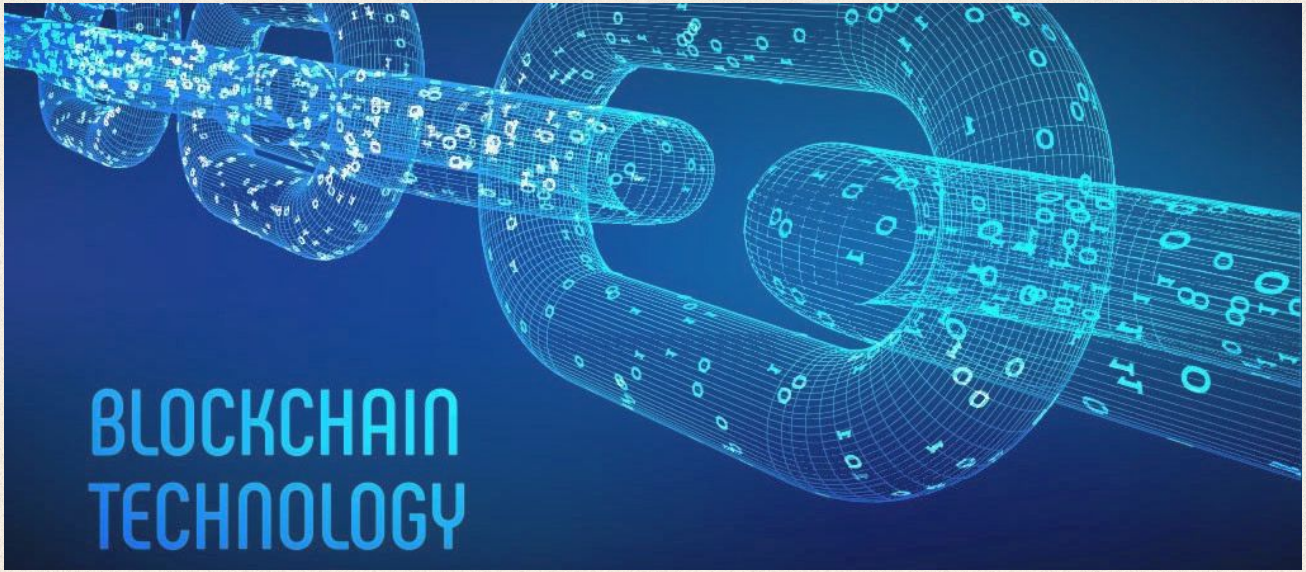
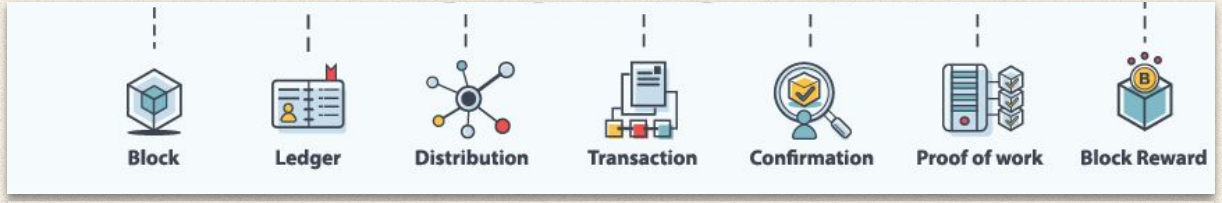
ทำนายราคาอีเธอร์ด้วยวิธีการวิเคราะห์การถดถอยเชิงพหุคูณ

Introduction





Introduction

Objective!

เพื่อหาตัวแบบที่เหมาะสมสำหรับการทำนายราคาอีเธอร์ (Ether)

-Scope-

1. ศึกษาการหาตัวแบบโดย การวิเคราะห์ถดถอยพหุคูณ (Multiple Linear Regression)

2. ศึกษาโดยใช้ชุดข้อมูลราคาและปริมาณการซื้อ-ขายย้อนหลัง โดยแบ่ง เป็น 6 ชุดข้อมูล ได้แก่ 1 วันย้อนหลัง, 3 วันย้อนหลัง, 5 วันย้อนหลัง, 7 วันย้อนหลัง, 10 วันย้อนหลังและ 14 วันย้อนหลัง

3. ศึกษาโดยใช้ข้อมูลย้อนหลัง 2 ปี (15/11/2019-15/11/2021)

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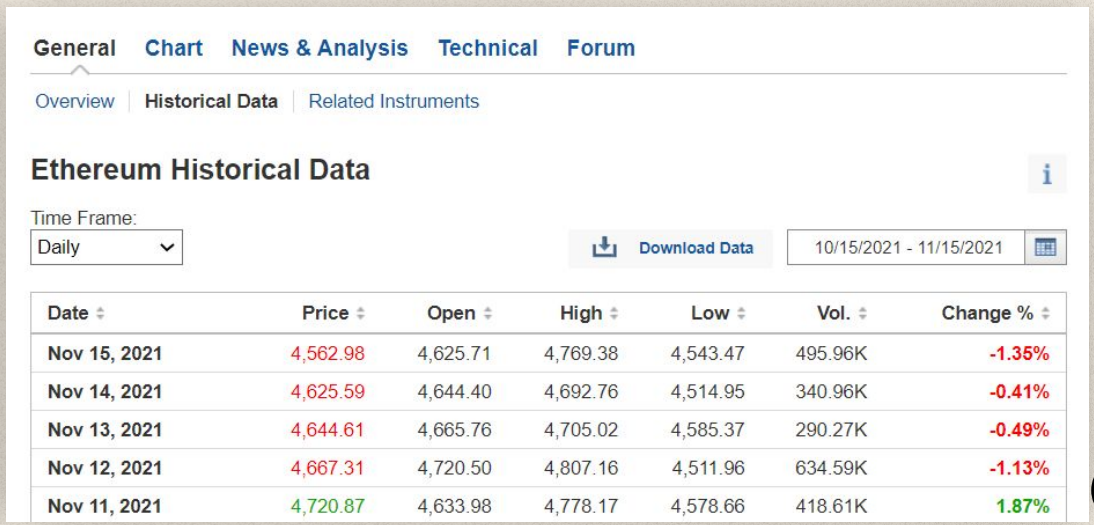
01

Collecting Data

01 Collecting Data



Date	Price	Open	High	Low	Vol.	Change %
Nov 15, 2021	4,562.98	4,625.71	4,769.38	4,543.47	495.96K	-1.35%
Nov 14, 2021	4,625.59	4,644.40	4,692.76	4,514.95	340.96K	-0.41%
Nov 13, 2021	4,644.61	4,665.76	4,705.02	4,585.37	290.27K	-0.49%
Nov 12, 2021	4,667.31	4,720.50	4,807.16	4,511.96	634.59K	-1.13%
Nov 11, 2021	4,720.87	4,633.98	4,778.17	4,578.66	418.61K	1.87%

https://www.investing.com/indices/investing.com-eth-usd-historical-data

01 Collecting Data

Ethereum Historical Data

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Date	Close	Open	High	Low	Vol	Change
15/11/2021	4,562.98	4,625.71	4,769.38	4,543.47	495.96K	-1.35
14/11/2021	4,625.59	4,644.40	4,692.76	4,514.95	340.96K	-0.41
13/11/2021	4,644.61	4,665.76	4,705.02	4,585.37	290.27K	-0.49
12/11/2021	4,667.31	4,720.50	4,807.16	4,511.96	634.59K	-1.13
11/11/2021	4,720.87	4,633.98	4,778.17	4,578.66	418.61K	1.87
10/11/2021	4,634.03	4,731.83	4,864.06	4,498.78	761.90K	-2.07
9/11/2021	4,731.83	4,808.34	4,836.69	4,715.43	437.41K	-1.59
8/11/2021	4,808.38	4,612.05	4,822.97	4,612.05	673.21K	4.26
7/11/2021	4,612.06	4,517.27	4,634.39	4,502.70	337.81K	2.1
6/11/2021	4,517.36	4,475.00	4,526.75	4,330.29	442.60K	0.95
5/11/2021	4,475.00	4,534.96	4,569.31	4,439.67	409.75K	-1.33
4/11/2021	4,535.11	4,601.93	4,604.83	4,421.87	495.86K	-1.46
3/11/2021	4,602.21	4,586.96	4,661.88	4,458.87	634.68K	0.35
2/11/2021	4,586.06	4,320.85	4,598.38	4,287.36	630.26K	6.14
1/11/2021	4,320.85	4,287.41	4,376.94	4,157.51	574.26K	0.78
31/10/2021	4,287.56	4,322.00	4,393.61	4,169.48	555.32K	-0.77
30/10/2021	4,320.65	4,413.70	4,428.41	4,250.24	494.87K	-2.11
29/10/2021	4,413.70	4,284.90	4,458.30	4,268.21	781.57K	3.01
28/10/2021	4,284.90	3,921.54	4,289.80	3,896.33	865.80K	9.25

Pre Ethereum Historical Data | Ethereum Historical Data

02

Preparing Data

02 Preparing Data

Ethereum Historical Data

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K1

	A	B	C	D	E	F	G
1	Date	Close	Open	High	Low	Vol	Change
2	15/11/2021	4,562.98	4,625.71	4,769.38	4,543.47	495.96K	-1.35
3	14/11/2021	4,625.59	4,644.40	4,692.76	4,514.95	340.96K	-0.41
4	13/11/2021	4,644.61	4,665.76	4,705.02	4,585.37	290.27K	-0.49
5	12/11/2021	4,667.31	4,720.50	4,807.16	4,511.96	634.59K	-1.13
6	11/11/2021	4,720.87	4,633.98	4,778.17	4,578.66	418.61K	1.87
7	10/11/2021	4,634.03	4,731.83	4,864.06	4,498.78	761.90K	-2.07
8	9/11/2021	4,731.83	4,808.34	4,836.69	4,715.43	437.41K	-1.59
9	8/11/2021	4,808.38	4,612.05	4,822.97	4,612.05	673.21K	4.26
10	7/11/2021	4,612.06	4,517.27	4,634.39	4,502.70	337.81K	2.1
11	6/11/2021	4,517.36	4,475.00	4,526.75	4,330.29	442.60K	0.95
12	5/11/2021	4,475.00	4,534.96	4,569.31	4,439.67	409.75K	-1.33
13	4/11/2021	4,535.11	4,601.93	4,604.83	4,421.87	495.86K	-1.46
14	3/11/2021	4,602.21	4,586.96	4,661.88	4,458.87	634.68K	0.35
15	2/11/2021	4,586.06	4,320.85	4,598.38	4,287.36	630.26K	6.14
16	1/11/2021	4,320.85	4,287.41	4,376.94	4,157.51	574.26K	0.78
17	31/10/2021	4,287.56	4,322.00	4,393.61	4,169.48	555.32K	-0.77
18	30/10/2021	4,320.65	4,413.70	4,428.41	4,250.24	494.87K	-2.11
19	29/10/2021	4,413.70	4,284.90	4,458.30	4,268.21	781.57K	3.01
20	28/10/2021	4,284.90	3,921.54	4,289.80	3,896.33	865.80K	9.25

Pre Ethereum Historical Data | Ethereum Historical Data

Ethereum Historical Data

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I8

	A	B	C	D	E	F	G
1	Date	Close	Open	High	Low	Vol	Change
2	15/11/2021	4562.98	4625.71	4769.38	4543.47	495960	-1.35
3	14/11/2021	4625.59	4644.40	4692.76	4514.95	340960	-0.41
4	13/11/2021	4644.61	4665.76	4705.02	4585.37	290270	-0.49
5	12/11/2021	4667.31	4720.50	4807.16	4511.96	634590	-1.13
6	11/11/2021	4720.87	4633.98	4778.17	4578.66	418610	1.87
7	10/11/2021	4634.03	4731.83	4864.06	4498.78	761900	-2.07
8	9/11/2021	4731.83	4808.34	4836.69	4715.43	437410	-1.59
9	8/11/2021	4808.38	4612.05	4822.97	4612.05	673210	4.26
10	7/11/2021	4612.06	4517.27	4634.39	4502.70	337810	2.1
11	6/11/2021	4517.36	4475.00	4526.75	4330.29	442600	0.95
12	5/11/2021	4475.00	4534.96	4569.31	4439.67	409750	-1.33
13	4/11/2021	4535.11	4601.93	4604.83	4421.87	495860	-1.46
14	3/11/2021	4602.21	4586.96	4661.88	4458.87	634680	0.35
15	2/11/2021	4586.06	4320.85	4598.38	4287.36	630260	6.14
16	1/11/2021	4320.85	4287.41	4376.94	4157.51	574260	0.78
17	31/10/2021	4287.56	4322.00	4393.61	4169.48	555320	-0.77
18	30/10/2021	4320.65	4413.70	4428.41	4250.24	494870	-2.11
19	29/10/2021	4413.70	4284.90	4458.30	4268.21	781570	3.01

Pre Ethereum Historical Data | Ethereum Historical Data

02 Preparing Data

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
1	Date	Close	Close_1	Open_1	High_1	Low_1	Vol_1	Change_1	Close_2	Open_2	High_2	Low_2	Vol_2	Change_2	Close_3	Open_3	High_3	Low_3	Vol_3	Change_3	Close_4
2	15/11/2021	4562.98	4625.59	4644.40	4692.76	4514.95	340960.00	-0.41	4644.61	4665.76	4705.02	4585.37	290270.00	-0.49	4667.31	4720.50	4807.16	4511.96	634590.00	-1.13	4720.87
3	14/11/2021	4625.59	4644.61	4665.76	4705.02	4585.37	290270.00	-0.49	4667.31	4720.50	4807.16	4511.96	634590.00	-1.13	4720.87	4633.98	4778.17	4578.66	418610.00	1.87	4634.03
4	13/11/2021	4644.61	4667.31	4720.50	4807.16	4511.96	634590.00	-1.13	4720.87	4633.98	4778.17	4578.66	418610.00	1.87	4634.03	4731.83	4864.06	4498.78	761900.00	-2.07	4731.83
5	12/11/2021	4667.31	4720.87	4633.98	4778.17	4578.66	418610.00	1.87	4634.03	4731.83	4864.06	4498.78	761900.00	-2.07	4731.83	4808.34	4836.69	4715.43	437410.00	-1.59	4808.38
6	11/11/2021	4720.87	4634.03	4731.83	4864.06	4498.78	761900.00	-2.07	4731.83	4808.34	4836.69	4715.43	437410.00	-1.59	4808.38	4612.05	4822.97	4612.05	673210.00	4.26	4612.06
7	10/11/2021	4634.03	4731.83	4808.34	4836.69	4715.43	437410.00	-1.59	4808.38	4612.05	4822.97	4612.05	673210.00	4.26	4612.06	4517.27	4634.39	4502.70	337810.00	2.10	4517.36
8	9/11/2021	4731.83	4808.38	4612.05	4822.97	4612.05	673210.00	4.26	4612.06	4517.27	4634.39	4502.70	337810.00	2.10	4517.36	4475.00	4526.75	4330.29	442600.00	0.95	4475.00
9	8/11/2021	4808.38	4612.06	4517.27	4634.39	4502.70	337810.00	2.10	4517.36	4475.00	4526.75	4330.29	442600.00	0.95	4475.00	4534.96	4569.31	4439.67	409750.00	-1.33	4535.11
10	7/11/2021	4612.06	4517.36	4475.00	4526.75	4330.29	442600.00	0.95	4475.00	4534.96	4569.31	4439.67	409750.00	-1.33	4535.11	4601.93	4604.83	4421.87	495860.00	-1.46	4602.21
11	6/11/2021	4517.36	4475.00	4534.96	4569.31	4439.67	409750.00	-1.33	4535.11	4601.93	4604.83	4421.87	495860.00	-1.46	4602.21	4586.96	4661.88	4458.87	634680.00	0.35	4586.06
12	5/11/2021	4475.00	4535.11	4601.93	4604.83	4421.87	495860.00	-1.46	4602.21	4586.96	4661.88	4458.87	634680.00	0.35	4586.06	4320.85	4598.38	4287.36	630260.00	6.14	4320.85
13	4/11/2021	4535.11	4602.21	4586.96	4661.88	4458.87	634680.00	0.35	4586.06	4320.85	4598.38	4287.36	630260.00	6.14	4320.85	4287.41	4376.94	4157.51	574260.00	0.78	4287.56
14	3/11/2021	4602.21	4586.06	4320.85	4598.38	4287.36	630260.00	6.14	4320.85	4287.41	4376.94	4157.51	574260.00	0.78	4287.56	4322.00	4393.61	4169.48	555320.00	-0.77	4320.65
15	2/11/2021	4586.06	4320.85	4287.41	4376.94	4157.51	574260.00	0.78	4287.56	4322.00	4393.61	4169.48	555320.00	-0.77	4320.65	4413.70	4428.41	4250.24	494870.00	-2.11	4413.70
16	1/11/2021	4320.85	4287.56	4322.00	4393.61	4169.48	555320.00	-0.77	4320.65	4413.70	4428.41	4250.24	494870.00	-2.11	4413.70	4284.90	4458.30	4268.21	781570.00	3.01	4284.90
17	31/10/2021	4287.56	4320.65	4413.70	4428.41	4250.24	494870.00	-2.11	4413.70	4284.90	4458.30	4268.21	781570.00	3.01	4284.90	3921.54	4289.80	3896.33	865800.00	9.25	3921.93
18	30/10/2021	4320.65	4413.70	4284.90	4458.30	4268.21	781570.00	3.01	4284.90	3921.54	4289.80	3896.33	865800.00	9.25	3921.93	4130.06	4299.61	3914.06	1070000.0	-5.03	4129.51
19	29/10/2021	4413.70	4284.90	3921.54	4289.80	3896.33	865800.00	9.25	3921.93	4130.06	4299.61	3914.06	1070000.0	-5.03	4129.51	4219.92	4291.98	4098.19	559290.00	-2.14	4219.92
20	28/10/2021	4284.90	3921.93	4130.06	4299.61	3914.06	1070000.0	-5.03	4129.51	4219.92	4291.98	4098.19	559290.00	-2.14	4219.92	4082.68	4234.76	4069.94	481410.00	3.36	4082.80
21	27/10/2021	3921.93	4129.51	4219.92	4291.98	4098.19	559290.00	-2.14	4219.92	4082.68	4234.76	4069.94	481410.00	3.36	4082.80	4168.80	4184.00	3965.84	507630.00	-2.06	4168.85
22	26/10/2021	4129.51	4219.92	4082.68	4234.76	4069.94	481410.00	3.36	4082.80	4168.80	4184.00	3965.84	507630.00	-2.06	4168.85	3970.94	4169.33	3938.79	487030.00	4.98	3970.94

_1 _3 _5 _7 _10 _14 Explore

03

Exploratory Data Analysis

03 Exploratory Data Analysis

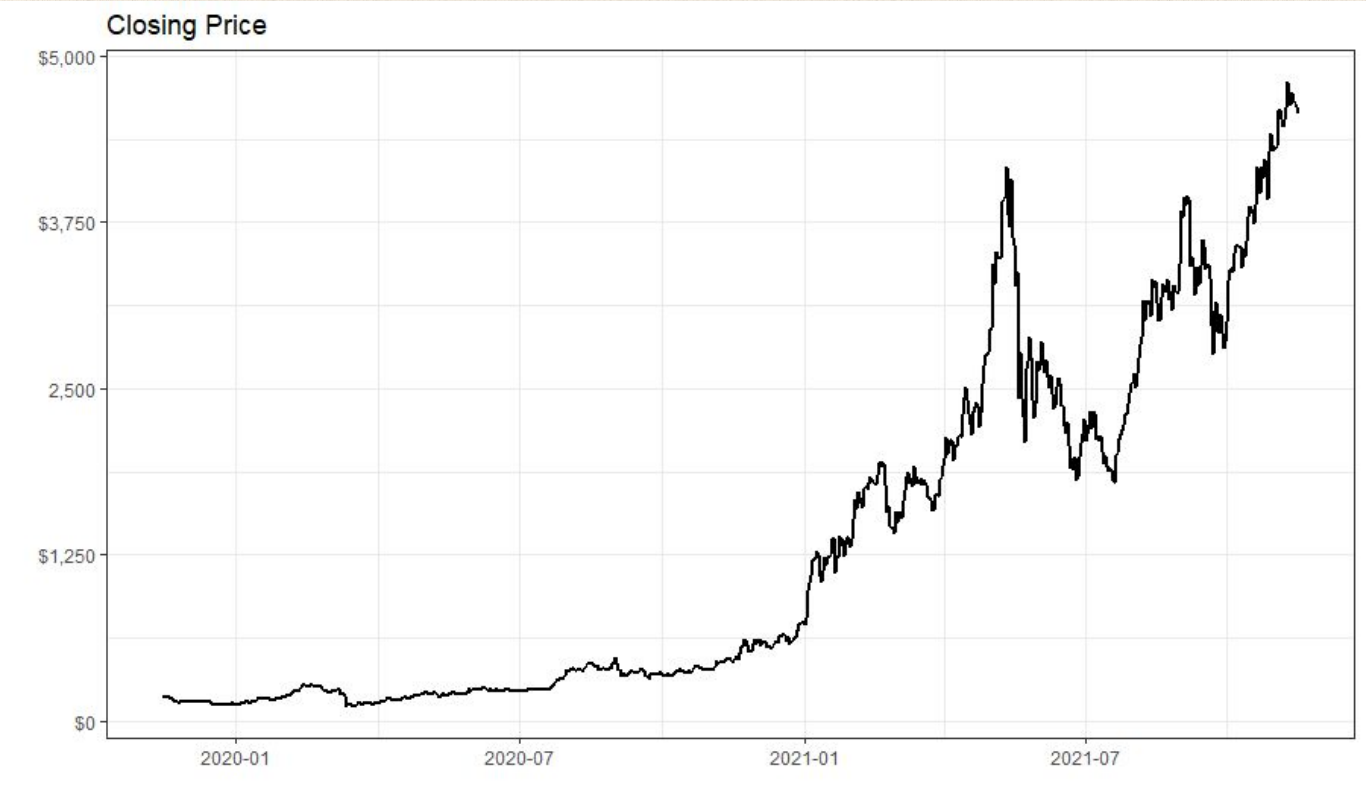
```
> skim(eth_df)
-- Data Summary ------------------------
                           Values
Name                       eth_df
Number of rows             732
Number of columns          8
_______________________
Column type frequency:
  Date                     1
  numeric                  7
________________________
Group variables            None

-- Variable type: Date ------------------------------------------------------------------------------------------------------
-
# A tibble: 1 x 7
  skim_variable n_missing complete_rate min        max        median     n_unique
* <chr>             <int>         <dbl> <date>     <date>     <date>        <int>
1 Date                  0             1 2019-11-15 2021-11-15 2020-11-14      732

-- Variable type: numeric ---------------------------------------------------------------------------------------------------
-
# A tibble: 7 x 11
  skim_variable n_missing complete_rate        mean         sd      p0        p25         p50         p75       p100 hist
* <chr>             <int>         <dbl>       <dbl>      <dbl>   <dbl>      <dbl>       <dbl>       <dbl>      <dbl> <chr>
1 Close                 0             1    1289.       1303.     108.      228.       467.        2218.       4808.
2 Close_1               0             1    1283.       1298.     108.      228.       463.        2201.       4808.
3 Open_1                0             1    1277.       1293.     108.      227.       462.        2191.       4808.
4 High_1                0             1    1326.       1339.     118.      232.       478.        2290.       4864.
5 Low_1                 0             1    1225.       1243.      88.5     221.       451.        2098.       4715.
6 Vol_1                 0             1 8538739.    9301679.   27030   1647500    5610000    12407500    60700000
7 Change_1              0             1       0.587       5.36   -44.6      -1.97       0.375       3.29       26.0
```

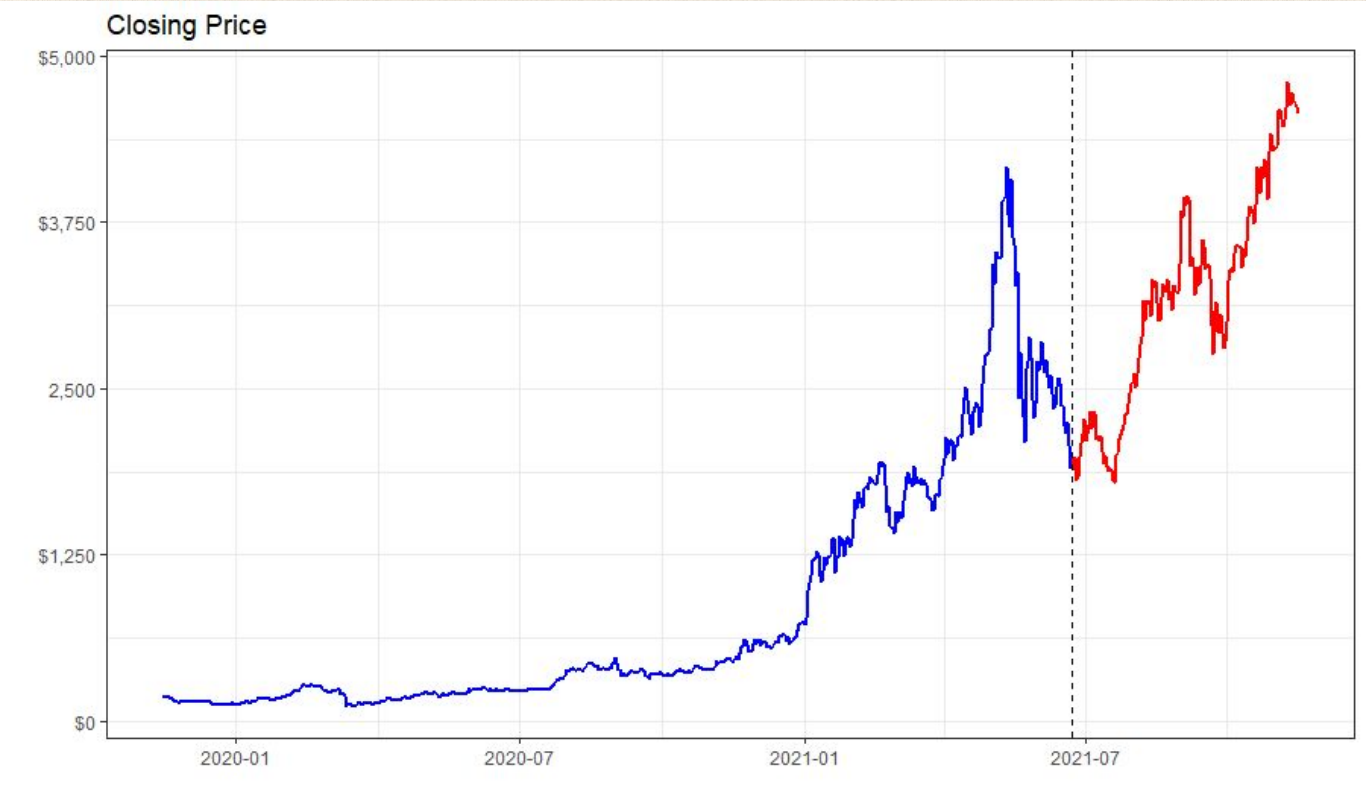
03

Exploratory Data Analysis



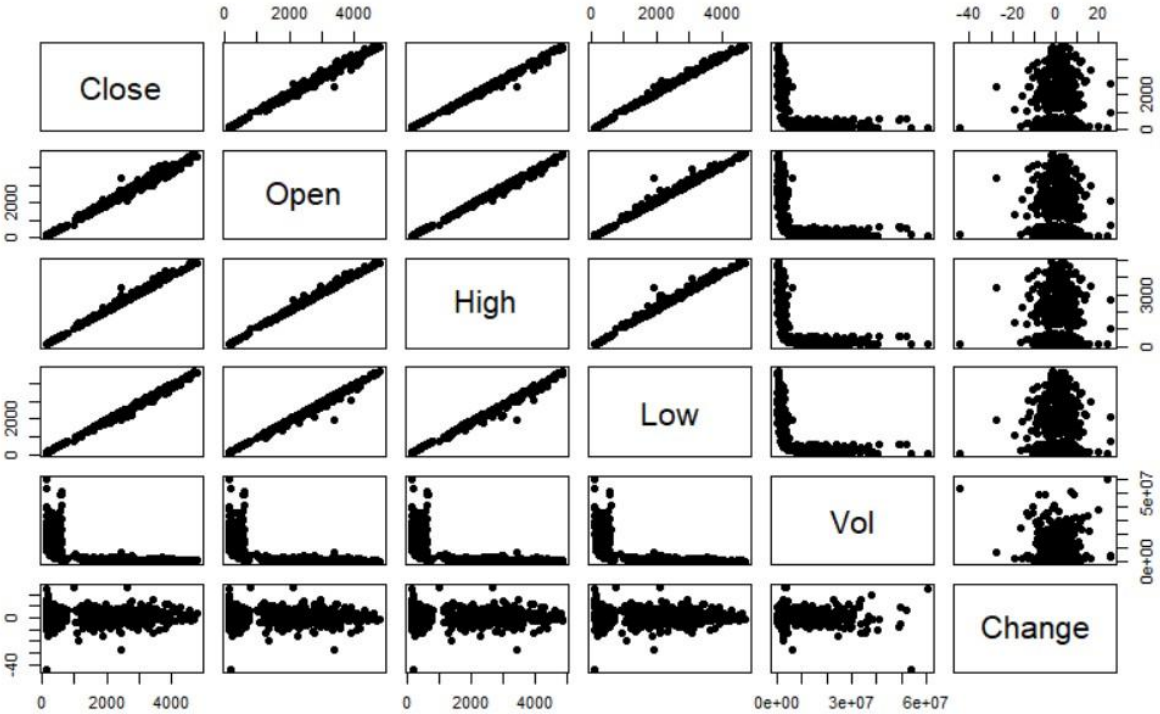
03

Exploratory Data Analysis



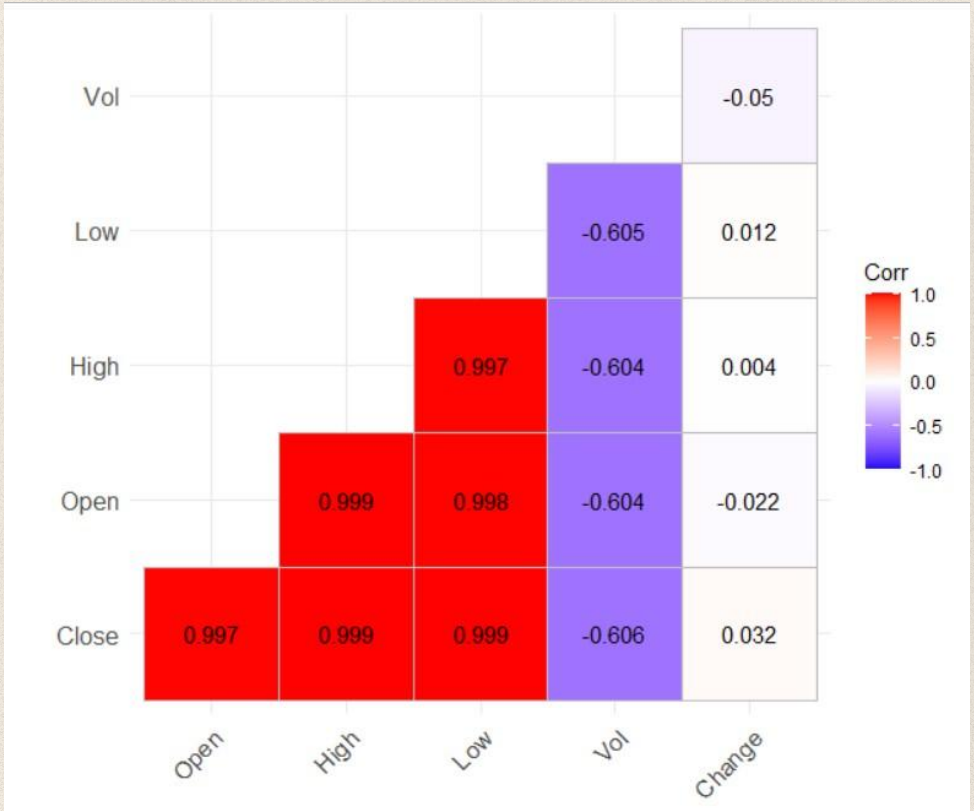
03

Exploratory Data Analysis



03

Exploratory Data Analysis



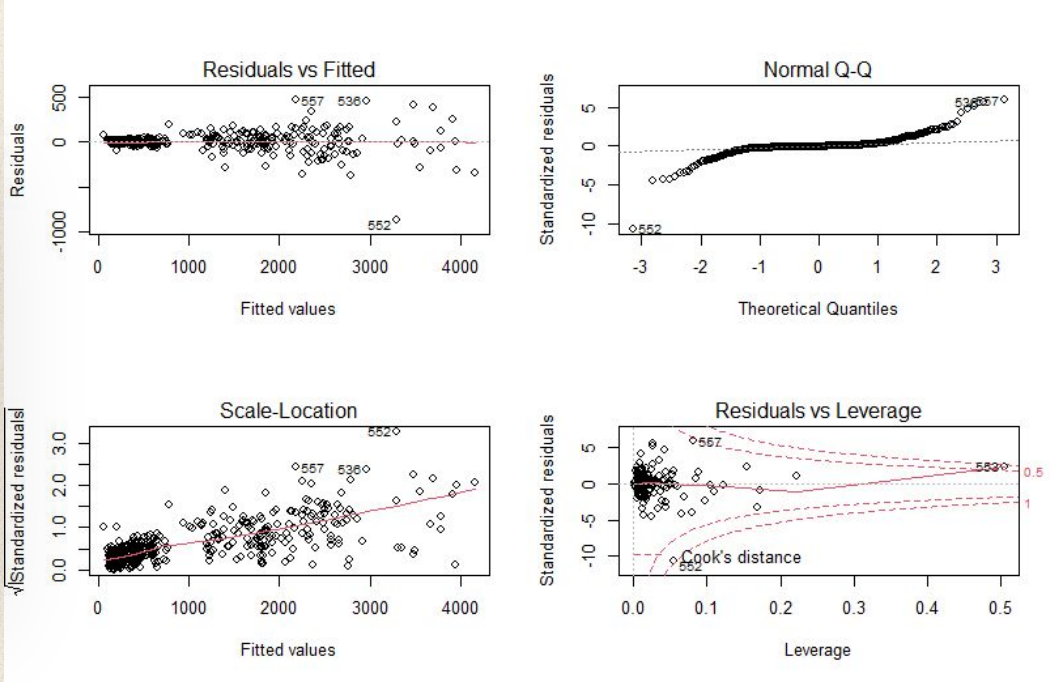
03 Exploratory Data Analysis

```
Call:
lm(formula = Close ~ Close_1 + Open_1 + High_1 + Low_1 + Vol_1 +
    Change_1, data = train)

Residuals:
    Min      1Q  Median      3Q     Max
-863.22  -11.67   -2.66   10.77  468.15

Coefficients:
              Estimate Std. Error t value Pr(>|t|)
(Intercept)  1.086e+01  8.142e+00   1.334  0.18274
Close_1      1.108e+00  1.217e-01   9.107  < 2e-16 ***
Open_1       5.327e-01  1.092e-01   4.880 1.38e-06 ***
High_1      -4.015e-01  1.274e-01  -3.151  0.00171 **
Low_1       -2.394e-01  8.994e-02  -2.662  0.00799 **
Vol_1       -4.403e-07  4.360e-07  -1.010  0.31299
Change_1     1.105e+00  8.737e-01   1.264  0.20666
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 83.61 on 578 degrees of freedom
Multiple R-squared:  0.9916,    Adjusted R-squared:  0.9915
F-statistic: 1.141e+04 on 6 and 578 DF,  p-value: < 2.2e-16
```



lm(Close ~ Close_1+Open_1+High_1+Low_1+Vol_1+Change_1,data = train)

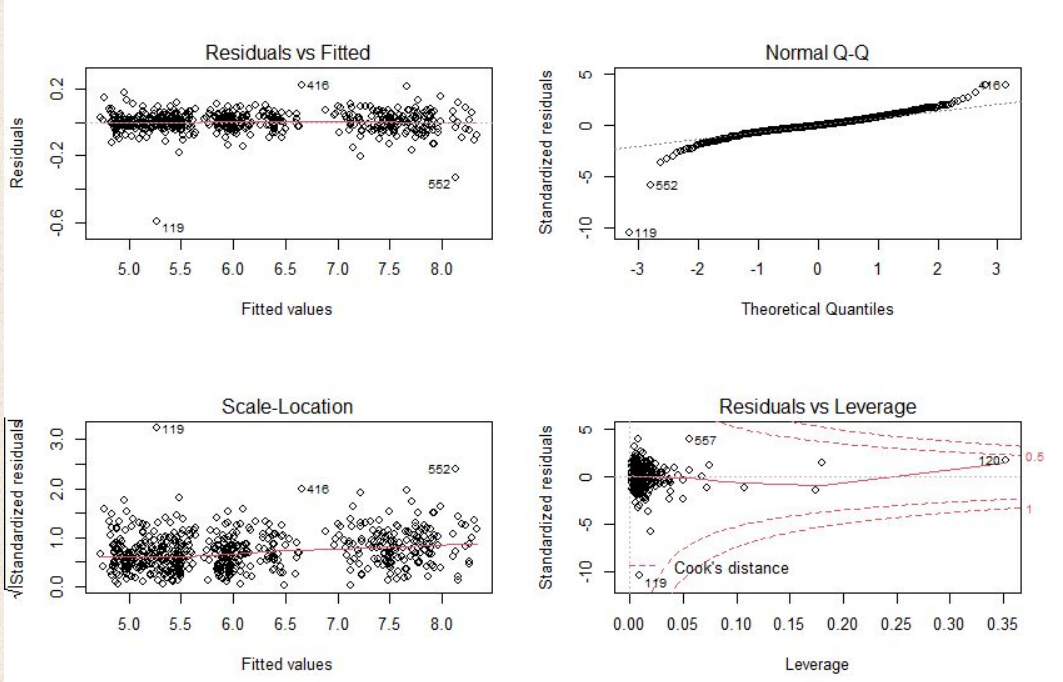
03 Exploratory Data Analysis

```
Call:
lm(formula = log(Close) ~ log(Close_1) + log(Open_1) + log(High_1) +
    log(Low_1) + log(Vol_1), data = train)

Residuals:
     Min       1Q   Median       3Q      Max
-0.59214 -0.02494 -0.00069  0.02801  0.22471

Coefficients:
              Estimate Std. Error t value Pr(>|t|)
(Intercept)   0.219163   0.090052   2.434   0.0152 *
log(Close_1)  0.712644   0.117813   6.049 2.62e-09 ***
log(Open_1)  -0.003627   0.103587  -0.035   0.9721
log(High_1)   0.248257   0.131127   1.893   0.0588 .
log(Low_1)    0.032925   0.094262   0.349   0.7270
log(Vol_1)   -0.010265   0.004270  -2.404   0.0165 *
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.05726 on 579 degrees of freedom
Multiple R-squared:  0.9969,    Adjusted R-squared:  0.9969
F-statistic: 3.739e+04 on 5 and 579 DF,  p-value: < 2.2e-16
```



lm(log(Close)~ log(Close_1)+log(Open_1)+log(High_1)+log(Low_1)+log(Vol_1),data = train)

04

Feature Engineering

04

Feature Engineering

stepAIC {MASS} R Documentation

Choose a model by AIC in a Stepwise Algorithm

Description

Performs stepwise model selection by AIC.

Usage

```
stepAIC(object, scope, scale = 0,
        direction = c("both", "backward", "forward"),
        trace = 1, keep = NULL, steps = 1000, use.start = FALSE,
        k = 2, ...)
```

Package : MASS

Function : stepAIC(object, direction = 'both')

04 Feature Engineering

Features ก่อนการทำ Feature Selection

```
Call:
lm(formula = log(Close) ~ log(Close_1) + log(Open_1) + log(High_1) +
    log(Low_1) + log(Vol_1), data = train)

Residuals:
     Min       1Q   Median       3Q      Max
-0.32290 -0.02481  0.00007  0.02828  0.22036

Coefficients:
              Estimate Std. Error t value Pr(>|t|)
(Intercept)   0.204282   0.080286   2.544   0.0112 *
log(Close_1)  0.896592   0.110580   8.108 3.07e-15 ***
log(Open_1)   0.051873   0.092071   0.563   0.5734
log(High_1)   0.137324   0.124130   1.106   0.2691
log(Low_1)   -0.096905   0.084799  -1.143   0.2536
log(Vol_1)   -0.008706   0.003664  -2.376   0.0178 *
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.05057 on 580 degrees of freedom
Multiple R-squared:  0.9978,    Adjusted R-squared:  0.9978
F-statistic: 5.196e+04 on 5 and 580 DF,  p-value: < 2.2e-16
```

Features ที่ได้หลังจากทำ Feature Selection

```
Call:
lm(formula = log(Close) ~ log(Close_1) + log(High_1) + log(Vol_1),
    data = train)

Residuals:
     Min       1Q   Median       3Q      Max
-0.32712 -0.02504 -0.00066  0.02848  0.22243

Coefficients:
              Estimate Std. Error t value Pr(>|t|)
(Intercept)   0.179087   0.075402   2.375  0.01787 *
log(Close_1)  0.802390   0.065889  12.178  < 2e-16 ***
log(High_1)   0.188007   0.064589   2.911  0.00374 **
log(Vol_1)   -0.007556   0.003435  -2.200  0.02821 *
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.05054 on 582 degrees of freedom
Multiple R-squared:  0.9978,    Adjusted R-squared:  0.9978
F-statistic: 8.669e+04 on 3 and 582 DF,  p-value: < 2.2e-16
```

05

Modeling

05

Modeling

lm {stats} R Documentation

Fitting Linear Models

Description

`lm` is used to fit linear models. It can be used to carry out regression, single stratum analysis of variance and analysis of covariance (although `aov` may provide a more convenient interface for these).

Usage

```
lm(formula, data, subset, weights, na.action,
   method = "qr", model = TRUE, x = FALSE, y = FALSE, qr = TRUE,
   singular.ok = TRUE, contrasts = NULL, offset, ...)
```

Package : stats

Function : lm()

05

Modeling : Train

```
reg_l <- lm(log(Close)~ log(Close_1)+log(High_1)+log(Vol_1),data = train)
summary(reg_l)
```

```
Call:
lm(formula = log(Close) ~ log(Close_1) + log(High_1) + log(Vol_1),
    data = train)

Residuals:
     Min       1Q   Median       3Q      Max
-0.32712 -0.02504 -0.00066  0.02848  0.22243

Coefficients:
              Estimate Std. Error t value Pr(>|t|)
(Intercept)   0.179087   0.075402   2.375  0.01787 *
log(Close_1)  0.802390   0.065889  12.178  < 2e-16 ***
log(High_1)   0.188007   0.064589   2.911  0.00374 **
log(Vol_1)   -0.007556   0.003435  -2.200  0.02821 *
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.05054 on 582 degrees of freedom
Multiple R-squared:  0.9978,    Adjusted R-squared:  0.9978
F-statistic: 8.669e+04 on 3 and 582 DF,  p-value: < 2.2e-16
```

05 Modeling : Test

```
pred.d1 <- predict(reg_l,newdata=test)
```

```
> pred.d1
      587       588       589       590       591       592       593       594       595       596       597       598       599
 5.115065  5.140067  4.968561  4.976520  4.960071  4.962350  4.916515  4.898701  4.892457  4.846954  4.882643  4.899500  4.936779
      600       601       602       603       604       605       606       607       608       609       610       611       612
 4.924487  4.939860  4.916232  4.832490  4.896667  4.917301  4.917065  4.773301  4.765437  4.732624  4.838203  4.830706  4.901117
      613       614       615       616       617       618       619       620       621       622       623       624       625
 4.792524  5.279755  5.306278  5.315303  5.326660  5.481169  5.501054  5.436575  5.419323  5.419019  5.448597  5.393935  5.397014
      626       627       628       629       630       631       632       633       634       635       636       637       638
 5.429408  5.432976  5.430548  5.522350  5.588388  5.615950  5.572206  5.581545  5.553532  5.574097  5.641483  5.586697  5.567412
      639       640       641       642       643       644       645       646       647       648       649       650       651
 5.592609  5.651859  5.596374  5.585541  5.469129  5.413803  5.435841  5.413629  5.411776  5.366704  5.323992  5.249768  5.256509
      652       653       654       655       656       657       658       659       660       661       662       663       664
 5.247937  5.218637  5.204586  5.225530  5.169968  5.175245  5.145508  5.131717  5.089394  5.098372  5.104116  5.135379  5.139687
      665       666       667       668       669       670       671       672       673       674       675       676       677
 5.127102  5.134035  5.169125  5.144469  5.109898  5.119021  5.118469  4.980672  4.996156  4.975024  4.982813  4.940636  4.963607
      678       679       680       681       682       683       684       685       686       687       688       689       690
 4.973178  4.977451  4.922053  4.911439  4.907529  4.860644  4.886694  4.876319  4.896343  4.912269  4.865992  4.849757  4.852274
      691       692       693       694       695       696       697       698       699       700       701       702       703
 4.843379  4.864614  4.870209  4.893479  4.861721  4.867976  4.871176  4.896190  4.827728  4.908387  4.970054  4.969033  4.985891
      704       705       706       707       708       709       710       711       712       713       714       715       716
 4.985947  4.979306  4.994643  5.010830  5.029378  5.011845  5.014045  5.011630  4.996354  5.008896  5.016536  5.028328  5.037551
      717       718       719       720       721       722       723       724       725       726       727       728       729
 5.052331  5.031558  5.038640  5.006082  4.994720  4.971266  5.036846  5.028793  5.106659  5.176213  5.182108  5.198475  5.226109
      730       731       732
 5.216737  5.206211  5.232872
```

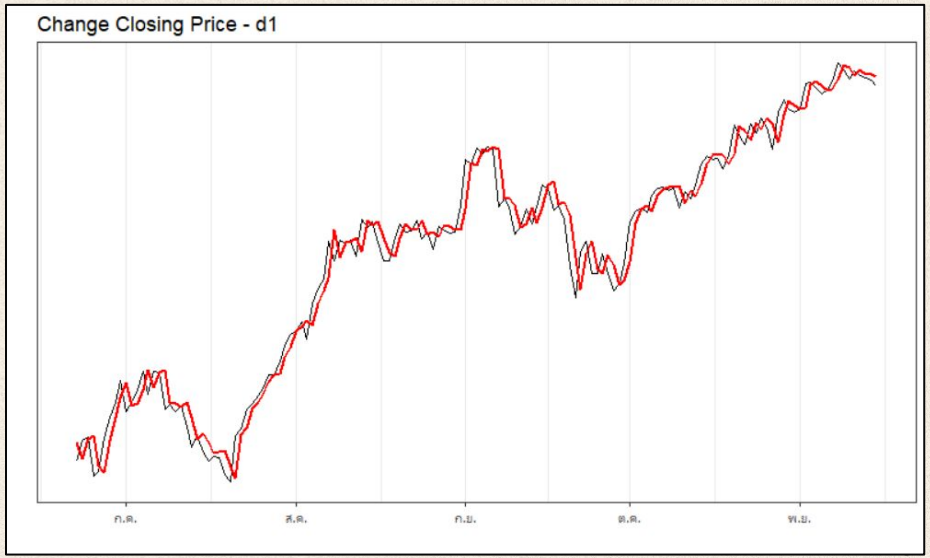
06

Result & Evaluation

1 Day

Features ที่ใช้

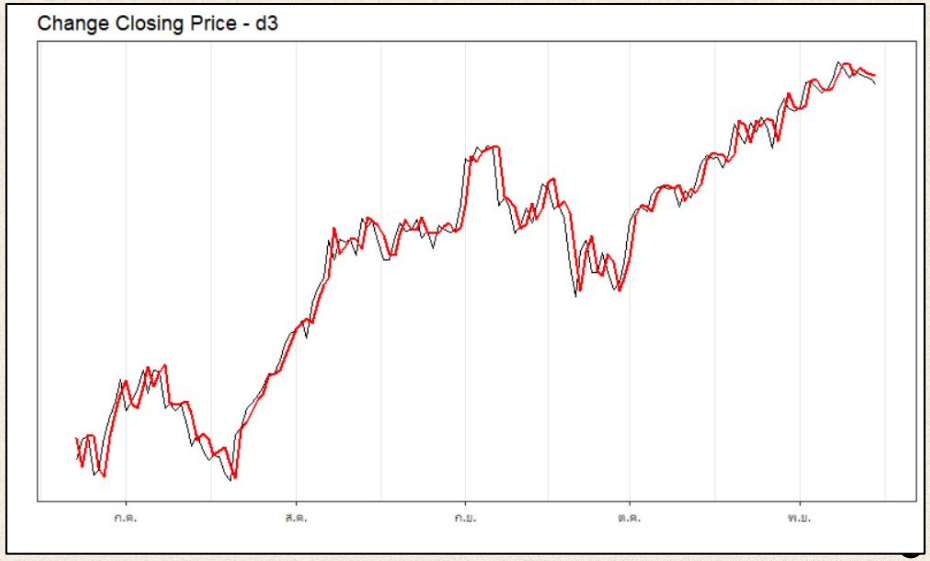
```
Coefficients:
              Estimate Std. Error t value Pr(>|t|)
(Intercept)   0.233027   0.084842   2.747  0.00621 **
log(Close_1)  0.742924   0.061245  12.130  < 2e-16 ***
log(High_1)   0.246412   0.060011   4.106  4.6e-05 ***
log(Vol_1)   -0.010897   0.004036  -2.700  0.00714 **
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
```



3 Days

Features ที่ใช้

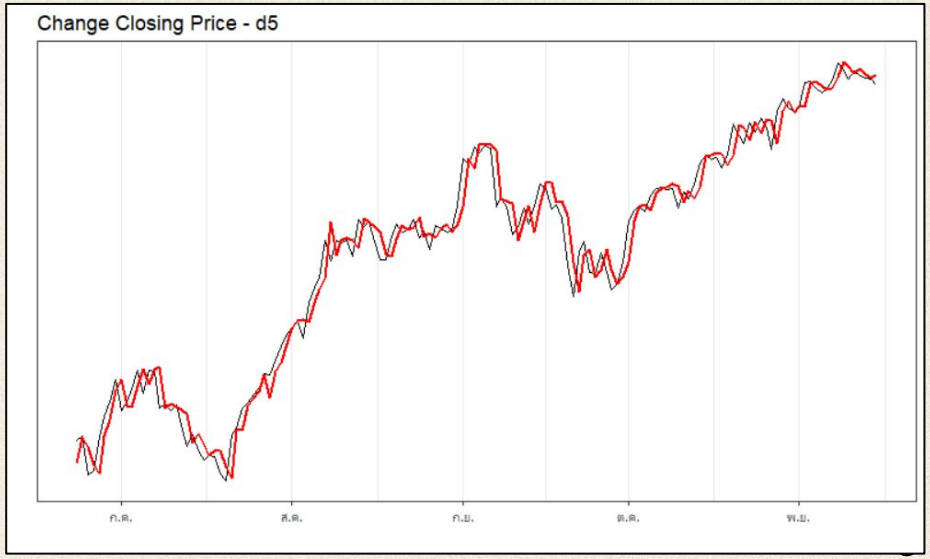
```
Coefficients:
              Estimate Std. Error t value Pr(>|t|)
(Intercept)   0.243591   0.087020   2.799  0.00529 **
log(Close_1)  0.716665   0.061380  11.676  < 2e-16 ***
log(High_1)   0.373821   0.075410   4.957 9.41e-07 ***
log(Vol_1)   -0.011458   0.004125  -2.778  0.00565 **
log(Close_3) -0.221732   0.073170  -3.030  0.00255 **
log(Low_3)    0.120367   0.061035   1.972  0.04907 *
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
```



5 Days

Features ที่ใช้

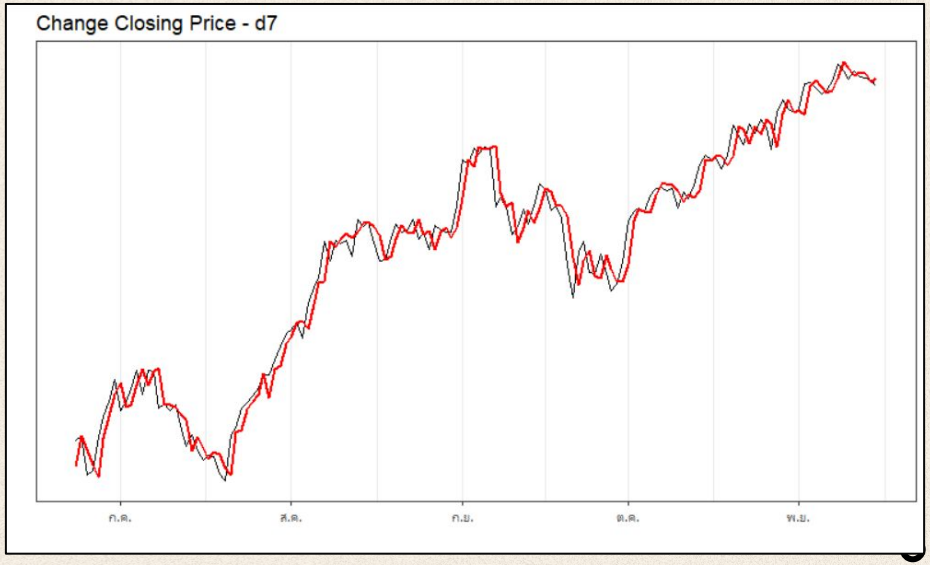
```
Coefficients:
              Estimate Std. Error t value Pr(>|t|)
(Intercept)   0.244321   0.086638   2.820  0.00497 **
log(Close_1)  0.728824   0.063001  11.568  < 2e-16 ***
log(High_1)   0.388957   0.090628   4.292 2.08e-05 ***
log(Vol_1)   -0.011302   0.004105  -2.753  0.00608 **
log(High_2)  -0.135038   0.071682  -1.884  0.06009 .
log(Open_3)  -7.308768   4.951996  -1.476  0.14051
log(Close_4)  7.522137   4.955539   1.518  0.12958
log(High_4)  -0.178338   0.074402  -2.397  0.01685 *
log(Open_5)   0.085285   0.049910   1.709  0.08803 .
log(Low_5)   -0.114467   0.053709  -2.131  0.03349 *
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
```



7 Days

Features ที่ใช้

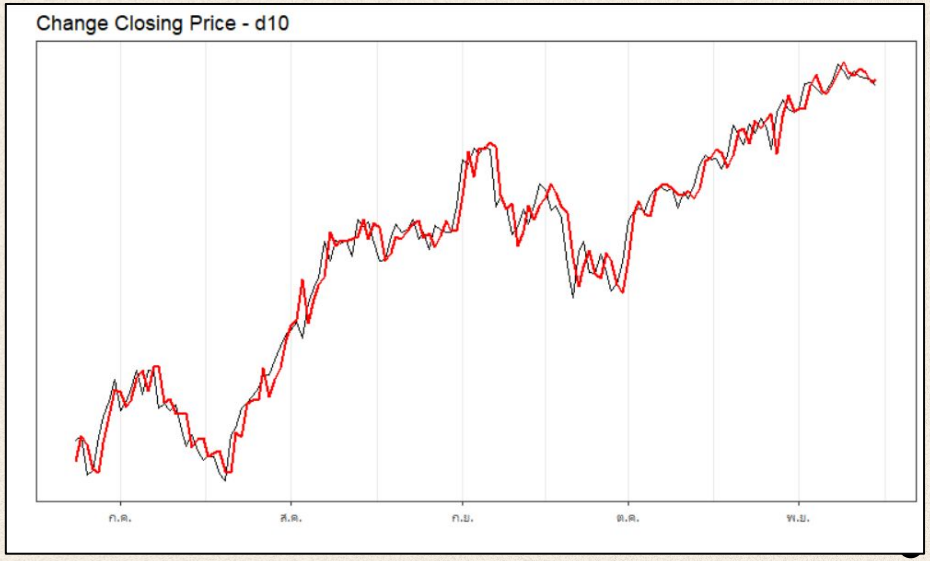
```
Coefficients:
              Estimate Std. Error t value Pr(>|t|)
(Intercept)    0.26543    0.08974   2.958  0.00323 **
log(Close_1)   0.78206    0.06005  13.023  < 2e-16 ***
log(Open_1)    0.16470    0.07804   2.110  0.03525 *
log(High_1)    0.21608    0.10104   2.139  0.03289 *
log(High_2)   -0.19464    0.07847  -2.480  0.01341 *
log(Open_3)   -8.09411    4.99235  -1.621  0.10551
log(Close_4)   8.32606    4.99794   1.666  0.09628 .
log(High_4)   -0.20136    0.07940  -2.536  0.01148 *
log(Low_5)    -0.09144    0.05737  -1.594  0.11156
log(Close_6)   0.23530    0.07799   3.017  0.00267 **
log(Low_6)    -0.16153    0.07709  -2.095  0.03658 *
log(Vol_6)    -0.01207    0.00424  -2.847  0.00458 **
log(Close_7)   0.12591    0.07832   1.608  0.10844
log(Low_7)    -0.12030    0.06308  -1.907  0.05698 .
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
```



10 Days

Features ที่ใช้

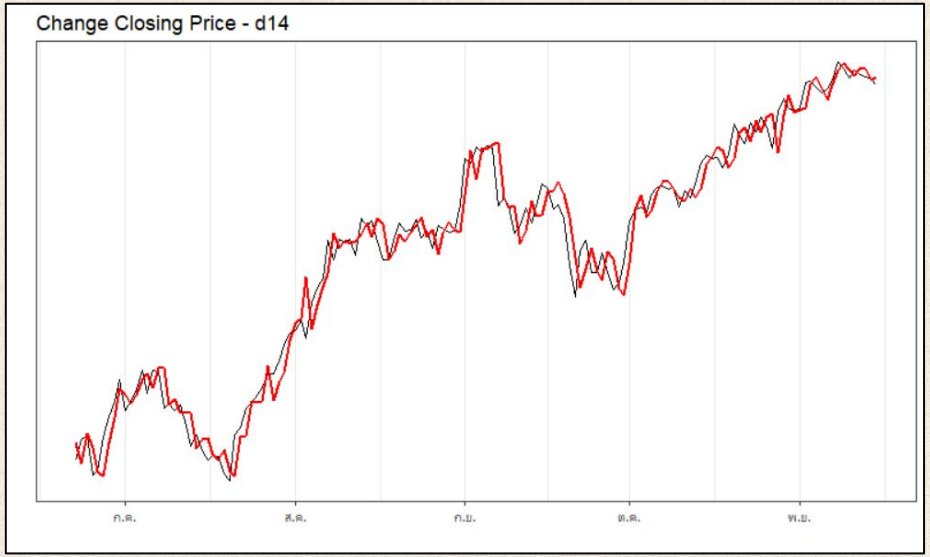
```
Coefficients:
               Estimate Std. Error t value Pr(>|t|)
(Intercept)     0.250730   0.106746   2.349 0.019175 *
log(Close_1)    0.724662   0.062983  11.506  < 2e-16 ***
log(Open_1)     0.125799   0.079888   1.575 0.115887
log(High_1)     0.336536   0.108556   3.100 0.002031 **
log(Vol_1)     -0.008796   0.005033  -1.748 0.081073 .
log(High_2)    -0.190391   0.077825  -2.446 0.014733 *
log(Open_3)    -8.406780   4.800125  -1.751 0.080426 .
log(Close_4)    8.609813   4.805053   1.792 0.073697 .
log(High_4)    -0.194265   0.078590  -2.472 0.013735 *
log(Low_5)     -0.090047   0.047824  -1.883 0.060228 .
log(High_6)     0.246547   0.064166   3.842 0.000136 ***
log(Vol_6)     -0.012255   0.005399  -2.270 0.023597 *
log(Low_7)     -0.212934   0.054568  -3.902 0.000107 ***
log(High_8)    -0.190429   0.068116  -2.796 0.005356 **
log(Low_8)      0.105176   0.061935   1.698 0.090029 .
log(Vol_8)      0.009510   0.005359   1.774 0.076534 .
log(Open_9)    14.576301   4.773404   3.054 0.002367 **
log(Low_9)      0.157443   0.064455   2.443 0.014884 *
log(Close_10) -14.586211   4.778226  -3.053 0.002375 **
log(Open_10)   -0.193005   0.067652  -2.853 0.004491 **
log(High_10)    0.169724   0.101166   1.678 0.093965 .
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
```



14 Days

Features ที่ใช้

```
Coefficients:
               Estimate Std. Error t value Pr(>|t|)
(Intercept)     0.248204   0.107239   2.314 0.021002 *
log(Close_1)    0.727727   0.062559  11.633  < 2e-16 ***
log(Open_1)     0.161585   0.080292   2.012 0.044648 *
log(High_1)     0.309160   0.107533   2.875 0.004194 **
log(Vol_1)     -0.007463   0.005005  -1.491 0.136501
log(High_2)    -0.187494   0.077126  -2.431 0.015371 *
log(Open_3)    -7.767639   4.803310  -1.617 0.106411
log(Close_4)    7.969238   4.808057   1.657 0.097983 .
log(High_4)    -0.266521   0.073471  -3.628 0.000312 ***
log(High_6)     0.292687   0.068627   4.265 2.35e-05 ***
log(Low_6)     -0.109404   0.053526  -2.044 0.041425 *
log(Vol_6)     -0.014583   0.005579  -2.614 0.009192 **
log(Low_7)     -0.171298   0.059752  -2.867 0.004302 **
log(High_8)    -0.208933   0.067955  -3.075 0.002211 **
log(Low_8)      0.132575   0.063014   2.104 0.035833 *
log(Vol_8)      0.010851   0.005392   2.013 0.044633 *
log(Open_9)    13.841550   4.808442   2.879 0.004147 **
log(Low_9)      0.117280   0.064486   1.819 0.069492 .
log(Close_10) -13.742177   4.812517  -2.856 0.004456 **
log(Low_11)    -0.198643   0.054195  -3.665 0.000271 ***
log(Close_12)   0.129397   0.078317   1.652 0.099050 .
log(Low_12)    -0.119359   0.073995  -1.613 0.107294
log(Close_13)   0.142180   0.063980   2.222 0.026664 *
log(Open_14)    0.123074   0.065997   1.865 0.062729 .
log(High_14)   -0.187304   0.078488  -2.386 0.017345 *
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
```



Evaluation

	R^2	MSE	RMSE
1 day	0.9584182	0.003246071	0.0569743
3 days	0.9577216	0.003189059	0.05647176
5 days	0.958034	0.003114937	0.05581162
7 days	0.9585714	0.00305785	0.05529783
10 days	0.9548292	0.002864176	0.05351799
14 days	0.9526409	0.002794	0.0528583

Thanks!

620710405 นางสาวณัฐธิดา ลาภธนชัย

620710745 นางสาวอาทิตยา ชมทอง

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