ขาย เงินเปลี่ยนตามราคา
    elseif forecast(i) == 0 % Forecast is down
        money(i) = money(i-1); %ขาย เงินไม่เปลี่ยนตามราคา
    end
    % Calculate the cumulative return
    if i == 1
        cumulative_returns1_Ukraine(i) = 0;
    elseif money(i+1) - money(1) == 0
        cumulative_returns1_Ukraine(i) =
cumulative_returns1_Ukraine(i-1);
    else
        cumulative_returns1_Ukraine(i) = (money(i+1) -
money(1)) / money(1);
    end
end

writematrix(cumulative_returns1_Ukraine,
fileName,'Sheet',my_sheet, 'Range', 'N1496:N1595');

target_forecast =
readmatrix(fileName,'Sheet',my_sheet,'Range',
'I1496:I1595');
%position = readmatrix(fileName, 'Range', 'C1:C10');

% Initialize return and cumulative return arrays
cumulative_returns1_tar_Ukraine = zeros(99, 1);
money_tar = zeros(100, 1);
% Perform the backtest
for i = 1:99
    if i == 1
        money_tar(i) = price(1);
    elseif target_forecast(i) == 1 % Forecast is up
```

```matlab
        money_tar(i) = price(i);  %ยังไม่ขาย เงินเปลี่ยนตามราคา
    elseif target_forecast(i) == 0 % Forecast is down
        money_tar(i) = money_tar(i-1);  %ขาย เงินไม่เปลี่ยนตามราคา
    end

    % Calculate the cumulative return
    if i == 1
        cumulative_returns1_tar_Ukraine(i) = 0;
    elseif money(i+1) - money(1) == 0
        cumulative_returns1_tar_Ukraine(i) =
cumulative_returns1_tar_Ukraine(i-1);
    else
        cumulative_returns1_tar_Ukraine(i) = (money(i+1) -
money(1)) / money(1);
    end
end

% Write the results back to the Excel file
%writematrix(returns, fileName, 'Range', 'D1:D10');
writematrix(cumulative_returns1_tar_Ukraine,
fileName,'Sheet',my_sheet, 'Range', 'AC1496:AC1595');

disp('Backtest complete. Returns and cumulative returns have
been written to columns N.');

%%% Hit Ratio%%%%

total_sum = sum(a);
hit_ratio = total_sum / 100;

writematrix(hit_ratio, fileName, 'Sheet', 'hit_ratio',
'Range', 'G2');

total_sum_di = sum(aa);
hit_ratio_di = total_sum_di / 100;

writematrix(hit_ratio_di, fileName, 'Sheet', 'hit_ratio',
'Range', 'H2');
```

```matlab
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%window 10

m=2;
% Specify the file name and sheet name (if applicable)

clear p;
clear cc;
clear cc_crash_window10_eurusd_chinese6;
clear cc_crash_window10_dax_1day
clear pp_crash_window10_dax_1day
clear target2_crash_window10_dax_1day
clear cc_di_window10_dax_1day
clear pp_price_crash_window10_dax_1day
clear target2_price_crash_window10_dax_1day
clear price
clear total_sum
clear hit_ratio
clear total_sum_di
clear hit_ratio_di

%%%covid crash
price=readmatrix(fileName,'Sheet',my_sheet,'Range',
'D2:D2181');

disp('Data has been successfully modified and written to
column B.');
    for i=1:100

[cc_Ukraine_crash_window10_dax_1day(i),pp_Ukraine_crash_wind
ow10_dax_1day(i),target2_Ukraine_crash_window10_dax_1day(i)]
=run_svm_forecast_alarm3(ret_eurusd(1:end_day-
i),target_eurusd(1:end_day-i+1),200,m);
    end
    d=flip(cc_Ukraine_crash_window10_dax_1day);
    e=flip(pp_Ukraine_crash_window10_dax_1day);
    f=flip(target2_Ukraine_crash_window10_dax_1day);
```

```matlab
writematrix(d', fileName,'Sheet',my_sheet,'Range',
'O1496:O1595');
writematrix(e', fileName,'Sheet',my_sheet,'Range',
'P1496:P1595');
writematrix(f', fileName,'Sheet',my_sheet,'Range',
'Q1496:Q1595');
%%forcast direction
for i=1:100

[cc_Ukraine_di_window10_dax_1day(i),pp_price_Ukraine_crash_w
indow10_dax_1day(i),target2_price_Ukraine_crash_window10_dax
_1day(i)]=run_svm_forecast_direction3(price(1:end_day-
i),price(1:end_day-i+1),200,m);
end
    dd=flip(cc_Ukraine_di_window10_dax_1day);
    ee=flip(pp_price_Ukraine_crash_window10_dax_1day);
    ff=flip(target2_price_Ukraine_crash_window10_dax_1day);
writematrix(dd', fileName,'Sheet',my_sheet,'Range',
'R1496:R1595');
writematrix(ee', fileName,'Sheet',my_sheet,'Range',
'S1496:S1595');
writematrix(ff', fileName,'Sheet',my_sheet,'Range',
'T1496:T1595');
 %%chinese crash, we need to sort the output from backward
order to forward order.
 %%start date of forecast 2121-100=2021
 %%end date of forecast 2121    =2121

disp('Data has been successfully modified and written to
column B.');

 elapsedTime = toc;

% Convert the elapsed time from seconds to hours
elapsedTimeInHours = elapsedTime / 3600;
%per_form1_dax1day_window5=sum(cc_di_window5_dax_1day);
per_form2_dax1day_window10=sum(cc_Ukraine_crash_window10_dax
_1day)
% Display the elapsed time in hours
```

```matlab
%fprintf('Elapsed time: %.6f hours\n performance 1:=%2f
performance 2:=%2f  ', elapsedTimeInHours,
per_form1_dax1day_window5,per_form2_dax1day_window5);
toc;

%%%backtest
% Specify the file name and sheet name (if applicable)

% Read data from columns A (price), B (forecast direction),
and C (position)
price = readmatrix(fileName,'Sheet',my_sheet, 'Range',
'D1496:D1595');
forecast = readmatrix(fileName,'Sheet',my_sheet,'Range',
'S1496:S1595');
%position = readmatrix(fileName, 'Range', 'C1:C10');

% Initialize return and cumulative return arrays
cumulative_returns2_Ukraine = zeros(99, 1);
money = zeros(100, 1);
% Perform the backtest
for i = 1:99
    % Check the forecast direction and determine the
position
    if i == 1
        money(i) = price(1);
    elseif forecast(i) == 1 % Forecast is up
        money(i) = price(i); %ยังไม่ขาย เงินเปลี่ยนตามราคา
    elseif forecast(i) == 0 % Forecast is down
        money(i) = money(i-1); %ขาย เงินไม่เปลี่ยนตามราคา
    end
    % Calculate the cumulative return
    if i == 1
        cumulative_returns2_Ukraine(i) = 0;
    elseif money(i+1) - money(1) == 0
        cumulative_returns2_Ukraine(i) =
cumulative_returns2_Ukraine(i-1);
    else
        cumulative_returns2_Ukraine(i) = (money(i+1) -
money(1)) / money(1);
```

```matlab
    end
end

% Write the results back to the Excel file
%writematrix(returns, fileName, 'Range', 'D1:D10');
writematrix(cumulative_returns2_Ukraine,
fileName,'Sheet',my_sheet, 'Range', 'U1496:U1595');

target_forecast =
readmatrix(fileName,'Sheet',my_sheet,'Range',
'P1496:P1595');
%position = readmatrix(fileName, 'Range', 'C1:C10');

% Initialize return and cumulative return arrays
cumulative_returns2_tar_Ukraine = zeros(99, 1);
money_tar = zeros(100, 1);
% Perform the backtest
for i = 1:99
    if i == 1
        money_tar(i) = price(1);
    elseif target_forecast(i) == 1 % Forecast is up
        money_tar(i) = price(i); %ยังไม่ขาย เงินเปลี่ยนตามราคา
    elseif target_forecast(i) == 0 % Forecast is down
        money_tar(i) = money_tar(i-1); %ขาย เงินไม่เปลี่ยนตามราคา
    end

    % Calculate the cumulative return
    if i == 1
        cumulative_returns2_tar_Ukraine(i) = 0;
    elseif money(i+1) - money(1) == 0
        cumulative_returns2_tar_Ukraine(i) =
cumulative_returns2_tar_Ukraine(i-1);
    else
        cumulative_returns2_tar_Ukraine(i) = (money(i+1) -
money(1)) / money(1);
    end
end

% Write the results back to the Excel file
```

```matlab
%writematrix(returns, fileName, 'Range', 'D1:D10');
writematrix(cumulative_returns2_tar_Ukraine,
fileName,'Sheet',my_sheet, 'Range', 'AD1496:AD1595');


disp('Backtest complete. Returns and cumulative returns have
been written to columns U.');

%%% Hit Ratio%%%%

total_sum = sum(d);
hit_ratio = total_sum / 100;

writematrix(hit_ratio, fileName, 'Sheet', 'hit_ratio',
'Range', 'I2');

total_sum_di = sum(dd);
hit_ratio_di = total_sum_di / 100;

writematrix(hit_ratio_di, fileName, 'Sheet', 'hit_ratio',
'Range', 'J2');

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

%%window 30
clear p;
clear cc;
clear cc_crash_window30_eurusd_chinese6;
clear cc_crash_window30_dax_1day
clear pp_crash_window30_dax_1day
clear target2_crash_window30_dax_1day
clear cc_di_window30_dax_1day
clear pp_price_crash_window30_dax_1day
clear target2_price_crash_window30_dax_1day
clear price
clear total_sum
clear hit_ratio
```

```matlab
clear total_sum_di
clear hit_ratio_di

m = 3;


%%%covid crash
price=readmatrix(fileName,'Sheet',my_sheet,'Range',
'D2:D2181');

disp('Data has been successfully modified and written to
column B.');
  for i=1:100

[cc_Ukraine_crash_window30_dax_1day(i),pp_Ukraine_crash_wind
ow30_dax_1day(i),target2_Ukraine_crash_window30_dax_1day(i)]
=run_svm_forecast_alarm3(ret_eurusd(1:end_day-
i),target_eurusd(1:end_day-i+1),200,m);
  end
  g=flip(cc_Ukraine_crash_window30_dax_1day);
  h=flip(pp_Ukraine_crash_window30_dax_1day);
  t=flip(target2_Ukraine_crash_window30_dax_1day);
writematrix(g', fileName,'Sheet',my_sheet,'Range',
'V1496:V1595');
writematrix(h', fileName,'Sheet',my_sheet,'Range',
'W1496:W1595');
writematrix(t', fileName,'Sheet',my_sheet,'Range',
'X1496:X1595');
%%forcast direction
for i=1:100

[cc_Ukraine_di_window30_dax_1day(i),pp_price_Ukraine_crash_w
indow30_dax_1day(i),target2_price_Ukraine_crash_window30_dax
_1day(i)]=run_svm_forecast_direction3(price(1:end_day-
i),price(1:end_day-i+1),200,m);
end
  gg=flip(cc_Ukraine_di_window30_dax_1day);
  hh=flip(pp_price_Ukraine_crash_window30_dax_1day);
  tt=flip(target2_price_Ukraine_crash_window30_dax_1day);
```

```matlab
writematrix(gg', fileName,'Sheet',my_sheet,'Range',
'Y1496:Y1595');
writematrix(hh', fileName,'Sheet',my_sheet,'Range',
'Z1496:Z1595');
writematrix(tt', fileName,'Sheet',my_sheet,'Range',
'AA1496:AA1595');

 %%chinese crash, we need to sort the output from backward
order to forward order.
 %%start date of forecast 2121-100=2021
 %%end date of forecast 2121   =2121


  %%%

disp('Data has been successfully modified and written to
column B.');

 elapsedTime = toc;

% Convert the elapsed time from seconds to hours
elapsedTimeInHours = elapsedTime / 3600;
%per_form1_dax1day_window5=sum(cc_di_window5_dax_1day);
per_form2_dax1day_window30=sum(cc_Ukraine_crash_window30_dax
_1day)
% Display the elapsed time in hours
%fprintf('Elapsed time: %.6f hours\n performance 1:=%2f
performance 2:=%2f  ', elapsedTimeInHours,
per_form1_dax1day_window5,per_form2_dax1day_window5);
toc;

%%%backtest
% Specify the file name and sheet name (if applicable)

% Read data from columns A (price), B (forecast direction),
and C (position)
price = readmatrix(fileName,'Sheet',my_sheet, 'Range',
'D1496:D1595');
```

```matlab
forecast = readmatrix(fileName,'Sheet',my_sheet,'Range',
'Z1496:Z1595');
%position = readmatrix(fileName, 'Range', 'C1:C10');

% Initialize return and cumulative return arrays
cumulative_returns3_Ukraine = zeros(99, 1);
money = zeros(100, 1);
% Perform the backtest
for i = 1:99
    % Check the forecast direction and determine the
position
    if i == 1
        money(i) = price(1);
    elseif forecast(i) == 1 % Forecast is up
        money(i) = price(i); %ยังไม่ขาย เงินเปลี่ยนตามราคา
    elseif forecast(i) == 0 % Forecast is down
        money(i) = money(i-1); %ขาย เงินไม่เปลี่ยนตามราคา
    end
    % Calculate the cumulative return
    if i == 1
        cumulative_returns3_Ukraine(i) = 0;
    elseif money(i+1) - money(1) == 0
        cumulative_returns3_Ukraine(i) =
cumulative_returns3_Ukraine(i-1);
    else
        cumulative_returns3_Ukraine(i) = (money(i+1) -
money(1)) / money(1);
    end
end

% Write the results back to the Excel file
%writematrix(returns, fileName, 'Range', 'D1:D10');
writematrix(cumulative_returns3_Ukraine,
fileName,'Sheet',my_sheet, 'Range', 'AB1496:AB1595');

target_forecast =
readmatrix(fileName,'Sheet',my_sheet,'Range',
'W1496:W1595');
%position = readmatrix(fileName, 'Range', 'C1:C10');
```

```matlab
% Initialize return and cumulative return arrays
cumulative_returns3_tar_Ukraine = zeros(99, 1);
money_tar = zeros(100, 1);
% Perform the backtest
for i = 1:99
    if i == 1
        money_tar(i) = price(1);
    elseif target_forecast(i) == 1 % Forecast is up
        money_tar(i) = price(i); %ยังไม่ขาย เงินเปลี่ยนตามราคา
    elseif target_forecast(i) == 0 % Forecast is down
        money_tar(i) = money_tar(i-1); %ขาย เงินไม่เปลี่ยนตามราคา
    end

    % Calculate the cumulative return
    if i == 1
        cumulative_returns3_tar_Ukraine(i) = 0;
    elseif money(i+1) - money(1) == 0
        cumulative_returns3_tar_Ukraine(i) =
cumulative_returns3_tar_Ukraine(i-1);
    else
        cumulative_returns3_tar_Ukraine(i) = (money(i+1) -
money(1)) / money(1);
    end
end

% Write the results back to the Excel file
%writematrix(returns, fileName, 'Range', 'D1:D10');
writematrix(cumulative_returns3_tar_Ukraine,
fileName,'Sheet',my_sheet, 'Range', 'AE1496:AE1595');


disp('Backtest complete. Returns and cumulative returns have
been written to columns U.');

%%% Hit Ratio%%%%

total_sum = sum(g);
hit_ratio = total_sum / 100;
```

```matlab
writematrix(hit_ratio, fileName, 'Sheet', 'hit_ratio',
'Range', 'K2');

total_sum_di = sum(gg);
hit_ratio_di = total_sum_di / 100;

writematrix(hit_ratio_di, fileName, 'Sheet', 'hit_ratio',
'Range', 'L2');

% Plotting the cumulative returns
plot(cumulative_returns1_Ukraine, 'DisplayName', 'Window
Size = 5', 'LineWidth', 1 , 'Color', 'r');
hold on;
plot(cumulative_returns2_Ukraine, 'DisplayName', 'Window
Size = 10', 'LineWidth', 1 , 'Color', 'b');
plot(cumulative_returns3_Ukraine, 'DisplayName', 'Window
Size = 30', 'LineWidth', 1 , 'Color', 'g');

% Adding labels and title
xlabel('Time','FontSize', 14); % Label for x-axis
ylabel('Cumulative Returns','FontSize', 14); % Label for y-
axis
title('Cumulative Returns (Direction) in Ukraine
Crash','FontSize', 14); % Title of the plot

% Adding a legend to identify the curves
%legend('show', 'Location', 'southwest','FontSize', 8);

% Saving the plot as an image file
exportgraphics(gcf,
'BacktestRun_dax_1Day_Ukraine_chart_DI.jpg', 'Resolution',
300); % Set resolution to 300 DPI

clf;
% Plotting the second set of cumulative returns

plot(cumulative_returns1_tar_Ukraine, 'DisplayName', 'Window
Size = 5', 'LineWidth', 1 , 'Color', 'r');
```

```matlab
hold on;
plot(cumulative_returns2_tar_Ukraine, 'DisplayName', 'Window Size = 10', 'LineWidth', 1 , 'Color', 'b');
plot(cumulative_returns3_tar_Ukraine, 'DisplayName', 'Window Size = 30', 'LineWidth', 1 , 'Color', 'g');

% Adding labels and title for the second plot
xlabel('Time','FontSize', 14); % Label for x-axis
ylabel('Cumulative Returns','FontSize', 14); % Label for y-axis
title('Cumulative Returns (Crash Indicator) in Ukraine Crash','FontSize', 14); % Title of the plot

% Adding a legend to identify the curves
legend('show', 'Location', 'Northwest','FontSize', 4.5);

% Saving the second plot as an image file
%saveas(gcf, 'cumulative_returns_comparison_target.jpg');
exportgraphics(gcf,
'BacktestRun_dax_1Day_Ukraine_chart_CI.jpg', 'Resolution',
300); % Set resolution to 300 DPI

clf;




% China
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%window5
```

```matlab
clear p;
clear cc;
clear cc_crash_window5_eurusd_chinese6;
clear target_eurusd;
clear ret_eurusd;
clear data;
clear target;
clear cc_crash_window5_dax_1day
clear pp_crash_window5_dax_1day
clear target2_crash_window5_dax_1day
clear cc_di_window5_dax_1day
clear pp_price_crash_window5_dax_1day
clear target2_price_crash_window5_dax_1day
clear cumulative_returns1
clear cumulative_returns2
clear cumulative_returns3
clear cumulative_returns1_tar
clear cumulative_returns2_tar
clear cumulative_returns3_tar
clear total_sum
clear hit_ratio
clear total_sum_di
clear hit_ratio_di

%%target =138691+1 since one day ahead!
% Read data from column A (range A1:A100) of the Excel file
%% data is return E
data = readmatrix(fileName,'Sheet',my_sheet,'Range',
'E2:E2181');
%% price is closed D
price=readmatrix(fileName,'Sheet',my_sheet,'Range',
'D2:D2181');
%% target is market cash
target=readmatrix(fileName,'Sheet',my_sheet,'Range',
'G2:G2181');
% Send read data to forecast module
```

```matlab
ret_eurusd = data;
target_eurusd=target;

%%%covid crash
% disp('Data has been successfully modified and written to
column B.');
   for i=1:100

[cc_China_crash_window5_dax_1day(i),pp_China_crash_window5_d
ax_1day(i),target2_China_crash_window5_dax_1day(i)]=run_svm_
forecast_alarm3(ret_eurusd(1:end_day-
i),target_eurusd(1:end_day-i+1),200,m);
   end
   a=flip(cc_China_crash_window5_dax_1day);
   b=flip(pp_China_crash_window5_dax_1day);
   c=flip(target2_China_crash_window5_dax_1day);

writematrix(a', fileName,'Sheet',my_sheet,'Range',
'H2013:H2112');
writematrix(b', fileName,'Sheet',my_sheet,'Range',
'I2013:I2112');
writematrix(c', fileName,'Sheet',my_sheet,'Range',
'J2013:J2112');
%%forcast direction
for i=1:100

[cc_China_di_window5_dax_1day(i),pp_price_China_crash_window
5_dax_1day(i),target2_price_China_crash_window5_dax_1day(i)]
=run_svm_forecast_direction3(price(1:end_day-
i),price(1:end_day-i+1),200,m);
end
 % price
   aa=flip(cc_China_di_window5_dax_1day);
   bb=flip(pp_price_China_crash_window5_dax_1day);
   cc=flip(target2_price_China_crash_window5_dax_1day);
writematrix(aa', fileName,'Sheet',my_sheet,'Range',
'K2013:K2112');
writematrix(bb', fileName,'Sheet',my_sheet,'Range',
'L2013:L2112');
```

```matlab
writematrix(cc', fileName,'Sheet',my_sheet,'Range',
'M2013:M2112');
 %%chinese crash, we need to sort the output from backward
order to forward order.
 %%start date of forecast 2121-100=2021
 %%end date of forecast 2121    =2121


   %%

disp('Data has been successfully modified and written to
column B.');
  % Write the modified data to column B (range B1:B100) of
the same Excel file

 elapsedTime = toc;

% Convert the elapsed time from seconds to hours
elapsedTimeInHours = elapsedTime / 3600;
%per_form1_dax1day_window5=sum(cc_di_window5_dax_1day);
per_form2_dax1day_window5=sum(cc_China_crash_window5_dax_1da
y)
% Display the elapsed time in hours
%fprintf('Elapsed time: %.6f hours\n performance 1:=%2f
performance 2:=%2f  ', elapsedTimeInHours,
per_form1_dax1day_window5,per_form2_dax1day_window5);
toc;

%%%backtest%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
% Specify the file name and sheet name (if applicable)
%fileName = 'test5.xlsx';

% Read data from columns A (price), B (forecast direction),
and C (position)
price = readmatrix(fileName,'Sheet',my_sheet, 'Range',
'D2013:D2112');
forecast = readmatrix(fileName,'Sheet',my_sheet,'Range',
'L2013:L2112');
%position = readmatrix(fileName, 'Range', 'C1:C10');
```

```matlab
% Initialize return and cumulative return arrays
cumulative_returns1_China = zeros(99, 1);
money = zeros(100, 1);
% Perform the backtest
for i = 1:99
    % Check the forecast direction and determine the
position
    if i == 1
        money(i) = price(1);
    elseif forecast(i) == 1 % Forecast is up
        money(i) = price(i);  %ยังไม่ขาย เงินเปลี่ยนตามราคา
    elseif forecast(i) == 0 % Forecast is down
        money(i) = money(i-1);  %ขาย เงินไม่เปลี่ยนตามราคา
    end
    % Calculate the cumulative return
    if i == 1
        cumulative_returns1_China(i) = 0;
    elseif money(i+1) - money(1) == 0
        cumulative_returns1_China(i) =
cumulative_returns1_China(i-1);
    else
        cumulative_returns1_China(i) = (money(i+1) -
money(1)) / money(1);
    end
end

writematrix(cumulative_returns1_China,
fileName,'Sheet',my_sheet, 'Range', 'N2013:N2112');

target_forecast =
readmatrix(fileName,'Sheet',my_sheet,'Range',
'I2013:I2112');
%position = readmatrix(fileName, 'Range', 'C1:C10');

% Initialize return and cumulative return arrays
cumulative_returns1_tar_China = zeros(99, 1);
money_tar = zeros(100, 1);
% Perform the backtest
```

```matlab
for i = 1:99
    if i == 1
        money_tar(i) = price(1);
    elseif target_forecast(i) == 1 % Forecast is up
        money_tar(i) = price(i);  %ยังไม่ขาย เงินเปลี่ยนตามราคา
    elseif target_forecast(i) == 0 % Forecast is down
        money_tar(i) = money_tar(i-1);  %ขาย เงินไม่เปลี่ยนตามราคา
    end

    % Calculate the cumulative return
    if i == 1
        cumulative_returns1_tar_China(i) = 0;
    elseif money(i+1) - money(1) == 0
        cumulative_returns1_tar_China(i) =
cumulative_returns1_tar_China(i-1);
    else
        cumulative_returns1_tar_China(i) = (money(i+1) -
money(1)) / money(1);
    end
end

% Write the results back to the Excel file
%writematrix(returns, fileName, 'Range', 'D1:D10');
writematrix(cumulative_returns1_tar_China,
fileName,'Sheet',my_sheet, 'Range', 'AC2013:AC2112');

disp('Backtest complete. Returns and cumulative returns have
been written to columns N.');


%%% Hit Ratio%%%%

total_sum = sum(a);
hit_ratio = total_sum / 100;

writematrix(hit_ratio, fileName, 'Sheet', 'hit_ratio',
'Range', 'M2');

total_sum_di = sum(aa);
```

```matlab
hit_ratio_di = total_sum_di / 100;

writematrix(hit_ratio_di, fileName, 'Sheet', 'hit_ratio', 'Range', 'N2');

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%window 10

m=2;
% Specify the file name and sheet name (if applicable)

clear p;
clear cc;
clear cc_crash_window10_eurusd_chinese6;
clear cc_crash_window10_dax_1day
clear pp_crash_window10_dax_1day
clear target2_crash_window10_dax_1day
clear cc_di_window10_dax_1day
clear pp_price_crash_window10_dax_1day
clear target2_price_crash_window10_dax_1day
clear price
clear total_sum
clear hit_ratio
clear total_sum_di
clear hit_ratio_di

%%covid crash
price=readmatrix(fileName,'Sheet',my_sheet,'Range', 'D2:D2181');

disp('Data has been successfully modified and written to column B.');
  for i=1:100

[cc_China_crash_window10_dax_1day(i),pp_China_crash_window10_dax_1day(i),target2_China_crash_window10_dax_1day(i)]=run_s
```

```matlab
vm_forecast_alarm3(ret_eurusd(1:end_day-
i),target_eurusd(1:end_day-i+1),200,m);
  end
  d=flip(cc_China_crash_window10_dax_1day);
  e=flip(pp_China_crash_window10_dax_1day);
  f=flip(target2_China_crash_window10_dax_1day);
writematrix(d', fileName,'Sheet',my_sheet,'Range',
'O2013:O2112');
writematrix(e', fileName,'Sheet',my_sheet,'Range',
'P2013:P2112');
writematrix(f', fileName,'Sheet',my_sheet,'Range',
'Q2013:Q2112');
%%forcast direction
for i=1:100

[cc_China_di_window10_dax_1day(i),pp_price_China_crash_windo
w10_dax_1day(i),target2_price_China_crash_window10_dax_1day(
i)]=run_svm_forecast_direction3(price(1:end_day-
i),price(1:end_day-i+1),200,m);
end
  dd=flip(cc_China_di_window10_dax_1day);
  ee=flip(pp_price_China_crash_window10_dax_1day);
  ff=flip(target2_price_China_crash_window10_dax_1day);
writematrix(dd', fileName,'Sheet',my_sheet,'Range',
'R2013:R2112');
writematrix(ee', fileName,'Sheet',my_sheet,'Range',
'S2013:S2112');
writematrix(ff', fileName,'Sheet',my_sheet,'Range',
'T2013:T2112');
 %%chinese crash, we need to sort the output from backward
order to forward order.
 %%start date of forecast 2121-100=2021
 %%end date of forecast 2121    =2121

disp('Data has been successfully modified and written to
column B.');

 elapsedTime = toc;
```

```matlab
% Convert the elapsed time from seconds to hours
elapsedTimeInHours = elapsedTime / 3600;
%per_form1_dax1day_window5=sum(cc_di_window5_dax_1day);
per_form2_dax1day_window10=sum(cc_China_crash_window10_dax_1
day)
% Display the elapsed time in hours
%fprintf('Elapsed time: %.6f hours\n performance 1:=%2f
performance 2:=%2f  ', elapsedTimeInHours,
per_form1_dax1day_window5,per_form2_dax1day_window5);
toc;

%%%backtest
% Specify the file name and sheet name (if applicable)

% Read data from columns A (price), B (forecast direction),
and C (position)
price = readmatrix(fileName,'Sheet',my_sheet, 'Range',
'D2013:D2112');
forecast = readmatrix(fileName,'Sheet',my_sheet,'Range',
'S2013:S2112');
%position = readmatrix(fileName, 'Range', 'C1:C10');

% Initialize return and cumulative return arrays
cumulative_returns2_China = zeros(99, 1);
money = zeros(100, 1);
% Perform the backtest
for i = 1:99
    % Check the forecast direction and determine the
position
    if i == 1
        money(i) = price(1);
    elseif forecast(i) == 1 % Forecast is up
        money(i) = price(i); %ยังไม่ขาย เงินเปลี่ยนตามราคา
    elseif forecast(i) == 0 % Forecast is down
        money(i) = money(i-1); %ขาย เงินไม่เปลี่ยนตามราคา
    end
    % Calculate the cumulative return
    if i == 1
        cumulative_returns2_China(i) = 0;
```

```matlab
    elseif money(i+1) - money(1) == 0
        cumulative_returns2_China(i) =
cumulative_returns2_China(i-1);
    else
        cumulative_returns2_China(i) = (money(i+1) -
money(1)) / money(1);
    end
end

% Write the results back to the Excel file
%writematrix(returns, fileName, 'Range', 'D1:D10');
writematrix(cumulative_returns2_China,
fileName,'Sheet',my_sheet, 'Range', 'U2013:U2112');

target_forecast =
readmatrix(fileName,'Sheet',my_sheet,'Range',
'P2013:P2112');
%position = readmatrix(fileName, 'Range', 'C1:C10');

% Initialize return and cumulative return arrays
cumulative_returns2_tar_China = zeros(99, 1);
money_tar = zeros(100, 1);
% Perform the backtest
for i = 1:99
    if i == 1
        money_tar(i) = price(1);
    elseif target_forecast(i) == 1 % Forecast is up
        money_tar(i) = price(i); %ยังไม่ขาย เงินเปลี่ยนตามราคา
    elseif target_forecast(i) == 0 % Forecast is down
        money_tar(i) = money_tar(i-1); %ขาย เงินไม่เปลี่ยนตามราคา
    end

    % Calculate the cumulative return
    if i == 1
        cumulative_returns2_tar_China(i) = 0;
    elseif money(i+1) - money(1) == 0
        cumulative_returns2_tar_China(i) =
cumulative_returns2_tar_China(i-1);
    else
```

```matlab
        cumulative_returns2_tar_China(i) = (money(i+1) -
money(1)) / money(1);
    end
end

% Write the results back to the Excel file
%writematrix(returns, fileName, 'Range', 'D1:D10');
writematrix(cumulative_returns2_tar_China,
fileName,'Sheet',my_sheet, 'Range', 'AD2013:AD2112');


disp('Backtest complete. Returns and cumulative returns have
been written to columns U.');



%%% Hit Ratio%%%%

total_sum = sum(d);
hit_ratio = total_sum / 100;

writematrix(hit_ratio, fileName, 'Sheet', 'hit_ratio',
'Range', 'O2');

total_sum_di = sum(dd);
hit_ratio_di = total_sum_di / 100;

writematrix(hit_ratio_di, fileName, 'Sheet', 'hit_ratio',
'Range', 'P2');

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

%%window 30
clear p;
clear cc;
clear cc_crash_window30_eurusd_chinese6;
clear cc_crash_window30_dax_1day
```

```matlab
clear pp_crash_window30_dax_1day
clear target2_crash_window30_dax_1day
clear cc_di_window30_dax_1day
clear pp_price_crash_window30_dax_1day
clear target2_price_crash_window30_dax_1day
clear price
clear total_sum
clear hit_ratio
clear total_sum_di
clear hit_ratio_di

m = 3;


%%%covid crash
price=readmatrix(fileName,'Sheet',my_sheet,'Range',
'D2:D2181');

disp('Data has been successfully modified and written to
column B.');
  for i=1:100

[cc_China_crash_window30_dax_1day(i),pp_China_crash_window30
_dax_1day(i),target2_China_crash_window30_dax_1day(i)]=run_s
vm_forecast_alarm3(ret_eurusd(1:end_day-
i),target_eurusd(1:end_day-i+1),200,m);
  end
  g=flip(cc_China_crash_window30_dax_1day);
  h=flip(pp_China_crash_window30_dax_1day);
  t=flip(target2_China_crash_window30_dax_1day);
writematrix(g', fileName,'Sheet',my_sheet,'Range',
'V2013:V2112');
writematrix(h', fileName,'Sheet',my_sheet,'Range',
'W2013:W2112');
writematrix(t', fileName,'Sheet',my_sheet,'Range',
'X2013:X2112');
%%forcast direction
for i=1:100
```

```matlab
[cc_China_di_window30_dax_1day(i),pp_price_China_crash_windo
w30_dax_1day(i),target2_price_China_crash_window30_dax_1day(
i)]=run_svm_forecast_direction3(price(1:end_day-
i),price(1:end_day-i+1),200,m);
end
   gg=flip(cc_China_di_window30_dax_1day);
   hh=flip(pp_price_China_crash_window30_dax_1day);
   tt=flip(target2_price_China_crash_window30_dax_1day);
writematrix(gg', fileName,'Sheet',my_sheet,'Range',
'Y2013:Y2112');
writematrix(hh', fileName,'Sheet',my_sheet,'Range',
'Z2013:Z2112');
writematrix(tt', fileName,'Sheet',my_sheet,'Range',
'AA2013:AA2112');

 %%chinese crash, we need to sort the output from backward
order to forward order.
 %%start date of forecast 2121-100=2021
 %%end date of forecast 2121    =2121


   %%%

disp('Data has been successfully modified and written to
column B.');

 elapsedTime = toc;

% Convert the elapsed time from seconds to hours
elapsedTimeInHours = elapsedTime / 3600;
%per_form1_dax1day_window5=sum(cc_di_window5_dax_1day);
per_form2_dax1day_window30=sum(cc_China_crash_window30_dax_1
day)
% Display the elapsed time in hours
%fprintf('Elapsed time: %.6f hours\n performance 1:=%2f
performance 2:=%2f  ', elapsedTimeInHours,
per_form1_dax1day_window5,per_form2_dax1day_window5);
toc;
```

```matlab
%%%backtest
% Specify the file name and sheet name (if applicable)

% Read data from columns A (price), B (forecast direction),
and C (position)
price = readmatrix(fileName,'Sheet',my_sheet, 'Range',
'D2013:D2112');
forecast = readmatrix(fileName,'Sheet',my_sheet,'Range',
'Z2013:Z2112');
%position = readmatrix(fileName, 'Range', 'C1:C10');

% Initialize return and cumulative return arrays
cumulative_returns3_China = zeros(99, 1);
money = zeros(100, 1);
% Perform the backtest
for i = 1:99
    % Check the forecast direction and determine the
position
    if i == 1
        money(i) = price(1);
    elseif forecast(i) == 1 % Forecast is up
        money(i) = price(i);  %ยังไม่ขาย เงินเปลี่ยนตามราคา
    elseif forecast(i) == 0 % Forecast is down
        money(i) = money(i-1);  %ขาย เงินไม่เปลี่ยนตามราคา
    end
    % Calculate the cumulative return
    if i == 1
        cumulative_returns3_China(i) = 0;
    elseif money(i+1) - money(1) == 0
        cumulative_returns3_China(i) =
cumulative_returns3_China(i-1);
    else
        cumulative_returns3_China(i) = (money(i+1) -
money(1)) / money(1);
    end
end

% Write the results back to the Excel file
```

```matlab
%writematrix(returns, fileName, 'Range', 'D1:D10');
writematrix(cumulative_returns3_China,
fileName,'Sheet',my_sheet, 'Range', 'AB2013:AB2112');

target_forecast =
readmatrix(fileName,'Sheet',my_sheet,'Range',
'W2013:W2112');
%position = readmatrix(fileName, 'Range', 'C1:C10');

% Initialize return and cumulative return arrays
cumulative_returns3_tar_China = zeros(99, 1);
money_tar = zeros(100, 1);
% Perform the backtest
for i = 1:99
    if i == 1
        money_tar(i) = price(1);
    elseif target_forecast(i) == 1 % Forecast is up
        money_tar(i) = price(i); %ยังไม่ขาย เงินเปลี่ยนตามราคา
    elseif target_forecast(i) == 0 % Forecast is down
        money_tar(i) = money_tar(i-1); %ขาย เงินไม่เปลี่ยนตามราคา
    end

    % Calculate the cumulative return
    if i == 1
        cumulative_returns3_tar_China(i) = 0;
    elseif money(i+1) - money(1) == 0
        cumulative_returns3_tar_China(i) =
cumulative_returns3_tar_China(i-1);
    else
        cumulative_returns3_tar_China(i) = (money(i+1) -
money(1)) / money(1);
    end
end

% Write the results back to the Excel file
%writematrix(returns, fileName, 'Range', 'D1:D10');
writematrix(cumulative_returns3_tar_China,
fileName,'Sheet',my_sheet, 'Range', 'AE2013:AE2112');
```

```matlab
disp('Backtest complete. Returns and cumulative returns have
been written to columns U.');



%%% Hit Ratio%%%%

total_sum = sum(g);
hit_ratio = total_sum / 100;

writematrix(hit_ratio, fileName, 'Sheet', 'hit_ratio',
'Range', 'Q2');


total_sum_di = sum(gg);
hit_ratio_di = total_sum_di / 100;

writematrix(hit_ratio_di, fileName, 'Sheet', 'hit_ratio',
'Range', 'R2');


% Plotting the cumulative returns
plot(cumulative_returns1_China, 'DisplayName', 'Window Size
= 5', 'LineWidth', 1 , 'Color', 'r');
hold on;
plot(cumulative_returns2_China, 'DisplayName', 'Window Size
= 10', 'LineWidth', 1 , 'Color', 'b');
plot(cumulative_returns3_China, 'DisplayName', 'Window Size
= 30', 'LineWidth', 1 , 'Color', 'g');

% Adding labels and title
xlabel('Time','FontSize', 14); % Label for x-axis
ylabel('Cumulative Returns','FontSize', 14); % Label for y-
axis
title('Cumulative Returns (Direction) in China
Crash','FontSize', 14); % Title of the plot

% Adding a legend to identify the curves
%legend('show', 'Location', 'southwest','FontSize', 8);
```

```matlab
% Saving the plot as an image file
exportgraphics(gcf,
'BacktestRun_dax_1Day_China_chart_DI.jpg', 'Resolution',
300); % Set resolution to 300 DPI

clf;
% Plotting the second set of cumulative returns

plot(cumulative_returns1_tar_China, 'DisplayName', 'Window
Size = 5', 'LineWidth', 1 , 'Color', 'r');
hold on;
plot(cumulative_returns2_tar_China, 'DisplayName', 'Window
Size = 10', 'LineWidth', 1 , 'Color', 'b');
plot(cumulative_returns3_tar_China, 'DisplayName', 'Window
Size = 30', 'LineWidth', 1 , 'Color', 'g');

% Adding labels and title for the second plot
xlabel('Time','FontSize', 14); % Label for x-axis
ylabel('Cumulative Returns','FontSize', 14); % Label for y-
axis
title('Cumulative Returns (Crash Indicator) in China
Crash','FontSize', 14); % Title of the plot

% Adding a legend to identify the curves
legend('show', 'Location', 'Northwest','FontSize', 4.5);

% Saving the second plot as an image file
%saveas(gcf, 'cumulative_returns_comparison_target.jpg');
exportgraphics(gcf,
'BacktestRun_dax_1Day_China_chart_CI.jpg', 'Resolution',
300); % Set resolution to 300 DPI


save run_dax_1day_svm_EF1_1_1_Ta
```

คะแนนการประเมินคุณภาพของงานและความถูกต้องของผลการรันของ RA

Name: Piw

Task: ให้ไปรัน SVM one day 3 crash U500

Duration: 8 สิงหาคม (1 วันทำการ) คะแนนรวม 9

ไม่มีหัวบอกว่าเป็น crash covid

หัวข้อตรวจสอบความถูกต้อง	คะแนน	หมายเหตุ
1) Preprocessing EF1.1.3 วันที่ของ Covid crashEF1.2.3 Chinese crash EF.1.4.3 Ukrain crash EF1.3.3 ตรงกันทั้งสามคน	1	
2) EF1.6.3 Backtest ถูก	0.5	ผิดตรง market crash indicator

3) EF1.5.3 มีการคำนวนค่า hit ratio และ cumulative return ค่าสุดท้าย	1	
4) ชื่อตัวแปรชื่อ mat file ชื่อ excel file ถูกต้อง	0	
5) ผลการรันถูกต้องตรงช่องหัวข้อมีชื่อ column และมีการตกแต่งตารางหรือเอาไปไว้ใน sheet ใหม่เพื่อค้นหาได้ง่าย	1	
6) มีการใช้คำสั่ง matlab วาดกราฟ save graph ได้ถูกขนาด fonts และมี ligand	1	
7) ผลการคำนวนครบถ้วนถูกต้องตามต้องการ	1	
8) ชื่อตัวแปรมีคำว่า covid หรือ สื่อ	1	

ความหมายครบถ้วน ทุกตัว		
9) งานมีคุณภาพของการ ใช้ function matlab มากเป็น พิเศษเหนืองานที่ มอบหมายให้ (high quality work)	1	
10)ส่งงานได้ครบถ้วนและ ตรงเวลา	1	

```matlab
%%U500 30 min SVM start date:30/7/2567
%%EF1.1.3
%%forecast and do backtest


% Covid
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%window5
tic;
m=1;
% Specify the file name and sheet name (if applicable)
fileName = 'u500_1day_backtest_Piw.xlsx';
my_sheet = 'back_test'
%%change excel name and market crash at data number..
end_day=2190;
function [YY,HRT,ret]=gen_market_crash_indicator2(threshold)
    % prices: Input array of stock prices
    fileName = 'u500_1day_backtest_Piw.xlsx';
```

```matlab
    my_sheet = 'back_test'
    % Read data from column A (range A1:A100) of the Excel
file
    prices = readmatrix(fileName,'Sheet',my_sheet,'Range',
'D2:D2191');
    % Parameters
    window_size = 500; % 10 years of monthly data
    percentile_threshold = threshold; % 5th percentile
    %reset=zeros(1,window_size);
    % Calculate monthly returns
    returns = diff(prices) ./ prices(1:end-1);
    %returns = [reset'; returns(window_size+1:end)]; %
Adding a zero for the first return value to keep indices
consistent
    returns=[0;returns];
    ret=returns;

    %%write return to excel file
    writematrix(ret, fileName,'Sheet',my_sheet,'Range',
'E2:E2191');
    n = length(returns);
    crash_index = zeros(n, 1); % Initialize crash index

    % Calculate the historical return-based threshold (HRT)
    HRT = zeros(n, 1); % Initialize HRT array

    for t = window_size+1:n
        historical_returns = returns(t-window_size:t-1);
        HRT(t) = prctile(historical_returns,
percentile_threshold);
    end

    % Calculate crash index based on HRT
    for t = window_size+2:n
        if returns(t) - HRT(t) < 0
            crash_index(t) = 1;
        else
            crash_index(t) = 0;
        end
```

```matlab
    end
    YY=crash_index;
    %%write return to excel file
    writematrix(YY, fileName,'Sheet',my_sheet,'Range',
'G2:G2191');
    % Prepare the data for SVM
    X = returns(window_size+2:end-1); % Features (returns)
    Y = crash_index(window_size+2:end-1); % Labels (crash
index)

    % Split the data into training and testing sets
    train_ratio = 0.8;
    train_size = floor(train_ratio * length(X));

    X_train = X(1:train_size);
    Y_train = Y(1:train_size);
    X_test = X(train_size+1:end);
    Y_test = Y(train_size+1:end);

        % Plot the results
    figure;
    subplot(3, 1, 1);
    plot(prices);
    title('Stock Price');

    subplot(3, 1, 2);
    plot(crash_index);
    title('Crash Index');

    subplot(3, 1, 3);
    plot(ret);
    hold on;
    plot(HRT);
    title('Return vs Theshold');
    legend('Return', 'Theshold');

    exportgraphics(gcf, 'Gen_Market_crash_chart.jpg',
'Resolution', 300); % Set resolution to 300 DPI
```

```matlab
    clf;




[target_u500_1day_covid_Piw,HRT,returns_u500_1day_covid_Piw]
=gen_market_crash_indicator2(10)

n = size(returns_u500_1day_covid_Piw);
l = n(1);
for i=1:l
    direction(i) = sign(returns_u500_1day_covid_Piw(i));
    if direction(i)==-1
        direction(i)=0;
    end
end

writematrix(direction', fileName,'Sheet',my_sheet,'Range',
'F2:F2191');

clear p;
clear cc;
clear cc_crash_window5_eurusd_chinese6;
clear target_eurusd;
clear ret_eurusd;
clear data;
clear target;
clear cc_crash_window5_u500_1day
clear pp_crash_window5_u500_1day
clear target2_crash_window5_u500_1day
clear cc_di_window5_u500_1day
clear pp_price_crash_window5_u500_1day
clear target2_price_crash_window5_u500_1day

%%target =138691+1 since one day ahead!
% Read data from column A (range A1:A100) of the Excel file
%% data is return E
```

```matlab
data = readmatrix(fileName,'Sheet',my_sheet,'Range',
'E2:E2191');
%% price is closed D
price=readmatrix(fileName,'Sheet',my_sheet,'Range',
'D2:D2191');
%% target is market cash
target=readmatrix(fileName,'Sheet',my_sheet,'Range',
'G2:G2191');
% Send read data to forecast module
ret_eurusd = data;
target_eurusd=target;

%%%covid crash
% disp('Data has been successfully modified and written to
column B.');
  for i=1:100

[cc_crash_window5_u500_1day(i),pp_crash_window5_u500_1day(i)
,target2_crash_window5_u500_1day(i)]=run_svm_forecast_alarm3
(ret_eurusd(1:end_day-i),target_eurusd(1:end_day-
i+1),200,m);
  end
  a=flip(cc_crash_window5_u500_1day);
  b=flip(pp_crash_window5_u500_1day);
  c=flip(target2_crash_window5_u500_1day);

writematrix(a', fileName,'Sheet',my_sheet,'Range',
'H905:H1004');
writematrix(b', fileName,'Sheet',my_sheet,'Range',
'I905:I1004');
writematrix(c', fileName,'Sheet',my_sheet,'Range',
'J905:J1004');
%%forcast direction
for i=1:100

[cc_di_window5_u500_1day(i),pp_price_crash_window5_u500_1day
(i),target2_price_crash_window5_u500_1day(i)]=run_svm_foreca
st_direction3(price(1:end_day-i),price(1:end_day-
i+1),200,m);
```

```matlab
end
 % price
   aa=flip(cc_di_window5_u500_1day);
   bb=flip(pp_price_crash_window5_u500_1day);
   cc=flip(target2_price_crash_window5_u500_1day);
writematrix(aa', fileName,'Sheet',my_sheet,'Range',
'K905:K1004');
writematrix(bb', fileName,'Sheet',my_sheet,'Range',
'L905:L1004');
writematrix(cc', fileName,'Sheet',my_sheet,'Range',
'M905:M1004');
 %%chinese crash, we need to sort the output from backward
order to forward order.
 %%start date of forecast 2121-100=2021
 %%end date of forecast 2121     =2121


   %%

disp('Data has been successfully modified and written to
column B.');
   % Write the modified data to column B (range B1:B100) of
the same Excel file

  elapsedTime = toc;

% Convert the elapsed time from seconds to hours
elapsedTimeInHours = elapsedTime / 3600;
%per_form1_dax1day_window5=sum(cc_di_window5_u500_1day);
per_form2_dax1day_window5=sum(cc_crash_window5_u500_1day)
% Display the elapsed time in hours
%fprintf('Elapsed time: %.6f hours\n performance 1:=%2f
performance 2:=%2f  ', elapsedTimeInHours,
per_form1_dax1day_window5,per_form2_dax1day_window5);
toc;

%%%backtest%%%%%%%%%%%%%%%%%%%%%%%%%%%
% Specify the file name and sheet name (if applicable)
%fileName = 'test5.xlsx';
```

```matlab
% Read data from columns A (price), B (forecast direction),
and C (position)
price = readmatrix(fileName,'Sheet',my_sheet, 'Range',
'D905:D1004');
forecast = readmatrix(fileName,'Sheet',my_sheet,'Range',
'L905:L1004');
%position = readmatrix(fileName, 'Range', 'C1:C10');

% Initialize return and cumulative return arrays
returns = zeros(100, 1);
cumulative_returns1 = zeros(99, 1);
position = zeros(100, 1);
% Perform the backtest
for i = 1:99
    % Check the forecast direction and determine the
position
    if forecast(i) == 1 % Forecast is up
        position(i) = 1; % Long position
    elseif forecast(i) == 0 % Forecast is down
        position(i) = -1; % Short position
    end

    % Calculate the return
    %ถ้าทำนายถูก
    if position(i) == 1 % Long position
        returns(i) = (price(i+1) - price(i)) / price(i);
    elseif position(i) == -1 % Short position
        returns(i) = (price(i) - price(i+1)) / price(i);
    end

    % Calculate the cumulative return
    if i == 1
        cumulative_returns1(i) = returns(i);
    else
        cumulative_returns1(i) = cumulative_returns1(i-1) +
returns(i);
    end
end
```

```matlab
writematrix(cumulative_returns1, fileName,'Sheet',my_sheet,
'Range', 'N905:N1004');

target_forecast =
readmatrix(fileName,'Sheet',my_sheet,'Range', 'I905:I1004');
%position = readmatrix(fileName, 'Range', 'C1:C10');

% Initialize return and cumulative return arrays
returns_tar = zeros(100, 1);
cumulative_returns1_tar = zeros(99, 1);
position_tar = zeros(100, 1);
% Perform the backtest
for i = 1:99
    % Check the forecast direction and determine the
position
    if target_forecast(i) == 1 % Forecast is up
        position_tar(i) = -1; % Long position
    elseif target_forecast(i) == 0 % Forecast is down
        position_tar(i) = 1; % Short position
    end

    % Calculate the return
    %ถ้าทำนายถูก
    if position_tar(i) == -1 % Long position
        returns_tar(i) = (price(i+1) - price(i)) / price(i);
    elseif position_tar(i) == 1 % Short position
        returns_tar(i) = (price(i) - price(i+1)) / price(i);
    end

    % Calculate the cumulative return
    if i == 1
        cumulative_returns1_tar(i) = returns_tar(i);
    else
        cumulative_returns1_tar(i) =
cumulative_returns1_tar(i-1) + returns_tar(i);
    end
end
```

```matlab
% Write the results back to the Excel file
%writematrix(returns, fileName, 'Range', 'D1:D10');
writematrix(cumulative_returns1_tar,
fileName,'Sheet',my_sheet, 'Range', 'AC905:AC1004');

disp('Backtest complete. Returns and cumulative returns have
been written to columns N.');

%%% Hit Ratio%%%%

total_sum = sum(a);
hit_ratio = total_sum / 100;

writematrix(hit_ratio, fileName, 'Sheet', 'hit_ratio',
'Range', 'A2');

total_sum_di = sum(aa);
hit_ratio_di = total_sum_di / 100;

writematrix(hit_ratio_di, fileName, 'Sheet', 'hit_ratio',
'Range', 'B2');

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%window 10

m=2;
% Specify the file name and sheet name (if applicable)

clear p;
clear cc;
clear cc_crash_window10_eurusd_chinese6;
clear cc_crash_window10_u500_1day
clear pp_crash_window10_u500_1day
clear target2_crash_window10_u500_1day
clear cc_di_window10_u500_1day
clear pp_price_crash_window10_u500_1day
clear target2_price_crash_window10_u500_1day
```

```matlab
clear price
clear total_sum
clear hit_ratio
clear total_sum_di
clear hit_ratio_di

%%%covid crash
price=readmatrix(fileName,'Sheet',my_sheet,'Range',
'D2:D2191');

disp('Data has been successfully modified and written to
column B.');
   for i=1:100

[cc_crash_window10_u500_1day(i),pp_crash_window10_u500_1day(
i),target2_crash_window10_u500_1day(i)]=run_svm_forecast_ala
rm3(ret_eurusd(1:end_day-i),target_eurusd(1:end_day-
i+1),200,m);
   end
   d=flip(cc_crash_window10_u500_1day);
   e=flip(pp_crash_window10_u500_1day);
   f=flip(target2_crash_window10_u500_1day);
writematrix(d', fileName,'Sheet',my_sheet,'Range',
'O905:O1004');
writematrix(e', fileName,'Sheet',my_sheet,'Range',
'P905:P1004');
writematrix(f', fileName,'Sheet',my_sheet,'Range',
'Q905:Q1004');
%%forcast direction
for i=1:100

[cc_di_window10_u500_1day(i),pp_price_crash_window10_u500_1d
ay(i),target2_price_crash_window10_u500_1day(i)]=run_svm_for
ecast_direction3(price(1:end_day-i),price(1:end_day-
i+1),200,m);
end
   dd=flip(cc_di_window10_u500_1day);
   ee=flip(pp_price_crash_window10_u500_1day);
   ff=flip(target2_price_crash_window10_u500_1day);
```

```matlab
writematrix(dd', fileName,'Sheet',my_sheet,'Range',
'R905:R1004');
writematrix(ee', fileName,'Sheet',my_sheet,'Range',
'S905:S1004');
writematrix(ff', fileName,'Sheet',my_sheet,'Range',
'T905:T1004');
 %%chinese crash, we need to sort the output from backward
order to forward order.
 %%start date of forecast 2121-100=2021
 %%end date of forecast 2121    =2121

disp('Data has been successfully modified and written to
column B.');

 elapsedTime = toc;

% Convert the elapsed time from seconds to hours
elapsedTimeInHours = elapsedTime / 3600;
%per_form1_dax1day_window5=sum(cc_di_window5_u500_1day);
per_form2_dax1day_window10=sum(cc_crash_window10_u500_1day)
% Display the elapsed time in hours
%fprintf('Elapsed time: %.6f hours\n performance 1:=%2f
performance 2:=%2f  ', elapsedTimeInHours,
per_form1_dax1day_window5,per_form2_dax1day_window5);
toc;

%%%backtest
% Specify the file name and sheet name (if applicable)

% Read data from columns A (price), B (forecast direction),
and C (position)
price = readmatrix(fileName,'Sheet',my_sheet, 'Range',
'D905:D1004');
forecast = readmatrix(fileName,'Sheet',my_sheet,'Range',
'S905:S1004');
%position = readmatrix(fileName, 'Range', 'C1:C10');

% Initialize return and cumulative return arrays
returns = zeros(100, 1);
```

```matlab
cumulative_returns2 = zeros(99, 1);
position = zeros(100, 1);
% Perform the backtest
for i = 1:99
    % Check the forecast direction and determine the
position
    if forecast(i) == 1 % Forecast is up
        position(i) = 1; % Long position
    elseif forecast(i) == 0 % Forecast is down
        position(i) = -1; % Short position
    end

    % Calculate the return
    %ถ้าทำนายถูก
    if position(i) == 1 % Long position
        returns(i) = (price(i+1) - price(i)) / price(i);
    elseif position(i) == -1 % Short position
        returns(i) = (price(i) - price(i+1)) / price(i);
    end

    % Calculate the cumulative return
    if i == 1
        cumulative_returns2(i) = returns(i);
    else
        cumulative_returns2(i) = cumulative_returns2(i-1) +
returns(i);
    end
end

% Write the results back to the Excel file
%writematrix(returns, fileName, 'Range', 'D1:D10');
writematrix(cumulative_returns2, fileName,'Sheet',my_sheet,
'Range', 'U905:U1004');

target_forecast =
readmatrix(fileName,'Sheet',my_sheet,'Range', 'P905:P1004');
%position = readmatrix(fileName, 'Range', 'C1:C10');

% Initialize return and cumulative return arrays
```

```matlab
returns_tar = zeros(100, 1);
cumulative_returns2_tar = zeros(99, 1);
position_tar = zeros(100, 1);
% Perform the backtest
for i = 1:99
    % Check the forecast direction and determine the
position
    if target_forecast(i) == 1 % Forecast is up
        position_tar(i) = -1; % Long position
    elseif target_forecast(i) == 0 % Forecast is down
        position_tar(i) = 1; % Short position
    end

    % Calculate the return
    %ถ้าทำนายถูก
    if position_tar(i) == -1 % Long position
        returns_tar(i) = (price(i+1) - price(i)) / price(i);
    elseif position_tar(i) == 1 % Short position
        returns_tar(i) = (price(i) - price(i+1)) / price(i);
    end

    % Calculate the cumulative return
    if i == 1
        cumulative_returns2_tar(i) = returns_tar(i);
    else
        cumulative_returns2_tar(i) =
cumulative_returns1_tar(i-1) + returns_tar(i);
    end
end

% Write the results back to the Excel file
%writematrix(returns, fileName, 'Range', 'D1:D10');
writematrix(cumulative_returns2_tar,
fileName,'Sheet',my_sheet, 'Range', 'AD905:AD1004');


disp('Backtest complete. Returns and cumulative returns have
been written to columns U.');
```

```matlab
%%% Hit Ratio%%%%

total_sum = sum(d);
hit_ratio = total_sum / 100;

writematrix(hit_ratio, fileName, 'Sheet', 'hit_ratio', ...
'Range', 'C2');

total_sum_di = sum(dd);
hit_ratio_di = total_sum_di / 100;

writematrix(hit_ratio_di, fileName, 'Sheet', 'hit_ratio', ...
'Range', 'D2');

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

%%window 30
clear p;
clear cc;
clear cc_crash_window30_eurusd_chinese6;
clear cc_crash_window30_u500_1day
clear pp_crash_window30_u500_1day
clear target2_crash_window30_u500_1day
clear cc_di_window30_u500_1day
clear pp_price_crash_window30_u500_1day
clear target2_price_crash_window30_u500_1day
clear price
clear total_sum
clear hit_ratio
clear total_sum_di
clear hit_ratio_di

m = 3;


%%%covid crash
```

```matlab
price=readmatrix(fileName,'Sheet',my_sheet,'Range',
'D2:D2191');

disp('Data has been successfully modified and written to
column B.');
   for i=1:100

[cc_crash_window30_u500_1day(i),pp_crash_window30_u500_1day(
i),target2_crash_window30_u500_1day(i)]=run_svm_forecast_ala
rm3(ret_eurusd(1:end_day-i),target_eurusd(1:end_day-
i+1),200,m);
   end
   g=flip(cc_crash_window30_u500_1day);
   h=flip(pp_crash_window30_u500_1day);
   t=flip(target2_crash_window30_u500_1day);
writematrix(g', fileName,'Sheet',my_sheet,'Range',
'V905:V1004');
writematrix(h', fileName,'Sheet',my_sheet,'Range',
'W905:W1004');
writematrix(t', fileName,'Sheet',my_sheet,'Range',
'X905:X1004');
%%forcast direction
for i=1:100

[cc_di_window30_u500_1day(i),pp_price_crash_window30_u500_1d
ay(i),target2_price_crash_window30_u500_1day(i)]=run_svm_for
ecast_direction3(price(1:end_day-i),price(1:end_day-
i+1),200,m);
end
   gg=flip(cc_di_window30_u500_1day);
   hh=flip(pp_price_crash_window30_u500_1day);
   tt=flip(target2_price_crash_window30_u500_1day);
writematrix(gg', fileName,'Sheet',my_sheet,'Range',
'Y905:Y1004');
writematrix(hh', fileName,'Sheet',my_sheet,'Range',
'Z905:Z1004');
writematrix(tt', fileName,'Sheet',my_sheet,'Range',
'AA905:AA1004');
```

```matlab
%%chinese crash, we need to sort the output from backward
order to forward order.
%%start date of forecast 2121-100=2021
%%end date of forecast 2121    =2121


%%

disp('Data has been successfully modified and written to
column B.');

elapsedTime = toc;

% Convert the elapsed time from seconds to hours
elapsedTimeInHours = elapsedTime / 3600;
%per_form1_dax1day_window5=sum(cc_di_window5_u500_1day);
per_form2_dax1day_window30=sum(cc_crash_window30_u500_1day)
% Display the elapsed time in hours
%fprintf('Elapsed time: %.6f hours\n performance 1:=%2f
performance 2:=%2f  ', elapsedTimeInHours,
per_form1_dax1day_window5,per_form2_dax1day_window5);
toc;

%%%backtest
% Specify the file name and sheet name (if applicable)

% Read data from columns A (price), B (forecast direction),
and C (position)
price = readmatrix(fileName,'Sheet',my_sheet, 'Range',
'D905:D1004');
forecast = readmatrix(fileName,'Sheet',my_sheet,'Range',
'Z905:Z1004');
%position = readmatrix(fileName, 'Range', 'C1:C10');

% Initialize return and cumulative return arrays
returns = zeros(100, 1);
cumulative_returns3 = zeros(99, 1);
position = zeros(100, 1);
% Perform the backtest
```

```matlab
for i = 1:99
    % Check the forecast direction and determine the
position
    if forecast(i) == 1 % Forecast is up
        position(i) = 1; % Long position
    elseif forecast(i) == 0 % Forecast is down
        position(i) = -1; % Short position
    end

    % Calculate the return
    %ถ้าทำนายถูก
    if position(i) == 1 % Long position
        returns(i) = (price(i+1) - price(i)) / price(i);
    elseif position(i) == -1 % Short position
        returns(i) = (price(i) - price(i+1)) / price(i);
    end

    % Calculate the cumulative return
    if i == 1
        cumulative_returns3(i) = returns(i);
    else
        cumulative_returns3(i) = cumulative_returns3(i-1) +
returns(i);
    end
end

% Write the results back to the Excel file
%writematrix(returns, fileName, 'Range', 'D1:D10');
writematrix(cumulative_returns3, fileName,'Sheet',my_sheet,
'Range', 'AB905:AB1004');

target_forecast =
readmatrix(fileName,'Sheet',my_sheet,'Range', 'W905:W1004');
%position = readmatrix(fileName, 'Range', 'C1:C10');

% Initialize return and cumulative return arrays
returns_tar = zeros(100, 1);
cumulative_returns3_tar = zeros(99, 1);
position_tar = zeros(100, 1);
```

```matlab
% Perform the backtest
for i = 1:99
    % Check the forecast direction and determine the
position
    if target_forecast(i) == 1 % Forecast is up
        position_tar(i) = -1; % Long position
    elseif target_forecast(i) == 0 % Forecast is down
        position_tar(i) = 1; % Short position
    end

    % Calculate the return
    %ถ้าทำนายถูก
    if position_tar(i) == -1 % Long position
        returns_tar(i) = (price(i+1) - price(i)) / price(i);
    elseif position_tar(i) == 1 % Short position
        returns_tar(i) = (price(i) - price(i+1)) / price(i);
    end

    % Calculate the cumulative return
    if i == 1
        cumulative_returns3_tar(i) = returns_tar(i);
    else
        cumulative_returns3_tar(i) =
cumulative_returns3_tar(i-1) + returns_tar(i);
    end
end

% Write the results back to the Excel file
%writematrix(returns, fileName, 'Range', 'D1:D10');
writematrix(cumulative_returns3_tar,
fileName,'Sheet',my_sheet, 'Range', 'AE905:AE1004');


disp('Backtest complete. Returns and cumulative returns have
been written to columns U.');

%%% Hit Ratio%%%%

total_sum = sum(g);
```

```matlab
hit_ratio = total_sum / 100;

writematrix(hit_ratio, fileName, 'Sheet', 'hit_ratio',
'Range', 'E2');

total_sum_di = sum(gg);
hit_ratio_di = total_sum_di / 100;

writematrix(hit_ratio_di, fileName, 'Sheet', 'hit_ratio',
'Range', 'F2');


clf;

% Plotting the cumulative returns
plot(cumulative_returns1, 'DisplayName', 'Window Size = 5',
'LineWidth', 1 , 'Color', 'r');
hold on;
plot(cumulative_returns2, 'DisplayName', 'Window Size = 10',
'LineWidth', 1 , 'Color', 'b');
hold on;
plot(cumulative_returns3, 'DisplayName', 'Window Size = 30',
'LineWidth', 1 , 'Color', 'g');

% Adding labels and title
xlabel('Time','FontSize', 14); % Label for x-axis
ylabel('Cumulative Returns','FontSize', 14); % Label for y-
axis
title('Cumulative Returns (Direction) in Covid
Crash','FontSize', 14); % Title of the plot

% Adding a legend to identify the curves
legend('show', 'Location', 'southwest','FontSize', 4.5);

% Saving the plot as an image file
exportgraphics(gcf,
'BacktestRun_U500_1Day_Covid_chart_DI.jpg', 'Resolution',
300); % Set resolution to 300 DPI
```

```matlab
clf;
% Plotting the second set of cumulative returns

plot(cumulative_returns1_tar, 'DisplayName', 'Window Size =
5', 'LineWidth', 1 , 'Color', 'r');
hold on;
plot(cumulative_returns2_tar, 'DisplayName', 'Window Size =
10', 'LineWidth', 1 , 'Color', 'b');
hold on;
plot(cumulative_returns3_tar, 'DisplayName', 'Window Size =
30', 'LineWidth', 1 , 'Color', 'g');

% Adding labels and title for the second plot
xlabel('Time','FontSize', 14); % Label for x-axis
ylabel('Cumulative Returns','FontSize', 14); % Label for y-
axis
title('Cumulative Returns (Crash Indicator) in Covid
Crash','FontSize', 14); % Title of the plot

% Adding a legend to identify the curves
legend('show', 'Location', 'Northwest','FontSize', 4.5);

% Saving the second plot as an image file
%saveas(gcf, 'cumulative_returns_comparison_target.jpg');
exportgraphics(gcf,
'BacktestRun_U500_1Day_Covid_chart_CI.jpg', 'Resolution',
300); % Set resolution to 300 DPI

clf;

% Ukraine
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%window5
```

```matlab
clear p;
clear cc;
clear cc_crash_window5_eurusd_chinese6;
clear target_eurusd;
clear ret_eurusd;
clear data;
clear target;
clear cc_crash_window5_u500_1day
clear pp_crash_window5_u500_1day
clear target2_crash_window5_u500_1day
clear cc_di_window5_u500_1day
clear pp_price_crash_window5_u500_1day
clear target2_price_crash_window5_u500_1day
clear cumulative_returns1
clear cumulative_returns2
clear cumulative_returns3
clear cumulative_returns1_tar
clear cumulative_returns2_tar
clear cumulative_returns3_tar
clear total_sum
clear hit_ratio
clear total_sum_di
clear hit_ratio_di

%%target =138691+1 since one day ahead!
% Read data from column A (range A1:A100) of the Excel file
%% data is return E
data = readmatrix(fileName,'Sheet',my_sheet,'Range',
'E2:E2191');
%% price is closed D
price=readmatrix(fileName,'Sheet',my_sheet,'Range',
'D2:D2191');
%% target is market cash
target=readmatrix(fileName,'Sheet',my_sheet,'Range',
'G2:G2191');
% Send read data to forecast module
```

```matlab
ret_eurusd = data;
target_eurusd=target;

%%%covid crash
% disp('Data has been successfully modified and written to
column B.');
   for i=1:100

[cc_crash_window5_u500_1day(i),pp_crash_window5_u500_1day(i)
,target2_crash_window5_u500_1day(i)]=run_svm_forecast_alarm3
(ret_eurusd(1:end_day-i),target_eurusd(1:end_day-
i+1),200,m);
   end
   a=flip(cc_crash_window5_u500_1day);
   b=flip(pp_crash_window5_u500_1day);
   c=flip(target2_crash_window5_u500_1day);

writematrix(a', fileName,'Sheet',my_sheet,'Range',
'H1503:H1602');
writematrix(b', fileName,'Sheet',my_sheet,'Range',
'I1503:I1602');
writematrix(c', fileName,'Sheet',my_sheet,'Range',
'J1503:J1602');
%%forcast direction
for i=1:100

[cc_di_window5_u500_1day(i),pp_price_crash_window5_u500_1day
(i),target2_price_crash_window5_u500_1day(i)]=run_svm_foreca
st_direction3(price(1:end_day-i),price(1:end_day-
i+1),200,m);
end
 % price
   aa=flip(cc_di_window5_u500_1day);
   bb=flip(pp_price_crash_window5_u500_1day);
   cc=flip(target2_price_crash_window5_u500_1day);
writematrix(aa', fileName,'Sheet',my_sheet,'Range',
'K1503:K1602');
writematrix(bb', fileName,'Sheet',my_sheet,'Range',
'L1503:L1602');
```

```matlab
writematrix(cc', fileName,'Sheet',my_sheet,'Range',
'M1503:M1602');
 %%chinese crash, we need to sort the output from backward
order to forward order.
 %%start date of forecast 2121-100=2021
 %%end date of forecast 2121    =2121


   %%

disp('Data has been successfully modified and written to
column B.');
  % Write the modified data to column B (range B1:B100) of
the same Excel file

 elapsedTime = toc;

% Convert the elapsed time from seconds to hours
elapsedTimeInHours = elapsedTime / 3600;
%per_form1_dax1day_window5=sum(cc_di_window5_u500_1day);
per_form2_dax1day_window5=sum(cc_crash_window5_u500_1day)
% Display the elapsed time in hours
%fprintf('Elapsed time: %.6f hours\n performance 1:=%2f
performance 2:=%2f  ', elapsedTimeInHours,
per_form1_dax1day_window5,per_form2_dax1day_window5);
toc;

%%%backtest%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
% Specify the file name and sheet name (if applicable)
%fileName = 'test5.xlsx';

% Read data from columns A (price), B (forecast direction),
and C (position)
price = readmatrix(fileName,'Sheet',my_sheet, 'Range',
'D1503:D1602');
forecast = readmatrix(fileName,'Sheet',my_sheet,'Range',
'L1503:L11602');
%position = readmatrix(fileName, 'Range', 'C1:C10');
```

```matlab
% Initialize return and cumulative return arrays
returns = zeros(100, 1);
cumulative_returns1 = zeros(99, 1);
position = zeros(100, 1);
% Perform the backtest
for i = 1:99
    % Check the forecast direction and determine the
position
    if forecast(i) == 1 % Forecast is up
        position(i) = 1; % Long position
    elseif forecast(i) == 0 % Forecast is down
        position(i) = -1; % Short position
    end

    % Calculate the return
    %ถ้าทำนายถูก
    if position(i) == 1 % Long position
        returns(i) = (price(i+1) - price(i)) / price(i);
    elseif position(i) == -1 % Short position
        returns(i) = (price(i) - price(i+1)) / price(i);
    end

    % Calculate the cumulative return
    if i == 1
        cumulative_returns1(i) = returns(i);
    else
        cumulative_returns1(i) = cumulative_returns1(i-1) +
returns(i);
    end
end

writematrix(cumulative_returns1, fileName,'Sheet',my_sheet,
'Range', 'N1503:N1602');

target_forecast =
readmatrix(fileName,'Sheet',my_sheet,'Range',
'I1503:I1602');
%position = readmatrix(fileName, 'Range', 'C1:C10');
```

```matlab
% Initialize return and cumulative return arrays
returns_tar = zeros(100, 1);
cumulative_returns1_tar = zeros(99, 1);
position_tar = zeros(100, 1);
% Perform the backtest
for i = 1:99
    % Check the forecast direction and determine the
position
    if target_forecast(i) == 1 % Forecast is up
        position_tar(i) = -1; % Long position
    elseif target_forecast(i) == 0 % Forecast is down
        position_tar(i) = 1; % Short position
    end

    % Calculate the return
    %ถ้าทำนายถูก
    if position_tar(i) == -1 % Long position
        returns_tar(i) = (price(i+1) - price(i)) / price(i);
    elseif position_tar(i) == 1 % Short position
        returns_tar(i) = (price(i) - price(i+1)) / price(i);
    end

    % Calculate the cumulative return
    if i == 1
        cumulative_returns1_tar(i) = returns_tar(i);
    else
        cumulative_returns1_tar(i) =
cumulative_returns1_tar(i-1) + returns_tar(i);
    end
end

% Write the results back to the Excel file
%writematrix(returns, fileName, 'Range', 'D1:D10');
writematrix(cumulative_returns1_tar,
fileName,'Sheet',my_sheet, 'Range', 'AC1503:AC1602');

disp('Backtest complete. Returns and cumulative returns have
been written to columns N.');
```

```matlab
%%% Hit Ratio%%%%

total_sum = sum(a);
hit_ratio = total_sum / 100;

writematrix(hit_ratio, fileName, 'Sheet', 'hit_ratio', ...
'Range', 'G2');

total_sum_di = sum(aa);
hit_ratio_di = total_sum_di / 100;

writematrix(hit_ratio_di, fileName, 'Sheet', 'hit_ratio', ...
'Range', 'H2');

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%window 10

m=2;
% Specify the file name and sheet name (if applicable)

clear p;
clear cc;
clear cc_crash_window10_eurusd_chinese6;
clear cc_crash_window10_u500_1day
clear pp_crash_window10_u500_1day
clear target2_crash_window10_u500_1day
clear cc_di_window10_u500_1day
clear pp_price_crash_window10_u500_1day
clear target2_price_crash_window10_u500_1day
clear price
clear total_sum
clear hit_ratio
clear total_sum_di
clear hit_ratio_di

%%%covid crash
```

```matlab
price=readmatrix(fileName,'Sheet',my_sheet,'Range',
'D2:D2191');

disp('Data has been successfully modified and written to
column B.');
  for i=1:100

[cc_crash_window10_u500_1day(i),pp_crash_window10_u500_1day(
i),target2_crash_window10_u500_1day(i)]=run_svm_forecast_ala
rm3(ret_eurusd(1:end_day-i),target_eurusd(1:end_day-
i+1),200,m);
  end
  d=flip(cc_crash_window10_u500_1day);
  e=flip(pp_crash_window10_u500_1day);
  f=flip(target2_crash_window10_u500_1day);
writematrix(d', fileName,'Sheet',my_sheet,'Range',
'O1503:O1602');
writematrix(e', fileName,'Sheet',my_sheet,'Range',
'P1503:P1602');
writematrix(f', fileName,'Sheet',my_sheet,'Range',
'Q1503:Q1602');
%%forcast direction
for i=1:100

[cc_di_window10_u500_1day(i),pp_price_crash_window10_u500_1d
ay(i),target2_price_crash_window10_u500_1day(i)]=run_svm_for
ecast_direction3(price(1:end_day-i),price(1:end_day-
i+1),200,m);
end
  dd=flip(cc_di_window10_u500_1day);
  ee=flip(pp_price_crash_window10_u500_1day);
  ff=flip(target2_price_crash_window10_u500_1day);
writematrix(dd', fileName,'Sheet',my_sheet,'Range',
'R1503:R1602');
writematrix(ee', fileName,'Sheet',my_sheet,'Range',
'S1503:S1602');
writematrix(ff', fileName,'Sheet',my_sheet,'Range',
'T1503:T1602');
```

```matlab
%%chinese crash, we need to sort the output from backward
order to forward order.
%%start date of forecast 2121-100=2021
%%end date of forecast 2121    =2121

disp('Data has been successfully modified and written to
column B.');

 elapsedTime = toc;

% Convert the elapsed time from seconds to hours
elapsedTimeInHours = elapsedTime / 3600;
%per_form1_dax1day_window5=sum(cc_di_window5_u500_1day);
per_form2_dax1day_window10=sum(cc_crash_window10_u500_1day)
% Display the elapsed time in hours
%fprintf('Elapsed time: %.6f hours\n performance 1:=%2f
performance 2:=%2f  ', elapsedTimeInHours,
per_form1_dax1day_window5,per_form2_dax1day_window5);
toc;

%%%backtest
% Specify the file name and sheet name (if applicable)

% Read data from columns A (price), B (forecast direction),
and C (position)
price = readmatrix(fileName,'Sheet',my_sheet, 'Range',
'D1503:D1602');
forecast = readmatrix(fileName,'Sheet',my_sheet,'Range',
'S1503:S1602');
%position = readmatrix(fileName, 'Range', 'C1:C10');

% Initialize return and cumulative return arrays
returns = zeros(100, 1);
cumulative_returns2 = zeros(99, 1);
position = zeros(100, 1);
% Perform the backtest
for i = 1:99
    % Check the forecast direction and determine the
position
```

```matlab
    if forecast(i) == 1 % Forecast is up
        position(i) = 1; % Long position
    elseif forecast(i) == 0 % Forecast is down
        position(i) = -1; % Short position
    end

    % Calculate the return
    %ถ้าทำนายถูก
    if position(i) == 1 % Long position
        returns(i) = (price(i+1) - price(i)) / price(i);
    elseif position(i) == -1 % Short position
        returns(i) = (price(i) - price(i+1)) / price(i);
    end

    % Calculate the cumulative return
    if i == 1
        cumulative_returns2(i) = returns(i);
    else
        cumulative_returns2(i) = cumulative_returns2(i-1) + returns(i);
    end
end

% Write the results back to the Excel file
%writematrix(returns, fileName, 'Range', 'D1:D10');
writematrix(cumulative_returns2, fileName,'Sheet',my_sheet, 'Range', 'U1503:U1602');

target_forecast = readmatrix(fileName,'Sheet',my_sheet,'Range', 'P1503:P1602');
%position = readmatrix(fileName, 'Range', 'C1:C10');

% Initialize return and cumulative return arrays
returns_tar = zeros(100, 1);
cumulative_returns2_tar = zeros(99, 1);
position_tar = zeros(100, 1);
% Perform the backtest
for i = 1:99
```

```matlab
    % Check the forecast direction and determine the
position
    if target_forecast(i) == 1 % Forecast is up
        position_tar(i) = -1; % Long position
    elseif target_forecast(i) == 0 % Forecast is down
        position_tar(i) = 1; % Short position
    end

    % Calculate the return
    %ถ้าทำนายถูก
    if position_tar(i) == -1 % Long position
        returns_tar(i) = (price(i+1) - price(i)) / price(i);
    elseif position_tar(i) == 1 % Short position
        returns_tar(i) = (price(i) - price(i+1)) / price(i);
    end

    % Calculate the cumulative return
    if i == 1
        cumulative_returns2_tar(i) = returns_tar(i);
    else
        cumulative_returns2_tar(i) =
cumulative_returns1_tar(i-1) + returns_tar(i);
    end
end

% Write the results back to the Excel file
%writematrix(returns, fileName, 'Range', 'D1:D10');
writematrix(cumulative_returns2_tar,
fileName,'Sheet',my_sheet, 'Range', 'AD1503:AD1602');


disp('Backtest complete. Returns and cumulative returns have
been written to columns U.');

%%% Hit Ratio%%%%

total_sum = sum(d);
hit_ratio = total_sum / 100;
```

```matlab
writematrix(hit_ratio, fileName, 'Sheet', 'hit_ratio',
'Range', 'I2');

total_sum_di = sum(dd);
hit_ratio_di = total_sum_di / 100;

writematrix(hit_ratio_di, fileName, 'Sheet', 'hit_ratio',
'Range', 'J2');

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

%%window 30
clear p;
clear cc;
clear cc_crash_window30_eurusd_chinese6;
clear cc_crash_window30_u500_1day
clear pp_crash_window30_u500_1day
clear target2_crash_window30_u500_1day
clear cc_di_window30_u500_1day
clear pp_price_crash_window30_u500_1day
clear target2_price_crash_window30_u500_1day
clear price
clear total_sum
clear hit_ratio
clear total_sum_di
clear hit_ratio_di

m = 3;


%%%covid crash
price=readmatrix(fileName,'Sheet',my_sheet,'Range',
'D2:D2191');

disp('Data has been successfully modified and written to
column B.');
  for i=1:100
```

```matlab
[cc_crash_window30_u500_1day(i),pp_crash_window30_u500_1day(
i),target2_crash_window30_u500_1day(i)]=run_svm_forecast_ala
rm3(ret_eurusd(1:end_day-i),target_eurusd(1:end_day-
i+1),200,m);
  end
  g=flip(cc_crash_window30_u500_1day);
  h=flip(pp_crash_window30_u500_1day);
  t=flip(target2_crash_window30_u500_1day);
writematrix(g', fileName,'Sheet',my_sheet,'Range',
'V1503:V1602');
writematrix(h', fileName,'Sheet',my_sheet,'Range',
'W1503:W1602');
writematrix(t', fileName,'Sheet',my_sheet,'Range',
'X1503:X1602');
%%forcast direction
for i=1:100

[cc_di_window30_u500_1day(i),pp_price_crash_window30_u500_1d
ay(i),target2_price_crash_window30_u500_1day(i)]=run_svm_for
ecast_direction3(price(1:end_day-i),price(1:end_day-
i+1),200,m);
end
  gg=flip(cc_di_window30_u500_1day);
  hh=flip(pp_price_crash_window30_u500_1day);
  tt=flip(target2_price_crash_window30_u500_1day);
writematrix(gg', fileName,'Sheet',my_sheet,'Range',
'Y1503:Y1602');
writematrix(hh', fileName,'Sheet',my_sheet,'Range',
'Z1503:Z1602');
writematrix(tt', fileName,'Sheet',my_sheet,'Range',
'AA1503:AA1602');

 %%chinese crash, we need to sort the output from backward
order to forward order.
 %%start date of forecast 2121-100=2021
 %%end date of forecast 2121   =2121
```

```matlab
%%
disp('Data has been successfully modified and written to
column B.');

 elapsedTime = toc;

% Convert the elapsed time from seconds to hours
elapsedTimeInHours = elapsedTime / 3600;
%per_form1_dax1day_window5=sum(cc_di_window5_u500_1day);
per_form2_dax1day_window30=sum(cc_crash_window30_u500_1day)
% Display the elapsed time in hours
%fprintf('Elapsed time: %.6f hours\n performance 1:=%2f
performance 2:=%2f  ', elapsedTimeInHours,
per_form1_dax1day_window5,per_form2_dax1day_window5);
toc;

%%%backtest
% Specify the file name and sheet name (if applicable)

% Read data from columns A (price), B (forecast direction),
and C (position)
price = readmatrix(fileName,'Sheet',my_sheet, 'Range',
'D1503:D1602');
forecast = readmatrix(fileName,'Sheet',my_sheet,'Range',
'Z1503:Z1602');
%position = readmatrix(fileName, 'Range', 'C1:C10');

% Initialize return and cumulative return arrays
returns = zeros(100, 1);
cumulative_returns3 = zeros(99, 1);
position = zeros(100, 1);
% Perform the backtest
for i = 1:99
    % Check the forecast direction and determine the
position
    if forecast(i) == 1 % Forecast is up
        position(i) = 1; % Long position
    elseif forecast(i) == 0 % Forecast is down
```

```matlab
        position(i) = -1; % Short position
    end

    % Calculate the return
    %ถ้าทำนายถูก
    if position(i) == 1 % Long position
        returns(i) = (price(i+1) - price(i)) / price(i);
    elseif position(i) == -1 % Short position
        returns(i) = (price(i) - price(i+1)) / price(i);
    end

    % Calculate the cumulative return
    if i == 1
        cumulative_returns3(i) = returns(i);
    else
        cumulative_returns3(i) = cumulative_returns3(i-1) +
returns(i);
    end
end

% Write the results back to the Excel file
%writematrix(returns, fileName, 'Range', 'D1:D10');
writematrix(cumulative_returns3, fileName,'Sheet',my_sheet,
'Range', 'AB1503:AB1602');

target_forecast =
readmatrix(fileName,'Sheet',my_sheet,'Range',
'W1503:W1602');
%position = readmatrix(fileName, 'Range', 'C1:C10');

% Initialize return and cumulative return arrays
returns_tar = zeros(100, 1);
cumulative_returns3_tar = zeros(99, 1);
position_tar = zeros(100, 1);
% Perform the backtest
for i = 1:99
    % Check the forecast direction and determine the
position
    if target_forecast(i) == 1 % Forecast is up
```

```matlab
        position_tar(i) = -1; % Long position
    elseif target_forecast(i) == 0 % Forecast is down
        position_tar(i) = 1; % Short position
    end

    % Calculate the return
    %ถ้าทำนายถูก
    if position_tar(i) == -1 % Long position
        returns_tar(i) = (price(i+1) - price(i)) / price(i);
    elseif position_tar(i) == 1 % Short position
        returns_tar(i) = (price(i) - price(i+1)) / price(i);
    end

    % Calculate the cumulative return
    if i == 1
        cumulative_returns3_tar(i) = returns_tar(i);
    else
        cumulative_returns3_tar(i) =
cumulative_returns3_tar(i-1) + returns_tar(i);
    end
end

% Write the results back to the Excel file
%writematrix(returns, fileName, 'Range', 'D1:D10');
writematrix(cumulative_returns3_tar,
fileName,'Sheet',my_sheet, 'Range', 'AE1503:AE1602');


disp('Backtest complete. Returns and cumulative returns have
been written to columns U.');

%%% Hit Ratio%%%%

total_sum = sum(g);
hit_ratio = total_sum / 100;

writematrix(hit_ratio, fileName, 'Sheet', 'hit_ratio',
'Range', 'K2');
```

```matlab
total_sum_di = sum(gg);
hit_ratio_di = total_sum_di / 100;

writematrix(hit_ratio_di, fileName, 'Sheet', 'hit_ratio',
'Range', 'L2');

% Plotting the cumulative returns
plot(cumulative_returns1, 'DisplayName', 'Window Size = 5',
'LineWidth', 1 , 'Color', 'r');
hold on;
plot(cumulative_returns2, 'DisplayName', 'Window Size = 10',
'LineWidth', 1 , 'Color', 'b');
plot(cumulative_returns3, 'DisplayName', 'Window Size = 30',
'LineWidth', 1 , 'Color', 'g');

% Adding labels and title
xlabel('Time','FontSize', 14); % Label for x-axis
ylabel('Cumulative Returns','FontSize', 14); % Label for y-
axis
title('Cumulative Returns (Direction) in Ukraine
Crash','FontSize', 14); % Title of the plot

% Adding a legend to identify the curves
legend('show', 'Location', 'Northwest','FontSize', 4.5);

% Saving the plot as an image file
exportgraphics(gcf,
'BacktestRun_U500_1Day_Ukraine_chart_DI.jpg', 'Resolution',
300); % Set resolution to 300 DPI

clf;
% Plotting the second set of cumulative returns

plot(cumulative_returns1_tar, 'DisplayName', 'Window Size =
5', 'LineWidth', 1 , 'Color', 'r');
hold on;
plot(cumulative_returns2_tar, 'DisplayName', 'Window Size =
10', 'LineWidth', 1 , 'Color', 'b');
```

```matlab
plot(cumulative_returns3_tar, 'DisplayName', 'Window Size =
30', 'LineWidth', 1 , 'Color', 'g');

% Adding labels and title for the second plot
xlabel('Time','FontSize', 14); % Label for x-axis
ylabel('Cumulative Returns','FontSize', 14); % Label for y-
axis
title('Cumulative Returns (Crash Indicator) in Ukraine
Crash','FontSize', 14); % Title of the plot

% Adding a legend to identify the curves
legend('show', 'Location', 'Northwest','FontSize', 4.5);

% Saving the second plot as an image file
%saveas(gcf, 'cumulative_returns_comparison_target.jpg');
exportgraphics(gcf,
'BacktestRun_U500_1Day_Ukraine_chart_CI.jpg', 'Resolution',
300); % Set resolution to 300 DPI

clf;




% China
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
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%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%window5
```

```matlab
clear p;
clear cc;
clear cc_crash_window5_eurusd_chinese6;
clear target_eurusd;
clear ret_eurusd;
clear data;
clear target;
clear cc_crash_window5_u500_1day
clear pp_crash_window5_u500_1day
clear target2_crash_window5_u500_1day
clear cc_di_window5_u500_1day
clear pp_price_crash_window5_u500_1day
clear target2_price_crash_window5_u500_1day
clear cumulative_returns1
clear cumulative_returns2
clear cumulative_returns3
clear cumulative_returns1_tar
clear cumulative_returns2_tar
clear cumulative_returns3_tar
clear total_sum
clear hit_ratio
clear total_sum_di
clear hit_ratio_di

%%target =138691+1 since one day ahead!
% Read data from column A (range A1:A100) of the Excel file
%% data is return E
data = readmatrix(fileName,'Sheet',my_sheet,'Range',
'E2:E2191');
%% price is closed D
price=readmatrix(fileName,'Sheet',my_sheet,'Range',
'D2:D2191');
%% target is market cash
target=readmatrix(fileName,'Sheet',my_sheet,'Range',
'G2:G2191');
% Send read data to forecast module
ret_eurusd = data;
target_eurusd=target;
```

```matlab
%%%covid crash
% disp('Data has been successfully modified and written to
column B.');
    for i=1:100

[cc_crash_window5_u500_1day(i),pp_crash_window5_u500_1day(i)
,target2_crash_window5_u500_1day(i)]=run_svm_forecast_alarm3
(ret_eurusd(1:end_day-i),target_eurusd(1:end_day-
i+1),200,m);
    end
    a=flip(cc_crash_window5_u500_1day);
    b=flip(pp_crash_window5_u500_1day);
    c=flip(target2_crash_window5_u500_1day);

writematrix(a', fileName,'Sheet',my_sheet,'Range',
'H2023:H2122');
writematrix(b', fileName,'Sheet',my_sheet,'Range',
'I2023:I2122');
writematrix(c', fileName,'Sheet',my_sheet,'Range',
'J2023:J2122');
%%forcast direction
for i=1:100

[cc_di_window5_u500_1day(i),pp_price_crash_window5_u500_1day
(i),target2_price_crash_window5_u500_1day(i)]=run_svm_foreca
st_direction3(price(1:end_day-i),price(1:end_day-
i+1),200,m);
end
 % price
    aa=flip(cc_di_window5_u500_1day);
    bb=flip(pp_price_crash_window5_u500_1day);
    cc=flip(target2_price_crash_window5_u500_1day);
writematrix(aa', fileName,'Sheet',my_sheet,'Range',
'K2023:K2122');
writematrix(bb', fileName,'Sheet',my_sheet,'Range',
'L2023:L2122');
writematrix(cc', fileName,'Sheet',my_sheet,'Range',
'M2023:M2122');
```

```matlab
%%chinese crash, we need to sort the output from backward
order to forward order.
%%start date of forecast 2121-100=2021
%%end date of forecast 2121   =2121


%%%

disp('Data has been successfully modified and written to
column B.');
% Write the modified data to column B (range B1:B100) of
the same Excel file

elapsedTime = toc;

% Convert the elapsed time from seconds to hours
elapsedTimeInHours = elapsedTime / 3600;
%per_form1_dax1day_window5=sum(cc_di_window5_u500_1day);
per_form2_dax1day_window5=sum(cc_crash_window5_u500_1day)
% Display the elapsed time in hours
%fprintf('Elapsed time: %.6f hours\n performance 1:=%2f
performance 2:=%2f  ', elapsedTimeInHours,
per_form1_dax1day_window5,per_form2_dax1day_window5);
toc;

%%%backtest%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
% Specify the file name and sheet name (if applicable)
%fileName = 'test5.xlsx';

% Read data from columns A (price), B (forecast direction),
and C (position)
price = readmatrix(fileName,'Sheet',my_sheet, 'Range',
'D2023:D2122');
forecast = readmatrix(fileName,'Sheet',my_sheet,'Range',
'L2023:L2122');
%position = readmatrix(fileName, 'Range', 'C1:C10');

% Initialize return and cumulative return arrays
returns = zeros(100, 1);
```

```matlab
cumulative_returns1 = zeros(99, 1);
position = zeros(100, 1);
% Perform the backtest
for i = 1:99
    % Check the forecast direction and determine the
position
    if forecast(i) == 1 % Forecast is up
        position(i) = 1; % Long position
    elseif forecast(i) == 0 % Forecast is down
        position(i) = -1; % Short position
    end

    % Calculate the return
    %ถ้าทำนายถูก
    if position(i) == 1 % Long position
        returns(i) = (price(i+1) - price(i)) / price(i);
    elseif position(i) == -1 % Short position
        returns(i) = (price(i) - price(i+1)) / price(i);
    end

    % Calculate the cumulative return
    if i == 1
        cumulative_returns1(i) = returns(i);
    else
        cumulative_returns1(i) = cumulative_returns1(i-1) +
returns(i);
    end
end

writematrix(cumulative_returns1, fileName,'Sheet',my_sheet,
'Range', 'N2023:N2122');

target_forecast =
readmatrix(fileName,'Sheet',my_sheet,'Range',
'I2023:I2122');
%position = readmatrix(fileName, 'Range', 'C1:C10');

% Initialize return and cumulative return arrays
returns_tar = zeros(100, 1);
```

```matlab
cumulative_returns1_tar = zeros(99, 1);
position_tar = zeros(100, 1);
% Perform the backtest
for i = 1:99
    % Check the forecast direction and determine the
position
    if target_forecast(i) == 1 % Forecast is up
        position_tar(i) = -1; % Long position
    elseif target_forecast(i) == 0 % Forecast is down
        position_tar(i) = 1; % Short position
    end

    % Calculate the return
    %ถ้าทำนายถูก
    if position_tar(i) == -1 % Long position
        returns_tar(i) = (price(i+1) - price(i)) / price(i);
    elseif position_tar(i) == 1 % Short position
        returns_tar(i) = (price(i) - price(i+1)) / price(i);
    end

    % Calculate the cumulative return
    if i == 1
        cumulative_returns1_tar(i) = returns_tar(i);
    else
        cumulative_returns1_tar(i) =
cumulative_returns1_tar(i-1) + returns_tar(i);
    end
end

% Write the results back to the Excel file
%writematrix(returns, fileName, 'Range', 'D1:D10');
writematrix(cumulative_returns1_tar,
fileName,'Sheet',my_sheet, 'Range', 'AC2023:AC2122');

disp('Backtest complete. Returns and cumulative returns have
been written to columns N.');


%%% Hit Ratio%%%%
```

```matlab
total_sum = sum(a);
hit_ratio = total_sum / 100;

writematrix(hit_ratio, fileName, 'Sheet', 'hit_ratio',
'Range', 'M2');

total_sum_di = sum(aa);
hit_ratio_di = total_sum_di / 100;

writematrix(hit_ratio_di, fileName, 'Sheet', 'hit_ratio',
'Range', 'N2');

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%window 10

m=2;
% Specify the file name and sheet name (if applicable)

clear p;
clear cc;
clear cc_crash_window10_eurusd_chinese6;
clear cc_crash_window10_u500_1day
clear pp_crash_window10_u500_1day
clear target2_crash_window10_u500_1day
clear cc_di_window10_u500_1day
clear pp_price_crash_window10_u500_1day
clear target2_price_crash_window10_u500_1day
clear price
clear total_sum
clear hit_ratio
clear total_sum_di
clear hit_ratio_di

%%%covid crash
price=readmatrix(fileName,'Sheet',my_sheet,'Range',
'D2:D2191');
```

```matlab
disp('Data has been successfully modified and written to
column B.');
   for i=1:100

[cc_crash_window10_u500_1day(i),pp_crash_window10_u500_1day(
i),target2_crash_window10_u500_1day(i)]=run_svm_forecast_ala
rm3(ret_eurusd(1:end_day-i),target_eurusd(1:end_day-
i+1),200,m);
   end
   d=flip(cc_crash_window10_u500_1day);
   e=flip(pp_crash_window10_u500_1day);
   f=flip(target2_crash_window10_u500_1day);
writematrix(d', fileName,'Sheet',my_sheet,'Range',
'O2023:O2122');
writematrix(e', fileName,'Sheet',my_sheet,'Range',
'P2023:P2122');
writematrix(f', fileName,'Sheet',my_sheet,'Range',
'Q2023:Q2122');
%%forcast direction
for i=1:100

[cc_di_window10_u500_1day(i),pp_price_crash_window10_u500_1d
ay(i),target2_price_crash_window10_u500_1day(i)]=run_svm_for
ecast_direction3(price(1:end_day-i),price(1:end_day-
i+1),200,m);
end
   dd=flip(cc_di_window10_u500_1day);
   ee=flip(pp_price_crash_window10_u500_1day);
   ff=flip(target2_price_crash_window10_u500_1day);
writematrix(dd', fileName,'Sheet',my_sheet,'Range',
'R2023:R2122');
writematrix(ee', fileName,'Sheet',my_sheet,'Range',
'S2023:S2122');
writematrix(ff', fileName,'Sheet',my_sheet,'Range',
'T2023:T2122');
 %%chinese crash, we need to sort the output from backward
order to forward order.
 %%start date of forecast 2121-100=2021
```

```matlab
  %%end date of forecast 2121    =2121

disp('Data has been successfully modified and written to
column B.');

  elapsedTime = toc;

% Convert the elapsed time from seconds to hours
elapsedTimeInHours = elapsedTime / 3600;
%per_form1_dax1day_window5=sum(cc_di_window5_u500_1day);
per_form2_dax1day_window10=sum(cc_crash_window10_u500_1day)
% Display the elapsed time in hours
%fprintf('Elapsed time: %.6f hours\n performance 1:=%2f
performance 2:=%2f  ', elapsedTimeInHours,
per_form1_dax1day_window5,per_form2_dax1day_window5);
toc;

%%%backtest
% Specify the file name and sheet name (if applicable)

% Read data from columns A (price), B (forecast direction),
and C (position)
price = readmatrix(fileName,'Sheet',my_sheet, 'Range',
'D2023:D2122');
forecast = readmatrix(fileName,'Sheet',my_sheet,'Range',
'S2023:S2122');
%position = readmatrix(fileName, 'Range', 'C1:C10');

% Initialize return and cumulative return arrays
returns = zeros(100, 1);
cumulative_returns2 = zeros(99, 1);
position = zeros(100, 1);
% Perform the backtest
for i = 1:99
    % Check the forecast direction and determine the
position
    if forecast(i) == 1 % Forecast is up
        position(i) = 1; % Long position
    elseif forecast(i) == 0 % Forecast is down
```

```matlab
        position(i) = -1; % Short position
    end

    % Calculate the return
    %ถ้าทำนายถูก
    if position(i) == 1 % Long position
        returns(i) = (price(i+1) - price(i)) / price(i);
    elseif position(i) == -1 % Short position
        returns(i) = (price(i) - price(i+1)) / price(i);
    end

    % Calculate the cumulative return
    if i == 1
        cumulative_returns2(i) = returns(i);
    else
        cumulative_returns2(i) = cumulative_returns2(i-1) +
returns(i);
    end
end

% Write the results back to the Excel file
%writematrix(returns, fileName, 'Range', 'D1:D10');
writematrix(cumulative_returns2, fileName,'Sheet',my_sheet,
'Range', 'U2023:U2122');

target_forecast =
readmatrix(fileName,'Sheet',my_sheet,'Range',
'P2023:P2122');
%position = readmatrix(fileName, 'Range', 'C1:C10');

% Initialize return and cumulative return arrays
returns_tar = zeros(100, 1);
cumulative_returns2_tar = zeros(99, 1);
position_tar = zeros(100, 1);
% Perform the backtest
for i = 1:99
    % Check the forecast direction and determine the
position
    if target_forecast(i) == 1 % Forecast is up
```

```matlab
        position_tar(i) = -1; % Long position
    elseif target_forecast(i) == 0 % Forecast is down
        position_tar(i) = 1; % Short position
    end

    % Calculate the return
    %ถ้าทำนายถูก
    if position_tar(i) == -1 % Long position
        returns_tar(i) = (price(i+1) - price(i)) / price(i);
    elseif position_tar(i) == 1 % Short position
        returns_tar(i) = (price(i) - price(i+1)) / price(i);
    end

    % Calculate the cumulative return
    if i == 1
        cumulative_returns2_tar(i) = returns_tar(i);
    else
        cumulative_returns2_tar(i) =
cumulative_returns1_tar(i-1) + returns_tar(i);
    end
end

% Write the results back to the Excel file
%writematrix(returns, fileName, 'Range', 'D1:D10');
writematrix(cumulative_returns2_tar,
fileName,'Sheet',my_sheet, 'Range', 'AD2023:AD2122');


disp('Backtest complete. Returns and cumulative returns have
been written to columns U.');



%%% Hit Ratio%%%%

total_sum = sum(d);
hit_ratio = total_sum / 100;
```

```matlab
writematrix(hit_ratio, fileName, 'Sheet', 'hit_ratio', ...
'Range', 'O2');

total_sum_di = sum(dd);
hit_ratio_di = total_sum_di / 100;

writematrix(hit_ratio_di, fileName, 'Sheet', 'hit_ratio', ...
'Range', 'P2');

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

%%window 30
clear p;
clear cc;
clear cc_crash_window30_eurusd_chinese6;
clear cc_crash_window30_u500_1day
clear pp_crash_window30_u500_1day
clear target2_crash_window30_u500_1day
clear cc_di_window30_u500_1day
clear pp_price_crash_window30_u500_1day
clear target2_price_crash_window30_u500_1day
clear price
clear total_sum
clear hit_ratio
clear total_sum_di
clear hit_ratio_di

m = 3;


%%%covid crash
price=readmatrix(fileName,'Sheet',my_sheet,'Range', ...
'D2:D2191');

disp('Data has been successfully modified and written to column B.');
    for i=1:100
```

```matlab
[cc_crash_window30_u500_1day(i),pp_crash_window30_u500_1day(
i),target2_crash_window30_u500_1day(i)]=run_svm_forecast_ala
rm3(ret_eurusd(1:end_day-i),target_eurusd(1:end_day-
i+1),200,m);
  end
  g=flip(cc_crash_window30_u500_1day);
  h=flip(pp_crash_window30_u500_1day);
  t=flip(target2_crash_window30_u500_1day);
writematrix(g', fileName,'Sheet',my_sheet,'Range',
'V2023:V2122');
writematrix(h', fileName,'Sheet',my_sheet,'Range',
'W2023:W2122');
writematrix(t', fileName,'Sheet',my_sheet,'Range',
'X2023:X2122');
%%forcast direction
for i=1:100

[cc_di_window30_u500_1day(i),pp_price_crash_window30_u500_1d
ay(i),target2_price_crash_window30_u500_1day(i)]=run_svm_for
ecast_direction3(price(1:end_day-i),price(1:end_day-
i+1),200,m);
end
  gg=flip(cc_di_window30_u500_1day);
  hh=flip(pp_price_crash_window30_u500_1day);
  tt=flip(target2_price_crash_window30_u500_1day);
writematrix(gg', fileName,'Sheet',my_sheet,'Range',
'Y2023:Y2122');
writematrix(hh', fileName,'Sheet',my_sheet,'Range',
'Z2023:Z2122');
writematrix(tt', fileName,'Sheet',my_sheet,'Range',
'AA2023:AA2122');

 %%chinese crash, we need to sort the output from backward
order to forward order.
 %%start date of forecast 2121-100=2021
 %%end date of forecast 2121   =2121
```

```matlab
    %%

disp('Data has been successfully modified and written to column B.');

  elapsedTime = toc;

% Convert the elapsed time from seconds to hours
elapsedTimeInHours = elapsedTime / 3600;
%per_form1_dax1day_window5=sum(cc_di_window5_u500_1day);
per_form2_dax1day_window30=sum(cc_crash_window30_u500_1day)
% Display the elapsed time in hours
%fprintf('Elapsed time: %.6f hours\n performance 1:=%2f
performance 2:=%2f  ', elapsedTimeInHours,
per_form1_dax1day_window5,per_form2_dax1day_window5);
toc;

%%%backtest
% Specify the file name and sheet name (if applicable)

% Read data from columns A (price), B (forecast direction),
and C (position)
price = readmatrix(fileName,'Sheet',my_sheet, 'Range',
'D2023:D2122');
forecast = readmatrix(fileName,'Sheet',my_sheet,'Range',
'Z2023:Z2122');
%position = readmatrix(fileName, 'Range', 'C1:C10');

% Initialize return and cumulative return arrays
returns = zeros(100, 1);
cumulative_returns3 = zeros(99, 1);
position = zeros(100, 1);
% Perform the backtest
for i = 1:99
    % Check the forecast direction and determine the
position
    if forecast(i) == 1 % Forecast is up
        position(i) = 1; % Long position
    elseif forecast(i) == 0 % Forecast is down
```

```matlab
        position(i) = -1; % Short position
    end

    % Calculate the return
    %ถ้าทำนายถูก
    if position(i) == 1 % Long position
        returns(i) = (price(i+1) - price(i)) / price(i);
    elseif position(i) == -1 % Short position
        returns(i) = (price(i) - price(i+1)) / price(i);
    end

    % Calculate the cumulative return
    if i == 1
        cumulative_returns3(i) = returns(i);
    else
        cumulative_returns3(i) = cumulative_returns3(i-1) +
returns(i);
    end
end

% Write the results back to the Excel file
%writematrix(returns, fileName, 'Range', 'D1:D10');
writematrix(cumulative_returns3, fileName,'Sheet',my_sheet,
'Range', 'AB2023:AB2122');

target_forecast =
readmatrix(fileName,'Sheet',my_sheet,'Range',
'W2023:W2122');
%position = readmatrix(fileName, 'Range', 'C1:C10');

% Initialize return and cumulative return arrays
returns_tar = zeros(100, 1);
cumulative_returns3_tar = zeros(99, 1);
position_tar = zeros(100, 1);
% Perform the backtest
for i = 1:99
    % Check the forecast direction and determine the
position
    if target_forecast(i) == 1 % Forecast is up
```

```matlab
        position_tar(i) = -1; % Long position
    elseif target_forecast(i) == 0 % Forecast is down
        position_tar(i) = 1; % Short position
    end

    % Calculate the return
    %ถ้าทำนายถูก
    if position_tar(i) == -1 % Long position
        returns_tar(i) = (price(i+1) - price(i)) / price(i);
    elseif position_tar(i) == 1 % Short position
        returns_tar(i) = (price(i) - price(i+1)) / price(i);
    end

    % Calculate the cumulative return
    if i == 1
        cumulative_returns3_tar(i) = returns_tar(i);
    else
        cumulative_returns3_tar(i) =
cumulative_returns3_tar(i-1) + returns_tar(i);
    end
end

% Write the results back to the Excel file
%writematrix(returns, fileName, 'Range', 'D1:D10');
writematrix(cumulative_returns3_tar,
fileName,'Sheet',my_sheet, 'Range', 'AE2023:AE2122');


disp('Backtest complete. Returns and cumulative returns have
been written to columns U.');



%%% Hit Ratio%%%%

total_sum = sum(g);
hit_ratio = total_sum / 100;
```

```matlab
writematrix(hit_ratio, fileName, 'Sheet', 'hit_ratio',
'Range', 'Q2');

total_sum_di = sum(gg);
hit_ratio_di = total_sum_di / 100;

writematrix(hit_ratio_di, fileName, 'Sheet', 'hit_ratio',
'Range', 'R2');


% Plotting the cumulative returns
plot(cumulative_returns1, 'DisplayName', 'Window Size = 5',
'LineWidth', 1 , 'Color', 'r');
hold on;
plot(cumulative_returns2, 'DisplayName', 'Window Size = 10',
'LineWidth', 1 , 'Color', 'b');
plot(cumulative_returns3, 'DisplayName', 'Window Size = 30',
'LineWidth', 1 , 'Color', 'g');

% Adding labels and title
xlabel('Time','FontSize', 14); % Label for x-axis
ylabel('Cumulative Returns','FontSize', 14); % Label for y-
axis
title('Cumulative Returns (Direction) in China
Crash','FontSize', 14); % Title of the plot

% Adding a legend to identify the curves
legend('show', 'Location', 'southwest','FontSize', 4.5);

% Saving the plot as an image file
exportgraphics(gcf,
'BacktestRun_U500_1Day_China_chart_DI.jpg', 'Resolution',
300); % Set resolution to 300 DPI

clf;
% Plotting the second set of cumulative returns

plot(cumulative_returns1_tar, 'DisplayName', 'Window Size =
5', 'LineWidth', 1 , 'Color', 'r');
```

```matlab
hold on;
plot(cumulative_returns2_tar, 'DisplayName', 'Window Size =
10', 'LineWidth', 1 , 'Color', 'b');
plot(cumulative_returns3_tar, 'DisplayName', 'Window Size =
30', 'LineWidth', 1 , 'Color', 'g');

% Adding labels and title for the second plot
xlabel('Time','FontSize', 14); % Label for x-axis
ylabel('Cumulative Returns','FontSize', 14); % Label for y-
axis
title('Cumulative Returns (Crash Indicator) in China
Crash','FontSize', 14); % Title of the plot

% Adding a legend to identify the curves
legend('show', 'Location', 'Northwest','FontSize', 4.5);

% Saving the second plot as an image file
%saveas(gcf, 'cumulative_returns_comparison_target.jpg');
exportgraphics(gcf,
'BacktestRun_U500_1Day_China_chart_CI.jpg', 'Resolution',
300); % Set resolution to 300 DPI



save run_u500_1day_svm_EF1_1_3_Piw
```

คะแนนการประเมินคุณภาพของงานและความถูกต้องของผลการรันของ RA

Name: Pee

Task: ให้ไปรัน SVM one day 3 crash U30

Duration: 8 สิงหาคม (1 วันทำการ) คะแนนรวม 9.5

0626	2014	33738.219	0.000739471	1	0																					
0627	2015	33861.259	0.003646903	1	0																					
0628	2016	33852.709	-0.000252501	0	0																					
0629	2017	34080.999	0.006743626	1	0																					
0630	2018	34335.729	0.007474253	1	0																					
0701	2019	34377.789	0.001224963	1	0																					
0703	2020	34450.279	0.002108629	1	0																					
0704	2021	34422.249	-0.000813636	0	0	Pe Fo	Pe Fo	Back test (Profit)Wi	Pe Fo	Pe Fo	Back test (Profit)Wi	Pe Fo	Pe Fo	Back test (Profit)Wi	Back test (Target)W	Back test (Target)W										
0705	2022	34331.499	-0.002636376	0	0	1 0 0	1 0 0	0.014513494	1 0 0	1 0 0	0.014513494	1 0 0	1 0 0	0.014513494	0.014513494	0.014513494										
0706	2023	33833.229	-0.014513494	0	1	1 0 0	0 1 0	0.015962956	1 0 0	1 0 0	0.013064031	1 0 0	1 0 0	0.015962956	0.013064031	0.013064031										
0707	2024	33882.269	0.001449463	1	0	1 0 0	0 1 0	0.012540222	1 0 0	0 1 0	0.009641297	1 0 0	0 1 0	0.012540222	0.016486765	0.016486765										
0708	2025	33766.299	-0.003422734	0	0	1 0 0	0 1 0	0.015396324	1 0 0	0 1 0	0.012497399	1 0 0	0 1 0	0.015396324	0.013630663	0.013630663										
0710	2026	33862.739	0.002856102	1	0	1 0 0	0 0 1	0.00656656	1 0 0	0 0 1	0.003667635	1 0 0	0 0 1	0.00656656	0.004800899	0.004800899										
0711	2027	34161.739	0.008829764	1	0	1 0 0	1 0 0	-0.000709416	1 0 0	0 1 0	0.010943611	1 0 0	1 0 0	-0.000709416	-0.002475077	-0.002475077										
0712	2028	34410.299	0.007275976	1	0	1 0 0	1 0 0	-0.000270884	1 0 0	1 0 0	0.011382143	1 0 0	1 0 0	-0.000270884	-0.002036546	-0.0020365										
0713	2029	34395.209	-0.000438531	0	0	1 0 0	0 1 0	-0.003846964	1 0 0	0 1 0	0.014958222	1 0 0	0 1 0	-0.003846964	-0.005612625	-0.005612625										
0714	2030	34518.209	0.003576079	1	0	1 0 0	1 0 0	-0.003007697	1 0 0	1 0 0	0.015797489	1 0 0	1 0 0	-0.003007697	-0.004773358	-0.004773358										
0715	2031	34489.239	-0.000839267	0	0	1 0 0	1 1 1	-4.93827E-05	1 0 0	0 0 1	0.012839175	1 0 0	1 1 1	-4.93827E-05	-0.007731672	-0.007731672										

มีหัวตารางถูก

หัวข้อตรวจสอบความถูกต้อง	คะแนน	หมายเหตุ
1) Preprocessing EF1.1.2 วันที่ของ Covid crashEF1.2.2 Chinese crash EF.1.4.2 Ukrain crash EF1.3.2 ตรงกันทั้งสามคน	1	
2) EF1.6.2 Backtest ถูก	0.5	ถูกที่ direction แต่ market crash ไม่ถูก
3) EF1.5.2 มีการคำนวน ค่า hit ratio และ cumulative return ค่าสุดท้าย	1	
4) ชื่อตัวแปรชื่อ mat file	1	

ชื่อ excel file ถูกต้อง		
5) ผลการรันถูกต้องตรง ช่องหัวข้อมีชื่อ column และมีการ ตกแต่งตารางหรือเอา ไปไว้ใน sheet ใหม่ เพื่อค้นหาได้ง่าย	1	
6) มีการใช้คำสั่ง matlab วาดกราฟ save graph ได้ถูก ขนาด fonts และมี ligand	1	
7) ผลการคำนวน ครบถ้วนถูกต้องตาม ต้องการ	1	
8) ชื่อตัวแปรมีคำว่า covid หรือ สื่อ ความหมายครบถ้วน ทุกตัว	1	
9) งานมีคุณภาพของการ ใช้ function matlab มากเป็น พิเศษเหนืองานที่	1	

มอบหมายให้ (high quality work)		
10)ส่งงานได้ครบถ้วนและ ตรงเวลา		

```matlab
%%u30 30 min SVM stau500rt date:30/7/2567
%%EF1.1.3
%%forecast and do backtest


% Covid
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%window5
tic;
m=1;
% Specify the file name and sheet name (if applicable)
fileName = 'u30_1day_backtest_EF1_1_2_Pee.xlsx';
my_sheet = 'back_test';
%%change excel name and market crash at data number..
end_day=2190;
function [YY,HRT,ret]=gen_market_crash_indicator2(threshold)
    % prices: Input array of stock prices
    fileName = 'u30_1day_backtest_EF1_1_2_Pee.xlsx';
    my_sheet = 'back_test';
    % Read data from column A (range A1:A100) of the Excel
file
    prices = readmatrix(fileName,'Sheet',my_sheet,'Range',
'D2:D2191');
    % Parameters
    window_size = 500; % 10 years of monthly data
    percentile_threshold = threshold; % 5th percentile
```

```matlab
    %reset=zeros(1,window_size);
    % Calculate monthly returns
    returns = diff(prices) ./ prices(1:end-1);
    %returns = [reset'; returns(window_size+1:end)]; %
Adding a zero for the first return value to keep indices
consistent
    returns=[0;returns];
    ret=returns;

    %%write return to excel file
    writematrix(ret, fileName,'Sheet',my_sheet,'Range',
'E2:E2191');
    n = length(returns);
    crash_index = zeros(n, 1); % Initialize crash index

    % Calculate the historical return-based threshold (HRT)
    HRT = zeros(n, 1); % Initialize HRT array

    for t = window_size+1:n
        historical_returns = returns(t-window_size:t-1);
        HRT(t) = prctile(historical_returns,
percentile_threshold);
    end

    % Calculate crash index based on HRT
    for t = window_size+2:n
        if returns(t) - HRT(t) < 0
            crash_index(t) = 1;
        else
            crash_index(t) = 0;
        end
    end
    YY=crash_index;
    %%write return to excel file
    writematrix(YY, fileName,'Sheet',my_sheet,'Range',
'G2:G2191');
    % Prepare the data for SVM
    X = returns(window_size+2:end-1); % Features (returns)
```

```matlab
    Y = crash_index(window_size+2:end-1); % Labels (crash
index)

    % Split the data into training and testing sets
    train_ratio = 0.8;
    train_size = floor(train_ratio * length(X));

    X_train = X(1:train_size);
    Y_train = Y(1:train_size);
    X_test = X(train_size+1:end);
    Y_test = Y(train_size+1:end);



end


[target_u30_1day_covid_Pee,HRT,returns_u30_1day_covid_Pee]=g
en_market_crash_indicator2(10)

n = size(returns_u30_1day_covid_Pee);
l = n(1);
for i=1:l
    direction(i) = sign(returns_u30_1day_covid_Pee(i));
    if direction(i)==-1
        direction(i)=0;
    end
end

writematrix(direction', fileName,'Sheet',my_sheet,'Range',
'F2:F2191');

clear p;
clear cc;
clear cc_crash_window5_eurusd_chinese6;
clear target_eurusd;
clear ret_eurusd;
clear data;
clear target;
```

```matlab
clear cc_crash_window5_u30_1day
clear pp_crash_window5_u30_1day
clear target2_crash_window5_u30_1day
clear cc_di_window5_u30_1day
clear pp_price_crash_window5_u30_1day
clear target2_price_crash_window5_u30_1day

%%target =138691+1 since one day ahead!
% Read data from column A (range A1:A100) of the Excel file
%% data is return E
data = readmatrix(fileName,'Sheet',my_sheet,'Range',
'E2:E2191');
%% price is closed D
price=readmatrix(fileName,'Sheet',my_sheet,'Range',
'D2:D2191');
%% target is market cash
target=readmatrix(fileName,'Sheet',my_sheet,'Range',
'G2:G2191');
% Send read data to forecast module
ret_eurusd = data;
target_eurusd=target;

%%%covid crash
% disp('Data has been successfully modified and written to
column B.');
   for i=1:100

[cc_crash_window5_u30_1day(i),pp_crash_window5_u30_1day(i),t
arget2_crash_window5_u30_1day(i)]=run_svm_forecast_alarm3(re
t_eurusd(1:end_day-i),target_eurusd(1:end_day-i+1),200,m);
   end
  a=flip(cc_crash_window5_u30_1day);
  b=flip(pp_crash_window5_u30_1day);
  c=flip(target2_crash_window5_u30_1day);

writematrix(a', fileName,'Sheet',my_sheet,'Range',
'H905:H1004');
writematrix(b', fileName,'Sheet',my_sheet,'Range',
'I905:I1004');
```

```matlab
writematrix(c', fileName,'Sheet',my_sheet,'Range',
'J905:J1004');
%%forcast direction
for i=1:100

[cc_di_window5_u30_1day(i),pp_price_crash_window5_u30_1day(i
),target2_price_crash_window5_u30_1day(i)]=run_svm_forecast_
direction3(price(1:end_day-i),price(1:end_day-i+1),200,m);
end
 % price
   aa=flip(cc_di_window5_u30_1day);
   bb=flip(pp_price_crash_window5_u30_1day);
   cc=flip(target2_price_crash_window5_u30_1day);
writematrix(aa', fileName,'Sheet',my_sheet,'Range',
'K905:K1004');
writematrix(bb', fileName,'Sheet',my_sheet,'Range',
'L905:L1004');
writematrix(cc', fileName,'Sheet',my_sheet,'Range',
'M905:M1004');
 %%chinese crash, we need to sort the output from backward
order to forward order.
 %%start date of forecast 2121-100=2021
 %%end date of forecast 2121    =2121


    %%%

disp('Data has been successfully modified and written to
column B.');
  % Write the modified data to column B (range B1:B100) of
the same Excel file

 elapsedTime = toc;

% Convert the elapsed time from seconds to hours
elapsedTimeInHours = elapsedTime / 3600;
%per_form1_dax1day_window5=sum(cc_di_window5_u30_1day);
per_form2_dax1day_window5=sum(cc_crash_window5_u30_1day)
% Display the elapsed time in hours
```

```matlab
%fprintf('Elapsed time: %.6f hours\n performance 1:=%2f
performance 2:=%2f  ', elapsedTimeInHours,
per_form1_dax1day_window5,per_form2_dax1day_window5);
toc;

%%%backtest%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
% Specify the file name and sheet name (if applicable)
%fileName = 'test5.xlsx';

% Read data from columns A (price), B (forecast direction),
and C (position)
price = readmatrix(fileName,'Sheet',my_sheet, 'Range',
'D905:D1004');
forecast = readmatrix(fileName,'Sheet',my_sheet,'Range',
'L905:L1004');
%position = readmatrix(fileName, 'Range', 'C1:C10');

% Initialize return and cumulative return arrays
returns = zeros(100, 1);
cumulative_returns1 = zeros(99, 1);
position = zeros(100, 1);
% Perform the backtest
for i = 1:99
    % Check the forecast direction and determine the
position
    if forecast(i) == 1 % Forecast is up
        position(i) = 1; % Long position
    elseif forecast(i) == 0 % Forecast is down
        position(i) = -1; % Short position
    end

    % Calculate the return
    %ถ้าทำนายถูก
    if position(i) == 1 % Long position
        returns(i) = (price(i+1) - price(i)) / price(i);
    elseif position(i) == -1 % Short position
        returns(i) = (price(i) - price(i+1)) / price(i);
    end
```

```matlab
    % Calculate the cumulative return
    if i == 1
        cumulative_returns1(i) = returns(i);
    else
        cumulative_returns1(i) = cumulative_returns1(i-1) +
returns(i);
    end
end

writematrix(cumulative_returns1, fileName,'Sheet',my_sheet,
'Range', 'N905:N1004');

target_forecast =
readmatrix(fileName,'Sheet',my_sheet,'Range', 'I905:I1004');
%position = readmatrix(fileName, 'Range', 'C1:C10');

% Initialize return and cumulative return arrays
returns_tar = zeros(100, 1);
cumulative_returns1_tar = zeros(99, 1);
position_tar = zeros(100, 1);
% Perform the backtest
for i = 1:99
    % Check the forecast direction and determine the
position
    if target_forecast(i) == 1 % Forecast is up
        position_tar(i) = -1; % Long position
    elseif target_forecast(i) == 0 % Forecast is down
        position_tar(i) = 1; % Short position
    end

    % Calculate the return
    %ถ้าทำนายถูก
    if position_tar(i) == -1 % Long position
        returns_tar(i) = (price(i+1) - price(i)) / price(i);
    elseif position_tar(i) == 1 % Short position
        returns_tar(i) = (price(i) - price(i+1)) / price(i);
    end

    % Calculate the cumulative return
```

```matlab
    if i == 1
        cumulative_returns1_tar(i) = returns_tar(i);
    else
        cumulative_returns1_tar(i) =
cumulative_returns1_tar(i-1) + returns_tar(i);
    end
end

% Write the results back to the Excel file
%writematrix(returns, fileName, 'Range', 'D1:D10');
writematrix(cumulative_returns1_tar,
fileName,'Sheet',my_sheet, 'Range', 'AC905:AC1004');

disp('Backtest complete. Returns and cumulative returns have
been written to columns N.');

%%% Hit Ratio%%%%

total_sum = sum(a);
hit_ratio = total_sum / 100;

writematrix(hit_ratio, fileName, 'Sheet', 'hit_ratio',
'Range', 'A2');

total_sum_di = sum(aa);
hit_ratio_di = total_sum_di / 100;

writematrix(hit_ratio_di, fileName, 'Sheet', 'hit_ratio',
'Range', 'B2');

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%window 10

m=2;
% Specify the file name and sheet name (if applicable)

clear p;
```

```matlab
clear cc;
clear cc_crash_window10_eurusd_chinese6;
clear cc_crash_window10_u30_1day
clear pp_crash_window10_u30_1day
clear target2_crash_window10_u30_1day
clear cc_di_window10_u30_1day
clear pp_price_crash_window10_u30_1day
clear target2_price_crash_window10_u30_1day
clear price
clear total_sum
clear hit_ratio
clear total_sum_di
clear hit_ratio_di

%%%covid crash
price=readmatrix(fileName,'Sheet',my_sheet,'Range',
'D2:D2191');

disp('Data has been successfully modified and written to
column B.');
  for i=1:100

[cc_crash_window10_u30_1day(i),pp_crash_window10_u30_1day(i)
,target2_crash_window10_u30_1day(i)]=run_svm_forecast_alarm3
(ret_eurusd(1:end_day-i),target_eurusd(1:end_day-
i+1),200,m);
  end
  d=flip(cc_crash_window10_u30_1day);
  e=flip(pp_crash_window10_u30_1day);
  f=flip(target2_crash_window10_u30_1day);
writematrix(d', fileName,'Sheet',my_sheet,'Range',
'O905:O1004');
writematrix(e', fileName,'Sheet',my_sheet,'Range',
'P905:P1004');
writematrix(f', fileName,'Sheet',my_sheet,'Range',
'Q905:Q1004');
%%forcast direction
for i=1:100
```

```matlab
[cc_di_window10_u30_1day(i),pp_price_crash_window10_u30_1day
(i),target2_price_crash_window10_u30_1day(i)]=run_svm_foreca
st_direction3(price(1:end_day-i),price(1:end_day-
i+1),200,m);
end
  dd=flip(cc_di_window10_u30_1day);
  ee=flip(pp_price_crash_window10_u30_1day);
  ff=flip(target2_price_crash_window10_u30_1day);
writematrix(dd', fileName,'Sheet',my_sheet,'Range',
'R905:R1004');
writematrix(ee', fileName,'Sheet',my_sheet,'Range',
'S905:S1004');
writematrix(ff', fileName,'Sheet',my_sheet,'Range',
'T905:T1004');
 %%chinese crash, we need to sort the output from backward
order to forward order.
 %%start date of forecast 2121-100=2021
 %%end date of forecast 2121    =2121

disp('Data has been successfully modified and written to
column B.');

 elapsedTime = toc;

% Convert the elapsed time from seconds to hours
elapsedTimeInHours = elapsedTime / 3600;
%per_form1_dax1day_window5=sum(cc_di_window5_u30_1day);
per_form2_dax1day_window10=sum(cc_crash_window10_u30_1day)
% Display the elapsed time in hours
%fprintf('Elapsed time: %.6f hours\n performance 1:=%2f
performance 2:=%2f  ', elapsedTimeInHours,
per_form1_dax1day_window5,per_form2_dax1day_window5);
toc;

%%%backtest
% Specify the file name and sheet name (if applicable)
```

```matlab
% Read data from columns A (price), B (forecast direction),
and C (position)
price = readmatrix(fileName,'Sheet',my_sheet, 'Range',
'D905:D1004');
forecast = readmatrix(fileName,'Sheet',my_sheet,'Range',
'S905:S1004');
%position = readmatrix(fileName, 'Range', 'C1:C10');

% Initialize return and cumulative return arrays
returns = zeros(100, 1);
cumulative_returns2 = zeros(99, 1);
position = zeros(100, 1);
% Perform the backtest
for i = 1:99
    % Check the forecast direction and determine the
position
    if forecast(i) == 1 % Forecast is up
        position(i) = 1; % Long position
    elseif forecast(i) == 0 % Forecast is down
        position(i) = -1; % Short position
    end

    % Calculate the return
    %ถ้าทำนายถูก
    if position(i) == 1 % Long position
        returns(i) = (price(i+1) - price(i)) / price(i);
    elseif position(i) == -1 % Short position
        returns(i) = (price(i) - price(i+1)) / price(i);
    end

    % Calculate the cumulative return
    if i == 1
        cumulative_returns2(i) = returns(i);
    else
        cumulative_returns2(i) = cumulative_returns2(i-1) +
returns(i);
    end
end
```

```matlab
% Write the results back to the Excel file
%writematrix(returns, fileName, 'Range', 'D1:D10');
writematrix(cumulative_returns2, fileName,'Sheet',my_sheet,
'Range', 'U905:U1004');

target_forecast =
readmatrix(fileName,'Sheet',my_sheet,'Range', 'P905:P1004');
%position = readmatrix(fileName, 'Range', 'C1:C10');

% Initialize return and cumulative return arrays
returns_tar = zeros(100, 1);
cumulative_returns2_tar = zeros(99, 1);
position_tar = zeros(100, 1);
% Perform the backtest
for i = 1:99
    % Check the forecast direction and determine the
position
    if target_forecast(i) == 1 % Forecast is up
        position_tar(i) = -1; % Long position
    elseif target_forecast(i) == 0 % Forecast is down
        position_tar(i) = 1; % Short position
    end

    % Calculate the return
    %ถ้าทำนายถูก
    if position_tar(i) == -1 % Long position
        returns_tar(i) = (price(i+1) - price(i)) / price(i);
    elseif position_tar(i) == 1 % Short position
        returns_tar(i) = (price(i) - price(i+1)) / price(i);
    end

    % Calculate the cumulative return
    if i == 1
        cumulative_returns2_tar(i) = returns_tar(i);
    else
        cumulative_returns2_tar(i) =
cumulative_returns1_tar(i-1) + returns_tar(i);
    end
end
```

```matlab
% Write the results back to the Excel file
%writematrix(returns, fileName, 'Range', 'D1:D10');
writematrix(cumulative_returns2_tar,
fileName,'Sheet',my_sheet, 'Range', 'AD905:AD1004');


disp('Backtest complete. Returns and cumulative returns have
been written to columns U.');

%%% Hit Ratio%%%%

total_sum = sum(d);
hit_ratio = total_sum / 100;

writematrix(hit_ratio, fileName, 'Sheet', 'hit_ratio',
'Range', 'C2');

total_sum_di = sum(dd);
hit_ratio_di = total_sum_di / 100;

writematrix(hit_ratio_di, fileName, 'Sheet', 'hit_ratio',
'Range', 'D2');

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

%%window 30
clear p;
clear cc;
clear cc_crash_window30_eurusd_chinese6;
clear cc_crash_window30_u30_1day
clear pp_crash_window30_u30_1day
clear target2_crash_window30_u30_1day
clear cc_di_window30_u30_1day
clear pp_price_crash_window30_u30_1day
clear target2_price_crash_window30_u30_1day
clear price
```

```matlab
clear total_sum
clear hit_ratio
clear total_sum_di
clear hit_ratio_di

m = 3;


%%%covid crash
price=readmatrix(fileName,'Sheet',my_sheet,'Range',
'D2:D2191');

disp('Data has been successfully modified and written to
column B.');
   for i=1:100

[cc_crash_window30_u30_1day(i),pp_crash_window30_u30_1day(i)
,target2_crash_window30_u30_1day(i)]=run_svm_forecast_alarm3
(ret_eurusd(1:end_day-i),target_eurusd(1:end_day-
i+1),200,m);
   end
   g=flip(cc_crash_window30_u30_1day);
   h=flip(pp_crash_window30_u30_1day);
   t=flip(target2_crash_window30_u30_1day);
writematrix(g', fileName,'Sheet',my_sheet,'Range',
'V905:V1004');
writematrix(h', fileName,'Sheet',my_sheet,'Range',
'W905:W1004');
writematrix(t', fileName,'Sheet',my_sheet,'Range',
'X905:X1004');
%%forcast direction
for i=1:100

[cc_di_window30_u30_1day(i),pp_price_crash_window30_u30_1day
(i),target2_price_crash_window30_u30_1day(i)]=run_svm_foreca
st_direction3(price(1:end_day-i),price(1:end_day-
i+1),200,m);
end
   gg=flip(cc_di_window30_u30_1day);
```

```matlab
    hh=flip(pp_price_crash_window30_u30_1day);
    tt=flip(target2_price_crash_window30_u30_1day);
writematrix(gg', fileName,'Sheet',my_sheet,'Range',
'Y905:Y1004');
writematrix(hh', fileName,'Sheet',my_sheet,'Range',
'Z905:Z1004');
writematrix(tt', fileName,'Sheet',my_sheet,'Range',
'AA905:AA1004');

 %%chinese crash, we need to sort the output from backward
order to forward order.
 %%start date of forecast 2121-100=2021
 %%end date of forecast 2121    =2121


   %%

disp('Data has been successfully modified and written to
column B.');

 elapsedTime = toc;

% Convert the elapsed time from seconds to hours
elapsedTimeInHours = elapsedTime / 3600;
%per_form1_dax1day_window5=sum(cc_di_window5_u30_1day);
per_form2_dax1day_window30=sum(cc_crash_window30_u30_1day)
% Display the elapsed time in hours
%fprintf('Elapsed time: %.6f hours\n performance 1:=%2f
performance 2:=%2f  ', elapsedTimeInHours,
per_form1_dax1day_window5,per_form2_dax1day_window5);
toc;

%%%backtest
% Specify the file name and sheet name (if applicable)

% Read data from columns A (price), B (forecast direction),
and C (position)
price = readmatrix(fileName,'Sheet',my_sheet, 'Range',
'D905:D1004');
```

```matlab
forecast = readmatrix(fileName,'Sheet',my_sheet,'Range',
'Z905:Z1004');
%position = readmatrix(fileName, 'Range', 'C1:C10');

% Initialize return and cumulative return arrays
returns = zeros(100, 1);
cumulative_returns3 = zeros(99, 1);
position = zeros(100, 1);
% Perform the backtest
for i = 1:99
    % Check the forecast direction and determine the
position
    if forecast(i) == 1 % Forecast is up
        position(i) = 1; % Long position
    elseif forecast(i) == 0 % Forecast is down
        position(i) = -1; % Short position
    end

    % Calculate the return
    %ถ้าทำนายถูก
    if position(i) == 1 % Long position
        returns(i) = (price(i+1) - price(i)) / price(i);
    elseif position(i) == -1 % Short position
        returns(i) = (price(i) - price(i+1)) / price(i);
    end

    % Calculate the cumulative return
    if i == 1
        cumulative_returns3(i) = returns(i);
    else
        cumulative_returns3(i) = cumulative_returns3(i-1) +
returns(i);
    end
end

% Write the results back to the Excel file
%writematrix(returns, fileName, 'Range', 'D1:D10');
writematrix(cumulative_returns3, fileName,'Sheet',my_sheet,
'Range', 'AB905:AB1004');
```

```matlab
target_forecast =
readmatrix(fileName,'Sheet',my_sheet,'Range', 'W905:W1004');
%position = readmatrix(fileName, 'Range', 'C1:C10');

% Initialize return and cumulative return arrays
returns_tar = zeros(100, 1);
cumulative_returns3_tar = zeros(99, 1);
position_tar = zeros(100, 1);
% Perform the backtest
for i = 1:99
    % Check the forecast direction and determine the
position
    if target_forecast(i) == 1 % Forecast is up
        position_tar(i) = -1; % Long position
    elseif target_forecast(i) == 0 % Forecast is down
        position_tar(i) = 1; % Short position
    end

    % Calculate the return
    %ถ้าทำนายถูก
    if position_tar(i) == -1 % Long position
        returns_tar(i) = (price(i+1) - price(i)) / price(i);
    elseif position_tar(i) == 1 % Short position
        returns_tar(i) = (price(i) - price(i+1)) / price(i);
    end

    % Calculate the cumulative return
    if i == 1
        cumulative_returns3_tar(i) = returns_tar(i);
    else
        cumulative_returns3_tar(i) =
cumulative_returns3_tar(i-1) + returns_tar(i);
    end
end

% Write the results back to the Excel file
%writematrix(returns, fileName, 'Range', 'D1:D10');
```

```matlab
writematrix(cumulative_returns3_tar,
fileName,'Sheet',my_sheet, 'Range', 'AE905:AE1004');


disp('Backtest complete. Returns and cumulative returns have
been written to columns U.');

%%% Hit Ratio%%%%

total_sum = sum(g);
hit_ratio = total_sum / 100;

writematrix(hit_ratio, fileName, 'Sheet', 'hit_ratio',
'Range', 'E2');

total_sum_di = sum(gg);
hit_ratio_di = total_sum_di / 100;

writematrix(hit_ratio_di, fileName, 'Sheet', 'hit_ratio',
'Range', 'F2');


clf;

% Plotting the cumulative returns
plot(cumulative_returns1, 'DisplayName', 'Window Size = 5',
'LineWidth', 1 , 'Color', 'r');
hold on;
plot(cumulative_returns2, 'DisplayName', 'Window Size = 10',
'LineWidth', 1 , 'Color', 'b');
hold on;
plot(cumulative_returns3, 'DisplayName', 'Window Size = 30',
'LineWidth', 1 , 'Color', 'g');

% Adding labels and title
xlabel('Time','FontSize', 14); % Label for x-axis
ylabel('Cumulative Returns','FontSize', 14); % Label for y-
axis
```

```matlab
title('Cumulative Returns (Direction) in Covid
Crash','FontSize', 14); % Title of the plot

% Adding a legend to identify the curves
%legend('show', 'Location', 'southwest','FontSize', 8);

% Saving the plot as an image file
exportgraphics(gcf,
'BacktestRun_u30_1Day_Covid_chart_DI.jpg', 'Resolution',
300); % Set resolution to 300 DPI

clf;
% Plotting the second set of cumulative returns

plot(cumulative_returns1_tar, 'DisplayName', 'Window Size =
5', 'LineWidth', 1 , 'Color', 'r');
hold on;
plot(cumulative_returns2_tar, 'DisplayName', 'Window Size =
10', 'LineWidth', 1 , 'Color', 'b');
hold on;
plot(cumulative_returns3_tar, 'DisplayName', 'Window Size =
30', 'LineWidth', 1 , 'Color', 'g');

% Adding labels and title for the second plot
xlabel('Time','FontSize', 14); % Label for x-axis
ylabel('Cumulative Returns','FontSize', 14); % Label for y-
axis
title('Cumulative Returns (Crash Indicator) in Covid
Crash','FontSize', 14); % Title of the plot

% Adding a legend to identify the curves
%legend('show', 'Location', 'Northwest','FontSize', 8);

% Saving the second plot as an image file
%saveas(gcf, 'cumulative_returns_comparison_target.jpg');
exportgraphics(gcf,
'BacktestRun_u30_1Day_Covid_chart_CI.jpg', 'Resolution',
300); % Set resolution to 300 DPI
```

```matlab
clf;

% Ukraine
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%window5



clear p;
clear cc;
clear cc_crash_window5_eurusd_chinese6;
clear target_eurusd;
clear ret_eurusd;
clear data;
clear target;
clear cc_crash_window5_u30_1day
clear pp_crash_window5_u30_1day
clear target2_crash_window5_u30_1day
clear cc_di_window5_u30_1day
clear pp_price_crash_window5_u30_1day
clear target2_price_crash_window5_u30_1day
clear cumulative_returns1
clear cumulative_returns2
clear cumulative_returns3
clear cumulative_returns1_tar
clear cumulative_returns2_tar
clear cumulative_returns3_tar
clear total_sum
clear hit_ratio
clear total_sum_di
clear hit_ratio_di

%%target =138691+1 since one day ahead!
```

```matlab
% Read data from column A (range A1:A100) of the Excel file
%% data is return E
data = readmatrix(fileName,'Sheet',my_sheet,'Range',
'E2:E2191');
%% price is closed D
price=readmatrix(fileName,'Sheet',my_sheet,'Range',
'D2:D2191');
%% target is market cash
target=readmatrix(fileName,'Sheet',my_sheet,'Range',
'G2:G2191');
% Send read data to forecast module
ret_eurusd = data;
target_eurusd=target;

%%%covid crash
% disp('Data has been successfully modified and written to
column B.');
    for i=1:100

[cc_crash_window5_u30_1day(i),pp_crash_window5_u30_1day(i),t
arget2_crash_window5_u30_1day(i)]=run_svm_forecast_alarm3(re
t_eurusd(1:end_day-i),target_eurusd(1:end_day-i+1),200,m);
    end
    a=flip(cc_crash_window5_u30_1day);
    b=flip(pp_crash_window5_u30_1day);
    c=flip(target2_crash_window5_u30_1day);

writematrix(a', fileName,'Sheet',my_sheet,'Range',
'H1503:H1602');
writematrix(b', fileName,'Sheet',my_sheet,'Range',
'I1503:I1602');
writematrix(c', fileName,'Sheet',my_sheet,'Range',
'J1503:J1602');
%%forcast direction
for i=1:100

[cc_di_window5_u30_1day(i),pp_price_crash_window5_u30_1day(i
),target2_price_crash_window5_u30_1day(i)]=run_svm_forecast_
direction3(price(1:end_day-i),price(1:end_day-i+1),200,m);
```

```matlab
end
 % price
   aa=flip(cc_di_window5_u30_1day);
   bb=flip(pp_price_crash_window5_u30_1day);
   cc=flip(target2_price_crash_window5_u30_1day);
writematrix(aa', fileName,'Sheet',my_sheet,'Range',
'K1503:K1602');
writematrix(bb', fileName,'Sheet',my_sheet,'Range',
'L1503:L1602');
writematrix(cc', fileName,'Sheet',my_sheet,'Range',
'M1503:M1602');
 %%chinese crash, we need to sort the output from backward
order to forward order.
 %%start date of forecast 2121-100=2021
 %%end date of forecast 2121    =2121


  %%

disp('Data has been successfully modified and written to
column B.');
  % Write the modified data to column B (range B1:B100) of
the same Excel file

 elapsedTime = toc;

% Convert the elapsed time from seconds to hours
elapsedTimeInHours = elapsedTime / 3600;
%per_form1_dax1day_window5=sum(cc_di_window5_u30_1day);
per_form2_dax1day_window5=sum(cc_crash_window5_u30_1day)
% Display the elapsed time in hours
%fprintf('Elapsed time: %.6f hours\n performance 1:=%2f
performance 2:=%2f  ', elapsedTimeInHours,
per_form1_dax1day_window5,per_form2_dax1day_window5);
toc;

%%%backtest%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
% Specify the file name and sheet name (if applicable)
%fileName = 'test5.xlsx';
```

```matlab
% Read data from columns A (price), B (forecast direction),
and C (position)
price = readmatrix(fileName,'Sheet',my_sheet, 'Range',
'D1503:D1602');
forecast = readmatrix(fileName,'Sheet',my_sheet,'Range',
'L1503:L11602');
%position = readmatrix(fileName, 'Range', 'C1:C10');

% Initialize return and cumulative return arrays
returns = zeros(100, 1);
cumulative_returns1 = zeros(99, 1);
position = zeros(100, 1);
% Perform the backtest
for i = 1:99
    % Check the forecast direction and determine the
position
    if forecast(i) == 1 % Forecast is up
        position(i) = 1; % Long position
    elseif forecast(i) == 0 % Forecast is down
        position(i) = -1; % Short position
    end

    % Calculate the return
    %ถ้าทำนายถูก
    if position(i) == 1 % Long position
        returns(i) = (price(i+1) - price(i)) / price(i);
    elseif position(i) == -1 % Short position
        returns(i) = (price(i) - price(i+1)) / price(i);
    end

    % Calculate the cumulative return
    if i == 1
        cumulative_returns1(i) = returns(i);
    else
        cumulative_returns1(i) = cumulative_returns1(i-1) +
returns(i);
    end
end
```

```matlab
writematrix(cumulative_returns1, fileName,'Sheet',my_sheet,
'Range', 'N1503:N1602');

target_forecast =
readmatrix(fileName,'Sheet',my_sheet,'Range',
'I1503:I1602');
%position = readmatrix(fileName, 'Range', 'C1:C10');

% Initialize return and cumulative return arrays
returns_tar = zeros(100, 1);
cumulative_returns1_tar = zeros(99, 1);
position_tar = zeros(100, 1);
% Perform the backtest
for i = 1:99
    % Check the forecast direction and determine the
position
    if target_forecast(i) == 1 % Forecast is up
        position_tar(i) = -1; % Long position
    elseif target_forecast(i) == 0 % Forecast is down
        position_tar(i) = 1; % Short position
    end

    % Calculate the return
    %ถ้าทำนายถูก
    if position_tar(i) == -1 % Long position
        returns_tar(i) = (price(i+1) - price(i)) / price(i);
    elseif position_tar(i) == 1 % Short position
        returns_tar(i) = (price(i) - price(i+1)) / price(i);
    end

    % Calculate the cumulative return
    if i == 1
        cumulative_returns1_tar(i) = returns_tar(i);
    else
        cumulative_returns1_tar(i) =
cumulative_returns1_tar(i-1) + returns_tar(i);
    end
end
```

```matlab
% Write the results back to the Excel file
%writematrix(returns, fileName, 'Range', 'D1:D10');
writematrix(cumulative_returns1_tar,
fileName,'Sheet',my_sheet, 'Range', 'AC1503:AC1602');

disp('Backtest complete. Returns and cumulative returns have
been written to columns N.');

%%% Hit Ratio%%%%

total_sum = sum(a);
hit_ratio = total_sum / 100;

writematrix(hit_ratio, fileName, 'Sheet', 'hit_ratio',
'Range', 'G2');

total_sum_di = sum(aa);
hit_ratio_di = total_sum_di / 100;

writematrix(hit_ratio_di, fileName, 'Sheet', 'hit_ratio',
'Range', 'H2');

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%window 10

m=2;
% Specify the file name and sheet name (if applicable)

clear p;
clear cc;
clear cc_crash_window10_eurusd_chinese6;
clear cc_crash_window10_u30_1day
clear pp_crash_window10_u30_1day
clear target2_crash_window10_u30_1day
clear cc_di_window10_u30_1day
clear pp_price_crash_window10_u30_1day
```

```matlab
clear target2_price_crash_window10_u30_1day
clear price
clear total_sum
clear hit_ratio
clear total_sum_di
clear hit_ratio_di

%%%covid crash
price=readmatrix(fileName,'Sheet',my_sheet,'Range',
'D2:D2191');

disp('Data has been successfully modified and written to
column B.');
  for i=1:100

[cc_crash_window10_u30_1day(i),pp_crash_window10_u30_1day(i)
,target2_crash_window10_u30_1day(i)]=run_svm_forecast_alarm3
(ret_eurusd(1:end_day-i),target_eurusd(1:end_day-
i+1),200,m);
  end
  d=flip(cc_crash_window10_u30_1day);
  e=flip(pp_crash_window10_u30_1day);
  f=flip(target2_crash_window10_u30_1day);
writematrix(d', fileName,'Sheet',my_sheet,'Range',
'O1503:O1602');
writematrix(e', fileName,'Sheet',my_sheet,'Range',
'P1503:P1602');
writematrix(f', fileName,'Sheet',my_sheet,'Range',
'Q1503:Q1602');
%%forcast direction
for i=1:100

[cc_di_window10_u30_1day(i),pp_price_crash_window10_u30_1day
(i),target2_price_crash_window10_u30_1day(i)]=run_svm_foreca
st_direction3(price(1:end_day-i),price(1:end_day-
i+1),200,m);
end
  dd=flip(cc_di_window10_u30_1day);
  ee=flip(pp_price_crash_window10_u30_1day);
```

```matlab
    ff=flip(target2_price_crash_window10_u30_1day);
writematrix(dd', fileName,'Sheet',my_sheet,'Range',
'R1503:R1602');
writematrix(ee', fileName,'Sheet',my_sheet,'Range',
'S1503:S1602');
writematrix(ff', fileName,'Sheet',my_sheet,'Range',
'T1503:T1602');
 %%chinese crash, we need to sort the output from backward
order to forward order.
 %%start date of forecast 2121-100=2021
 %%end date of forecast 2121    =2121

disp('Data has been successfully modified and written to
column B.');

 elapsedTime = toc;

% Convert the elapsed time from seconds to hours
elapsedTimeInHours = elapsedTime / 3600;
%per_form1_dax1day_window5=sum(cc_di_window5_u30_1day);
per_form2_dax1day_window10=sum(cc_crash_window10_u30_1day)
% Display the elapsed time in hours
%fprintf('Elapsed time: %.6f hours\n performance 1:=%2f
performance 2:=%2f  ', elapsedTimeInHours,
per_form1_dax1day_window5,per_form2_dax1day_window5);
toc;

%%%backtest
% Specify the file name and sheet name (if applicable)

% Read data from columns A (price), B (forecast direction),
and C (position)
price = readmatrix(fileName,'Sheet',my_sheet, 'Range',
'D1503:D1602');
forecast = readmatrix(fileName,'Sheet',my_sheet,'Range',
'S1503:S1602');
%position = readmatrix(fileName, 'Range', 'C1:C10');

% Initialize return and cumulative return arrays
```

```matlab
returns = zeros(100, 1);
cumulative_returns2 = zeros(99, 1);
position = zeros(100, 1);
% Perform the backtest
for i = 1:99
    % Check the forecast direction and determine the
position
    if forecast(i) == 1 % Forecast is up
        position(i) = 1; % Long position
    elseif forecast(i) == 0 % Forecast is down
        position(i) = -1; % Short position
    end

    % Calculate the return
    %ถ้าทำนายถูก
    if position(i) == 1 % Long position
        returns(i) = (price(i+1) - price(i)) / price(i);
    elseif position(i) == -1 % Short position
        returns(i) = (price(i) - price(i+1)) / price(i);
    end

    % Calculate the cumulative return
    if i == 1
        cumulative_returns2(i) = returns(i);
    else
        cumulative_returns2(i) = cumulative_returns2(i-1) +
returns(i);
    end
end

% Write the results back to the Excel file
%writematrix(returns, fileName, 'Range', 'D1:D10');
writematrix(cumulative_returns2, fileName,'Sheet',my_sheet,
'Range', 'U1503:U1602');

target_forecast =
readmatrix(fileName,'Sheet',my_sheet,'Range',
'P1503:P1602');
%position = readmatrix(fileName, 'Range', 'C1:C10');
```

```matlab
% Initialize return and cumulative return arrays
returns_tar = zeros(100, 1);
cumulative_returns2_tar = zeros(99, 1);
position_tar = zeros(100, 1);
% Perform the backtest
for i = 1:99
    % Check the forecast direction and determine the
position
    if target_forecast(i) == 1 % Forecast is up
        position_tar(i) = -1; % Long position
    elseif target_forecast(i) == 0 % Forecast is down
        position_tar(i) = 1; % Short position
    end

    % Calculate the return
    %ถ้าทำนายถูก
    if position_tar(i) == -1 % Long position
        returns_tar(i) = (price(i+1) - price(i)) / price(i);
    elseif position_tar(i) == 1 % Short position
        returns_tar(i) = (price(i) - price(i+1)) / price(i);
    end

    % Calculate the cumulative return
    if i == 1
        cumulative_returns2_tar(i) = returns_tar(i);
    else
        cumulative_returns2_tar(i) =
cumulative_returns1_tar(i-1) + returns_tar(i);
    end
end

% Write the results back to the Excel file
%writematrix(returns, fileName, 'Range', 'D1:D10');
writematrix(cumulative_returns2_tar,
fileName,'Sheet',my_sheet, 'Range', 'AD1503:AD1602');
```

```matlab
disp('Backtest complete. Returns and cumulative returns have
been written to columns U.');

%%% Hit Ratio%%%%

total_sum = sum(d);
hit_ratio = total_sum / 100;

writematrix(hit_ratio, fileName, 'Sheet', 'hit_ratio',
'Range', 'I2');

total_sum_di = sum(dd);
hit_ratio_di = total_sum_di / 100;

writematrix(hit_ratio_di, fileName, 'Sheet', 'hit_ratio',
'Range', 'J2');

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

%%window 30
clear p;
clear cc;
clear cc_crash_window30_eurusd_chinese6;
clear cc_crash_window30_u30_1day
clear pp_crash_window30_u30_1day
clear target2_crash_window30_u30_1day
clear cc_di_window30_u30_1day
clear pp_price_crash_window30_u30_1day
clear target2_price_crash_window30_u30_1day
clear price
clear total_sum
clear hit_ratio
clear total_sum_di
clear hit_ratio_di

m = 3;
```

```matlab
%%%covid crash
price=readmatrix(fileName,'Sheet',my_sheet,'Range',
'D2:D2191');

disp('Data has been successfully modified and written to
column B.');
  for i=1:100

[cc_crash_window30_u30_1day(i),pp_crash_window30_u30_1day(i)
,target2_crash_window30_u30_1day(i)]=run_svm_forecast_alarm3
(ret_eurusd(1:end_day-i),target_eurusd(1:end_day-
i+1),200,m);
  end
  g=flip(cc_crash_window30_u30_1day);
  h=flip(pp_crash_window30_u30_1day);
  t=flip(target2_crash_window30_u30_1day);
writematrix(g', fileName,'Sheet',my_sheet,'Range',
'V1503:V1602');
writematrix(h', fileName,'Sheet',my_sheet,'Range',
'W1503:W1602');
writematrix(t', fileName,'Sheet',my_sheet,'Range',
'X1503:X1602');
%%forcast direction
for i=1:100

[cc_di_window30_u30_1day(i),pp_price_crash_window30_u30_1day
(i),target2_price_crash_window30_u30_1day(i)]=run_svm_foreca
st_direction3(price(1:end_day-i),price(1:end_day-
i+1),200,m);
end
  gg=flip(cc_di_window30_u30_1day);
  hh=flip(pp_price_crash_window30_u30_1day);
  tt=flip(target2_price_crash_window30_u30_1day);
writematrix(gg', fileName,'Sheet',my_sheet,'Range',
'Y1503:Y1602');
writematrix(hh', fileName,'Sheet',my_sheet,'Range',
'Z1503:Z1602');
```

```matlab
writematrix(tt', fileName,'Sheet',my_sheet,'Range',
'AA1503:AA1602');

%%chinese crash, we need to sort the output from backward
order to forward order.
%%start date of forecast 2121-100=2021
%%end date of forecast 2121   =2121


%%

disp('Data has been successfully modified and written to
column B.');

elapsedTime = toc;

% Convert the elapsed time from seconds to hours
elapsedTimeInHours = elapsedTime / 3600;
%per_form1_dax1day_window5=sum(cc_di_window5_u30_1day);
per_form2_dax1day_window30=sum(cc_crash_window30_u30_1day)
% Display the elapsed time in hours
%fprintf('Elapsed time: %.6f hours\n performance 1:=%2f
performance 2:=%2f  ', elapsedTimeInHours,
per_form1_dax1day_window5,per_form2_dax1day_window5);
toc;

%%%backtest
% Specify the file name and sheet name (if applicable)

% Read data from columns A (price), B (forecast direction),
and C (position)
price = readmatrix(fileName,'Sheet',my_sheet, 'Range',
'D1503:D1602');
forecast = readmatrix(fileName,'Sheet',my_sheet,'Range',
'Z1503:Z1602');
%position = readmatrix(fileName, 'Range', 'C1:C10');

% Initialize return and cumulative return arrays
returns = zeros(100, 1);
```

```matlab
cumulative_returns3 = zeros(99, 1);
position = zeros(100, 1);
% Perform the backtest
for i = 1:99
    % Check the forecast direction and determine the
position
    if forecast(i) == 1 % Forecast is up
        position(i) = 1; % Long position
    elseif forecast(i) == 0 % Forecast is down
        position(i) = -1; % Short position
    end

    % Calculate the return
    %ถ้าทำนายถูก
    if position(i) == 1 % Long position
        returns(i) = (price(i+1) - price(i)) / price(i);
    elseif position(i) == -1 % Short position
        returns(i) = (price(i) - price(i+1)) / price(i);
    end

    % Calculate the cumulative return
    if i == 1
        cumulative_returns3(i) = returns(i);
    else
        cumulative_returns3(i) = cumulative_returns3(i-1) +
returns(i);
    end
end

% Write the results back to the Excel file
%writematrix(returns, fileName, 'Range', 'D1:D10');
writematrix(cumulative_returns3, fileName,'Sheet',my_sheet,
'Range', 'AB1503:AB1602');

target_forecast =
readmatrix(fileName,'Sheet',my_sheet,'Range',
'W1503:W1602');
%position = readmatrix(fileName, 'Range', 'C1:C10');
```

```matlab
% Initialize return and cumulative return arrays
returns_tar = zeros(100, 1);
cumulative_returns3_tar = zeros(99, 1);
position_tar = zeros(100, 1);
% Perform the backtest
for i = 1:99
    % Check the forecast direction and determine the
position
    if target_forecast(i) == 1 % Forecast is up
        position_tar(i) = -1; % Long position
    elseif target_forecast(i) == 0 % Forecast is down
        position_tar(i) = 1; % Short position
    end

    % Calculate the return
    %ถ้าทำนายถูก
    if position_tar(i) == -1 % Long position
        returns_tar(i) = (price(i+1) - price(i)) / price(i);
    elseif position_tar(i) == 1 % Short position
        returns_tar(i) = (price(i) - price(i+1)) / price(i);
    end

    % Calculate the cumulative return
    if i == 1
        cumulative_returns3_tar(i) = returns_tar(i);
    else
        cumulative_returns3_tar(i) =
cumulative_returns3_tar(i-1) + returns_tar(i);
    end
end

% Write the results back to the Excel file
%writematrix(returns, fileName, 'Range', 'D1:D10');
writematrix(cumulative_returns3_tar,
fileName,'Sheet',my_sheet, 'Range', 'AE1503:AE1602');


disp('Backtest complete. Returns and cumulative returns have
been written to columns U.');
```

```matlab
%%% Hit Ratio%%%%

total_sum = sum(g);
hit_ratio = total_sum / 100;

writematrix(hit_ratio, fileName, 'Sheet', 'hit_ratio',
'Range', 'K2');

total_sum_di = sum(gg);
hit_ratio_di = total_sum_di / 100;

writematrix(hit_ratio_di, fileName, 'Sheet', 'hit_ratio',
'Range', 'L2');

% Plotting the cumulative returns
plot(cumulative_returns1, 'DisplayName', 'Window Size = 5',
'LineWidth', 1 , 'Color', 'r');
hold on;
plot(cumulative_returns2, 'DisplayName', 'Window Size = 10',
'LineWidth', 1 , 'Color', 'b');
plot(cumulative_returns3, 'DisplayName', 'Window Size = 30',
'LineWidth', 1 , 'Color', 'g');

% Adding labels and title
xlabel('Time','FontSize', 14); % Label for x-axis
ylabel('Cumulative Returns','FontSize', 14); % Label for y-
axis
title('Cumulative Returns (Direction) in Ukraine
Crash','FontSize', 14); % Title of the plot

% Adding a legend to identify the curves
%legend('show', 'Location', 'southwest','FontSize', 8);

% Saving the plot as an image file
exportgraphics(gcf,
'BacktestRun_u30_1Day_Ukraine_chart_DI.jpg', 'Resolution',
300); % Set resolution to 300 DPI
```

```matlab
clf;
% Plotting the second set of cumulative returns

plot(cumulative_returns1_tar, 'DisplayName', 'Window Size =
5', 'LineWidth', 1 , 'Color', 'r');
hold on;
plot(cumulative_returns2_tar, 'DisplayName', 'Window Size =
10', 'LineWidth', 1 , 'Color', 'b');
plot(cumulative_returns3_tar, 'DisplayName', 'Window Size =
30', 'LineWidth', 1 , 'Color', 'g');

% Adding labels and title for the second plot
xlabel('Time','FontSize', 14); % Label for x-axis
ylabel('Cumulative Returns','FontSize', 14); % Label for y-
axis
title('Cumulative Returns (Crash Indicator) in Ukraine
Crash','FontSize', 14); % Title of the plot

% Adding a legend to identify the curves
%legend('show', 'Location', 'Northwest','FontSize', 8);

% Saving the second plot as an image file
%saveas(gcf, 'cumulative_returns_comparison_target.jpg');
exportgraphics(gcf,
'BacktestRun_u30_1Day_Ukraine_chart_CI.jpg', 'Resolution',
300); % Set resolution to 300 DPI

clf;




% China
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
```

```
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%window5




clear p;
clear cc;
clear cc_crash_window5_eurusd_chinese6;
clear target_eurusd;
clear ret_eurusd;
clear data;
clear target;
clear cc_crash_window5_u30_1day
clear pp_crash_window5_u30_1day
clear target2_crash_window5_u30_1day
clear cc_di_window5_u30_1day
clear pp_price_crash_window5_u30_1day
clear target2_price_crash_window5_u30_1day
clear cumulative_returns1
clear cumulative_returns2
clear cumulative_returns3
clear cumulative_returns1_tar
clear cumulative_returns2_tar
clear cumulative_returns3_tar
clear total_sum
clear hit_ratio
clear total_sum_di
clear hit_ratio_di

%%target =138691+1 since one day ahead!
% Read data from column A (range A1:A100) of the Excel file
%% data is return E
data = readmatrix(fileName,'Sheet',my_sheet,'Range',
'E2:E2191');
%% price is closed D
```

```matlab
price=readmatrix(fileName,'Sheet',my_sheet,'Range',
'D2:D2191');
%% target is market cash
target=readmatrix(fileName,'Sheet',my_sheet,'Range',
'G2:G2191');
% Send read data to forecast module
ret_eurusd = data;
target_eurusd=target;

%%%covid crash
% disp('Data has been successfully modified and written to
column B.');
   for i=1:100

[cc_crash_window5_u30_1day(i),pp_crash_window5_u30_1day(i),t
arget2_crash_window5_u30_1day(i)]=run_svm_forecast_alarm3(re
t_eurusd(1:end_day-i),target_eurusd(1:end_day-i+1),200,m);
   end
   a=flip(cc_crash_window5_u30_1day);
   b=flip(pp_crash_window5_u30_1day);
   c=flip(target2_crash_window5_u30_1day);

writematrix(a', fileName,'Sheet',my_sheet,'Range',
'H2023:H2122');
writematrix(b', fileName,'Sheet',my_sheet,'Range',
'I2023:I2122');
writematrix(c', fileName,'Sheet',my_sheet,'Range',
'J2023:J2122');
%%forcast direction
for i=1:100

[cc_di_window5_u30_1day(i),pp_price_crash_window5_u30_1day(i
),target2_price_crash_window5_u30_1day(i)]=run_svm_forecast_
direction3(price(1:end_day-i),price(1:end_day-i+1),200,m);
end
 % price
   aa=flip(cc_di_window5_u30_1day);
   bb=flip(pp_price_crash_window5_u30_1day);
   cc=flip(target2_price_crash_window5_u30_1day);
```

```matlab
writematrix(aa', fileName,'Sheet',my_sheet,'Range',
'K2023:K2122');
writematrix(bb', fileName,'Sheet',my_sheet,'Range',
'L2023:L2122');
writematrix(cc', fileName,'Sheet',my_sheet,'Range',
'M2023:M2122');
 %%chinese crash, we need to sort the output from backward
order to forward order.
 %%start date of forecast 2121-100=2021
 %%end date of forecast 2121    =2121


  %%

disp('Data has been successfully modified and written to
column B.');
  % Write the modified data to column B (range B1:B100) of
the same Excel file

 elapsedTime = toc;

% Convert the elapsed time from seconds to hours
elapsedTimeInHours = elapsedTime / 3600;
%per_form1_dax1day_window5=sum(cc_di_window5_u30_1day);
per_form2_dax1day_window5=sum(cc_crash_window5_u30_1day)
% Display the elapsed time in hours
%fprintf('Elapsed time: %.6f hours\n performance 1:=%2f
performance 2:=%2f  ', elapsedTimeInHours,
per_form1_dax1day_window5,per_form2_dax1day_window5);
toc;

%%%backtest%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
% Specify the file name and sheet name (if applicable)
%fileName = 'test5.xlsx';

% Read data from columns A (price), B (forecast direction),
and C (position)
price = readmatrix(fileName,'Sheet',my_sheet, 'Range',
'D2023:D2122');
```

```matlab
forecast = readmatrix(fileName,'Sheet',my_sheet,'Range',
'L2023:L2122');
%position = readmatrix(fileName, 'Range', 'C1:C10');

% Initialize return and cumulative return arrays
returns = zeros(100, 1);
cumulative_returns1 = zeros(99, 1);
position = zeros(100, 1);
% Perform the backtest
for i = 1:99
    % Check the forecast direction and determine the
position
    if forecast(i) == 1 % Forecast is up
        position(i) = 1; % Long position
    elseif forecast(i) == 0 % Forecast is down
        position(i) = -1; % Short position
    end

    % Calculate the return
    %ถ้าทำนายถูก
    if position(i) == 1 % Long position
        returns(i) = (price(i+1) - price(i)) / price(i);
    elseif position(i) == -1 % Short position
        returns(i) = (price(i) - price(i+1)) / price(i);
    end

    % Calculate the cumulative return
    if i == 1
        cumulative_returns1(i) = returns(i);
    else
        cumulative_returns1(i) = cumulative_returns1(i-1) +
returns(i);
    end
end

writematrix(cumulative_returns1, fileName,'Sheet',my_sheet,
'Range', 'N2023:N2122');
```

```matlab
target_forecast =
readmatrix(fileName,'Sheet',my_sheet,'Range',
'I2023:I2122');
%position = readmatrix(fileName, 'Range', 'C1:C10');

% Initialize return and cumulative return arrays
returns_tar = zeros(100, 1);
cumulative_returns1_tar = zeros(99, 1);
position_tar = zeros(100, 1);
% Perform the backtest
for i = 1:99
    % Check the forecast direction and determine the
position
    if target_forecast(i) == 1 % Forecast is up
        position_tar(i) = -1; % Long position
    elseif target_forecast(i) == 0 % Forecast is down
        position_tar(i) = 1; % Short position
    end

    % Calculate the return
    %ถ้าทำนายถูก
    if position_tar(i) == -1 % Long position
        returns_tar(i) = (price(i+1) - price(i)) / price(i);
    elseif position_tar(i) == 1 % Short position
        returns_tar(i) = (price(i) - price(i+1)) / price(i);
    end

    % Calculate the cumulative return
    if i == 1
        cumulative_returns1_tar(i) = returns_tar(i);
    else
        cumulative_returns1_tar(i) =
cumulative_returns1_tar(i-1) + returns_tar(i);
    end
end

% Write the results back to the Excel file
%writematrix(returns, fileName, 'Range', 'D1:D10');
```

```matlab
writematrix(cumulative_returns1_tar,
fileName,'Sheet',my_sheet, 'Range', 'AC2023:AC2122');

disp('Backtest complete. Returns and cumulative returns have
been written to columns N.');


%%% Hit Ratio%%%%

total_sum = sum(a);
hit_ratio = total_sum / 100;

writematrix(hit_ratio, fileName, 'Sheet', 'hit_ratio',
'Range', 'M2');

total_sum_di = sum(aa);
hit_ratio_di = total_sum_di / 100;

writematrix(hit_ratio_di, fileName, 'Sheet', 'hit_ratio',
'Range', 'N2');

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%window 10

m=2;
% Specify the file name and sheet name (if applicable)

clear p;
clear cc;
clear cc_crash_window10_eurusd_chinese6;
clear cc_crash_window10_u30_1day
clear pp_crash_window10_u30_1day
clear target2_crash_window10_u30_1day
clear cc_di_window10_u30_1day
clear pp_price_crash_window10_u30_1day
clear target2_price_crash_window10_u30_1day
clear price
```

```matlab
clear total_sum
clear hit_ratio
clear total_sum_di
clear hit_ratio_di

%%%covid crash
price=readmatrix(fileName,'Sheet',my_sheet,'Range',
'D2:D2191');

disp('Data has been successfully modified and written to
column B.');
  for i=1:100

[cc_crash_window10_u30_1day(i),pp_crash_window10_u30_1day(i)
,target2_crash_window10_u30_1day(i)]=run_svm_forecast_alarm3
(ret_eurusd(1:end_day-i),target_eurusd(1:end_day-
i+1),200,m);
  end
  d=flip(cc_crash_window10_u30_1day);
  e=flip(pp_crash_window10_u30_1day);
  f=flip(target2_crash_window10_u30_1day);
writematrix(d', fileName,'Sheet',my_sheet,'Range',
'O2023:O2122');
writematrix(e', fileName,'Sheet',my_sheet,'Range',
'P2023:P2122');
writematrix(f', fileName,'Sheet',my_sheet,'Range',
'Q2023:Q2122');
%%forcast direction
for i=1:100

[cc_di_window10_u30_1day(i),pp_price_crash_window10_u30_1day
(i),target2_price_crash_window10_u30_1day(i)]=run_svm_foreca
st_direction3(price(1:end_day-i),price(1:end_day-
i+1),200,m);
end
  dd=flip(cc_di_window10_u30_1day);
  ee=flip(pp_price_crash_window10_u30_1day);
  ff=flip(target2_price_crash_window10_u30_1day);
```

```matlab
writematrix(dd', fileName,'Sheet',my_sheet,'Range',
'R2023:R2122');
writematrix(ee', fileName,'Sheet',my_sheet,'Range',
'S2023:S2122');
writematrix(ff', fileName,'Sheet',my_sheet,'Range',
'T2023:T2122');
 %%chinese crash, we need to sort the output from backward
order to forward order.
 %%start date of forecast 2121-100=2021
 %%end date of forecast 2121    =2121

disp('Data has been successfully modified and written to
column B.');

 elapsedTime = toc;

% Convert the elapsed time from seconds to hours
elapsedTimeInHours = elapsedTime / 3600;
%per_form1_dax1day_window5=sum(cc_di_window5_u30_1day);
per_form2_dax1day_window10=sum(cc_crash_window10_u30_1day)
% Display the elapsed time in hours
%fprintf('Elapsed time: %.6f hours\n performance 1:=%2f
performance 2:=%2f  ', elapsedTimeInHours,
per_form1_dax1day_window5,per_form2_dax1day_window5);
toc;

%%%backtest
% Specify the file name and sheet name (if applicable)

% Read data from columns A (price), B (forecast direction),
and C (position)
price = readmatrix(fileName,'Sheet',my_sheet, 'Range',
'D2023:D2122');
forecast = readmatrix(fileName,'Sheet',my_sheet,'Range',
'S2023:S2122');
%position = readmatrix(fileName, 'Range', 'C1:C10');

% Initialize return and cumulative return arrays
returns = zeros(100, 1);
```

```matlab
cumulative_returns2 = zeros(99, 1);
position = zeros(100, 1);
% Perform the backtest
for i = 1:99
    % Check the forecast direction and determine the
position
    if forecast(i) == 1 % Forecast is up
        position(i) = 1; % Long position
    elseif forecast(i) == 0 % Forecast is down
        position(i) = -1; % Short position
    end

    % Calculate the return
    %ถ้าทำนายถูก
    if position(i) == 1 % Long position
        returns(i) = (price(i+1) - price(i)) / price(i);
    elseif position(i) == -1 % Short position
        returns(i) = (price(i) - price(i+1)) / price(i);
    end

    % Calculate the cumulative return
    if i == 1
        cumulative_returns2(i) = returns(i);
    else
        cumulative_returns2(i) = cumulative_returns2(i-1) +
returns(i);
    end
end

% Write the results back to the Excel file
%writematrix(returns, fileName, 'Range', 'D1:D10');
writematrix(cumulative_returns2, fileName,'Sheet',my_sheet,
'Range', 'U2023:U2122');

target_forecast =
readmatrix(fileName,'Sheet',my_sheet,'Range',
'P2023:P2122');
%position = readmatrix(fileName, 'Range', 'C1:C10');
```

```matlab
% Initialize return and cumulative return arrays
returns_tar = zeros(100, 1);
cumulative_returns2_tar = zeros(99, 1);
position_tar = zeros(100, 1);
% Perform the backtest
for i = 1:99
    % Check the forecast direction and determine the
position
    if target_forecast(i) == 1 % Forecast is up
        position_tar(i) = -1; % Long position
    elseif target_forecast(i) == 0 % Forecast is down
        position_tar(i) = 1; % Short position
    end

    % Calculate the return
    %ถ้าทำนายถูก
    if position_tar(i) == -1 % Long position
        returns_tar(i) = (price(i+1) - price(i)) / price(i);
    elseif position_tar(i) == 1 % Short position
        returns_tar(i) = (price(i) - price(i+1)) / price(i);
    end

    % Calculate the cumulative return
    if i == 1
        cumulative_returns2_tar(i) = returns_tar(i);
    else
        cumulative_returns2_tar(i) =
cumulative_returns1_tar(i-1) + returns_tar(i);
    end
end

% Write the results back to the Excel file
%writematrix(returns, fileName, 'Range', 'D1:D10');
writematrix(cumulative_returns2_tar,
fileName,'Sheet',my_sheet, 'Range', 'AD2023:AD2122');


disp('Backtest complete. Returns and cumulative returns have
been written to columns U.');
```

```matlab
%%% Hit Ratio%%%%

total_sum = sum(d);
hit_ratio = total_sum / 100;

writematrix(hit_ratio, fileName, 'Sheet', 'hit_ratio', ...
'Range', 'O2');

total_sum_di = sum(dd);
hit_ratio_di = total_sum_di / 100;

writematrix(hit_ratio_di, fileName, 'Sheet', 'hit_ratio', ...
'Range', 'P2');

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

%%window 30
clear p;
clear cc;
clear cc_crash_window30_eurusd_chinese6;
clear cc_crash_window30_u30_1day
clear pp_crash_window30_u30_1day
clear target2_crash_window30_u30_1day
clear cc_di_window30_u30_1day
clear pp_price_crash_window30_u30_1day
clear target2_price_crash_window30_u30_1day
clear price
clear total_sum
clear hit_ratio
clear total_sum_di
clear hit_ratio_di

m = 3;
```

```matlab
%%%covid crash
price=readmatrix(fileName,'Sheet',my_sheet,'Range',
'D2:D2191');

disp('Data has been successfully modified and written to
column B.');
    for i=1:100

[cc_crash_window30_u30_1day(i),pp_crash_window30_u30_1day(i)
,target2_crash_window30_u30_1day(i)]=run_svm_forecast_alarm3
(ret_eurusd(1:end_day-i),target_eurusd(1:end_day-
i+1),200,m);
    end
    g=flip(cc_crash_window30_u30_1day);
    h=flip(pp_crash_window30_u30_1day);
    t=flip(target2_crash_window30_u30_1day);
writematrix(g', fileName,'Sheet',my_sheet,'Range',
'V2023:V2122');
writematrix(h', fileName,'Sheet',my_sheet,'Range',
'W2023:W2122');
writematrix(t', fileName,'Sheet',my_sheet,'Range',
'X2023:X2122');
%%forcast direction
for i=1:100

[cc_di_window30_u30_1day(i),pp_price_crash_window30_u30_1day
(i),target2_price_crash_window30_u30_1day(i)]=run_svm_foreca
st_direction3(price(1:end_day-i),price(1:end_day-
i+1),200,m);
end
    gg=flip(cc_di_window30_u30_1day);
    hh=flip(pp_price_crash_window30_u30_1day);
    tt=flip(target2_price_crash_window30_u30_1day);
writematrix(gg', fileName,'Sheet',my_sheet,'Range',
'Y2023:Y2122');
writematrix(hh', fileName,'Sheet',my_sheet,'Range',
'Z2023:Z2122');
```

```matlab
writematrix(tt', fileName,'Sheet',my_sheet,'Range',
'AA2023:AA2122');

 %%chinese crash, we need to sort the output from backward
order to forward order.
 %%start date of forecast 2121-100=2021
 %%end date of forecast 2121   =2121



   %%

disp('Data has been successfully modified and written to
column B.');

 elapsedTime = toc;

% Convert the elapsed time from seconds to hours
elapsedTimeInHours = elapsedTime / 3600;
%per_form1_dax1day_window5=sum(cc_di_window5_u30_1day);
per_form2_dax1day_window30=sum(cc_crash_window30_u30_1day)
% Display the elapsed time in hours
%fprintf('Elapsed time: %.6f hours\n performance 1:=%2f
performance 2:=%2f  ', elapsedTimeInHours,
per_form1_dax1day_window5,per_form2_dax1day_window5);
toc;

%%%backtest
% Specify the file name and sheet name (if applicable)

% Read data from columns A (price), B (forecast direction),
and C (position)
price = readmatrix(fileName,'Sheet',my_sheet, 'Range',
'D2023:D2122');
forecast = readmatrix(fileName,'Sheet',my_sheet,'Range',
'Z2023:Z2122');
%position = readmatrix(fileName, 'Range', 'C1:C10');

% Initialize return and cumulative return arrays
returns = zeros(100, 1);
```

```matlab
cumulative_returns3 = zeros(99, 1);
position = zeros(100, 1);
% Perform the backtest
for i = 1:99
    % Check the forecast direction and determine the
position
    if forecast(i) == 1 % Forecast is up
        position(i) = 1; % Long position
    elseif forecast(i) == 0 % Forecast is down
        position(i) = -1; % Short position
    end

    % Calculate the return
    %ถ้าทำนายถูก
    if position(i) == 1 % Long position
        returns(i) = (price(i+1) - price(i)) / price(i);
    elseif position(i) == -1 % Short position
        returns(i) = (price(i) - price(i+1)) / price(i);
    end

    % Calculate the cumulative return
    if i == 1
        cumulative_returns3(i) = returns(i);
    else
        cumulative_returns3(i) = cumulative_returns3(i-1) +
returns(i);
    end
end

% Write the results back to the Excel file
%writematrix(returns, fileName, 'Range', 'D1:D10');
writematrix(cumulative_returns3, fileName,'Sheet',my_sheet,
'Range', 'AB2023:AB2122');

target_forecast =
readmatrix(fileName,'Sheet',my_sheet,'Range',
'W2023:W2122');
%position = readmatrix(fileName, 'Range', 'C1:C10');
```

```matlab
% Initialize return and cumulative return arrays
returns_tar = zeros(100, 1);
cumulative_returns3_tar = zeros(99, 1);
position_tar = zeros(100, 1);
% Perform the backtest
for i = 1:99
    % Check the forecast direction and determine the
position
    if target_forecast(i) == 1 % Forecast is up
        position_tar(i) = -1; % Long position
    elseif target_forecast(i) == 0 % Forecast is down
        position_tar(i) = 1; % Short position
    end

    % Calculate the return
    %ถ้าทำนายถูก
    if position_tar(i) == -1 % Long position
        returns_tar(i) = (price(i+1) - price(i)) / price(i);
    elseif position_tar(i) == 1 % Short position
        returns_tar(i) = (price(i) - price(i+1)) / price(i);
    end

    % Calculate the cumulative return
    if i == 1
        cumulative_returns3_tar(i) = returns_tar(i);
    else
        cumulative_returns3_tar(i) =
cumulative_returns3_tar(i-1) + returns_tar(i);
    end
end

% Write the results back to the Excel file
%writematrix(returns, fileName, 'Range', 'D1:D10');
writematrix(cumulative_returns3_tar,
fileName,'Sheet',my_sheet, 'Range', 'AE2023:AE2122');


disp('Backtest complete. Returns and cumulative returns have
been written to columns U.');
```

```matlab
%%% Hit Ratio%%%%

total_sum = sum(g);
hit_ratio = total_sum / 100;

writematrix(hit_ratio, fileName, 'Sheet', 'hit_ratio',
'Range', 'Q2');

total_sum_di = sum(gg);
hit_ratio_di = total_sum_di / 100;

writematrix(hit_ratio_di, fileName, 'Sheet', 'hit_ratio',
'Range', 'R2');


% Plotting the cumulative returns
plot(cumulative_returns1, 'DisplayName', 'Window Size = 5',
'LineWidth', 1 , 'Color', 'r');
hold on;
plot(cumulative_returns2, 'DisplayName', 'Window Size = 10',
'LineWidth', 1 , 'Color', 'b');
plot(cumulative_returns3, 'DisplayName', 'Window Size = 30',
'LineWidth', 1 , 'Color', 'g');

% Adding labels and title
xlabel('Time','FontSize', 14); % Label for x-axis
ylabel('Cumulative Returns','FontSize', 14); % Label for y-
axis
title('Cumulative Returns (Direction) in China
Crash','FontSize', 14); % Title of the plot

% Adding a legend to identify the curves
%legend('show', 'Location', 'southwest','FontSize', 8);

% Saving the plot as an image file
```

```matlab
exportgraphics(gcf,
'BacktestRun_u30_1Day_China_chart_DI.jpg', 'Resolution',
300); % Set resolution to 300 DPI

clf;
% Plotting the second set of cumulative returns

plot(cumulative_returns1_tar, 'DisplayName', 'Window Size =
5', 'LineWidth', 1 , 'Color', 'r');
hold on;
plot(cumulative_returns2_tar, 'DisplayName', 'Window Size =
10', 'LineWidth', 1 , 'Color', 'b');
plot(cumulative_returns3_tar, 'DisplayName', 'Window Size =
30', 'LineWidth', 1 , 'Color', 'g');

% Adding labels and title for the second plot
xlabel('Time','FontSize', 14); % Label for x-axis
ylabel('Cumulative Returns','FontSize', 14); % Label for y-
axis
title('Cumulative Returns (Crash Indicator) in China
Crash','FontSize', 14); % Title of the plot

% Adding a legend to identify the curves
%legend('show', 'Location', 'Northwest','FontSize', 8);

% Saving the second plot as an image file
%saveas(gcf, 'cumulative_returns_comparison_target.jpg');
exportgraphics(gcf,
'BacktestRun_u30_1Day_China_chart_CI.jpg', 'Resolution',
300); % Set resolution to 300 DPI


save run_u30_1day_svm_EF1_1_2_Pee
```

Summary of evaluation

ทุกคนรันได้แล้วได้ผลตรงตรง back test ที่ market crash ได้ไม่ตรงไม่เป็นไรรันตัวถัดไปโดยใช้ Code นี้ได้เลยไม่ต้องรอ แล้วผม
จะบอกว่าทำ back test อย่างไรอีกรอบทีหลังครับ เวลาเอา function gen market crash เข้ามาบางครั้งทำให้รันไม่ได้ไม่ทราบ
เพราะอะไรทางที่ดีให้มันแยกอยู่ด้านนอกและแค่ เรียกชื่อเข้ามาจะดีกว่า source code จะได้ไม่ยาว

รันที่ 30 นาทีและสี่ชม ตามข้อมูลที่เลือกแยกตามคนเหมือนงานนี้ต่อเลยครับ ใครรัน DAX ก็รัน DAXไป ใครรัน u30 ก็รันต่อไป
เลยไม่ต้องรอครับ ใส่หัวตาราง excel ด้วยสำหรับคนที่ไม่ได้ใส่ ส่วนตรง backest ที่ direction ใช้ได้แล้ว<mark>แต่ที่ market crash
แล้วผมจะเขียน code ส่งไปให้รันทีหลังได้ครับ</mark>