

BTC-Technical-Indicators-Walkthrough

September 29, 2021

1 Technical Indicators

Adding technical indicator values

1.0.1 Importing Libraries and Data

```
[8]: import pandas as pd
import _pickle as pickle
import numpy as np
import matplotlib.pyplot as plt
plt.style.use('bmh')
```

```
[9]: df = pd.read_csv('BTC-USD.csv')

# Viewing the DF
df
```

```
[9]:
```

	Date	Open	High	Low	Close \
0	2014-09-17	465.864014	468.174011	452.421997	457.334015
1	2014-09-18	456.859985	456.859985	413.104004	424.440002
2	2014-09-19	424.102997	427.834991	384.532013	394.795990
3	2014-09-20	394.673004	423.295990	389.882996	408.903992
4	2014-09-21	408.084991	412.425995	393.181000	398.821014
5	2014-09-22	399.100006	406.915985	397.130005	402.152008
6	2014-09-23	402.092010	441.557007	396.196991	435.790985
7	2014-09-24	435.751007	436.112000	421.131989	423.204987
8	2014-09-25	423.156006	423.519989	409.467987	411.574005
9	2014-09-26	411.428986	414.937988	400.009003	404.424988
10	2014-09-27	403.556000	406.622986	397.372009	399.519989
11	2014-09-28	399.471008	401.016998	374.332001	377.181000
12	2014-09-29	376.928009	385.210999	372.239990	375.467010
13	2014-09-30	376.088013	390.976990	373.442993	386.944000
14	2014-10-01	387.427002	391.378998	380.779999	383.614990
15	2014-10-02	383.988007	385.497009	372.946014	375.071991
16	2014-10-03	375.181000	377.695007	357.859009	359.511993
17	2014-10-04	359.891998	364.487000	325.885986	328.865997
18	2014-10-05	328.915985	341.800995	289.295990	320.510010
19	2014-10-06	320.389008	345.134003	302.559998	330.079010

20	2014-10-07	330.584015	339.247009	320.481995	336.187012
21	2014-10-08	336.115997	354.364014	327.187988	352.940002
22	2014-10-09	352.747986	382.726013	347.687012	365.026001
23	2014-10-10	364.687012	375.066986	352.963013	361.562012
24	2014-10-11	361.362000	367.191010	355.950989	362.299011
25	2014-10-12	362.605988	379.433014	356.144012	378.549011
26	2014-10-13	377.920990	397.226013	368.897003	390.414001
27	2014-10-14	391.691986	411.697998	391.324005	400.869995
28	2014-10-15	400.954987	402.226990	388.765991	394.773010
29	2014-10-16	394.518005	398.807007	373.070007	382.556000

...
1975	2020-02-13	10323.960938	10457.626953	10116.161133	10214.379883
1976	2020-02-14	10211.550781	10321.996094	10125.534180	10312.116211
1977	2020-02-15	10313.856445	10341.555664	9874.427734	9889.424805
1978	2020-02-16	9889.179688	10053.968750	9722.386719	9934.433594
1979	2020-02-17	9936.560547	9938.815430	9507.637695	9690.142578
1980	2020-02-18	9691.230469	10161.935547	9632.382813	10141.996094
1981	2020-02-19	10143.798828	10191.675781	9611.223633	9633.386719
1982	2020-02-20	9629.325195	9643.216797	9507.900391	9608.475586
1983	2020-02-21	9611.782227	9723.014648	9589.743164	9686.441406
1984	2020-02-22	9687.707031	9698.231445	9600.728516	9663.181641
1985	2020-02-23	9663.318359	9937.404297	9657.791016	9924.515625
1986	2020-02-24	9921.583008	9951.746094	9537.042969	9650.174805
1987	2020-02-25	9651.312500	9652.737305	9305.021484	9341.705078
1988	2020-02-26	9338.290039	9354.778320	8704.426758	8820.522461
1989	2020-02-27	8825.093750	8932.892578	8577.199219	8784.494141
1990	2020-02-28	8788.728516	8890.456055	8492.932617	8672.455078
1991	2020-02-29	8671.212891	8775.631836	8599.508789	8599.508789
1992	2020-03-01	8599.758789	8726.796875	8471.212891	8562.454102
1993	2020-03-02	8563.264648	8921.308594	8532.630859	8869.669922
1994	2020-03-03	8865.387695	8901.598633	8704.990234	8787.786133
1995	2020-03-04	8788.541992	8843.366211	8712.431641	8755.246094
1996	2020-03-05	8760.285156	9142.054688	8757.253906	9078.762695
1997	2020-03-06	9078.308594	9167.695313	9032.079102	9122.545898
1998	2020-03-07	9121.600586	9163.220703	8890.744141	8909.954102
1999	2020-03-08	8908.206055	8914.343750	8105.252930	8108.116211
2000	2020-03-09	8111.146484	8177.793457	7690.098145	7923.644531
2001	2020-03-10	7922.146973	8136.945313	7814.763184	7909.729492
2002	2020-03-11	7910.089844	7950.814453	7642.812500	7911.430176
2003	2020-03-12	7913.616211	7929.116211	4860.354004	4970.788086
2004	2020-03-13	5032.356934	5837.304688	4121.311035	5095.102539

	Adj Close	Volume
0	457.334015	21056800
1	424.440002	34483200
2	394.795990	37919700
3	408.903992	36863600

4	398.821014	26580100
5	402.152008	24127600
6	435.790985	45099500
7	423.204987	30627700
8	411.574005	26814400
9	404.424988	21460800
10	399.519989	15029300
11	377.181000	23613300
12	375.467010	32497700
13	386.944000	34707300
14	383.614990	26229400
15	375.071991	21777700
16	359.511993	30901200
17	328.865997	47236500
18	320.510010	83308096
19	330.079010	79011800
20	336.187012	49199900
21	352.940002	54736300
22	365.026001	83641104
23	361.562012	43665700
24	362.299011	13345200
25	378.549011	17552800
26	390.414001	35221400
27	400.869995	38491500
28	394.773010	25267100
29	382.556000	26990000
...
1975	10214.379883	49356071372
1976	10312.116211	43338264161
1977	9889.424805	43865054831
1978	9934.433594	43374780305
1979	9690.142578	45998298412
1980	10141.996094	47271023953
1981	9633.386719	46992019709
1982	9608.475586	44925260236
1983	9686.441406	40930547512
1984	9663.181641	35838025154
1985	9924.515625	41185185761
1986	9650.174805	45080496648
1987	9341.705078	42515259129
1988	8820.522461	50420050761
1989	8784.494141	45470195695
1990	8672.455078	44605450442
1991	8599.508789	35792392544
1992	8562.454102	35349164300
1993	8869.669922	42857674408
1994	8787.786133	42386715820

1995	8755.246094	34746706368
1996	9078.762695	39698054597
1997	9122.545898	40826885650
1998	8909.954102	36216930369
1999	8108.116211	39973102120
2000	7923.644531	46936995808
2001	7909.729492	42213940993
2002	7911.430176	38682762604
2003	4970.788086	53980357243
2004	5095.102539	70775234560

[2005 rows x 7 columns]

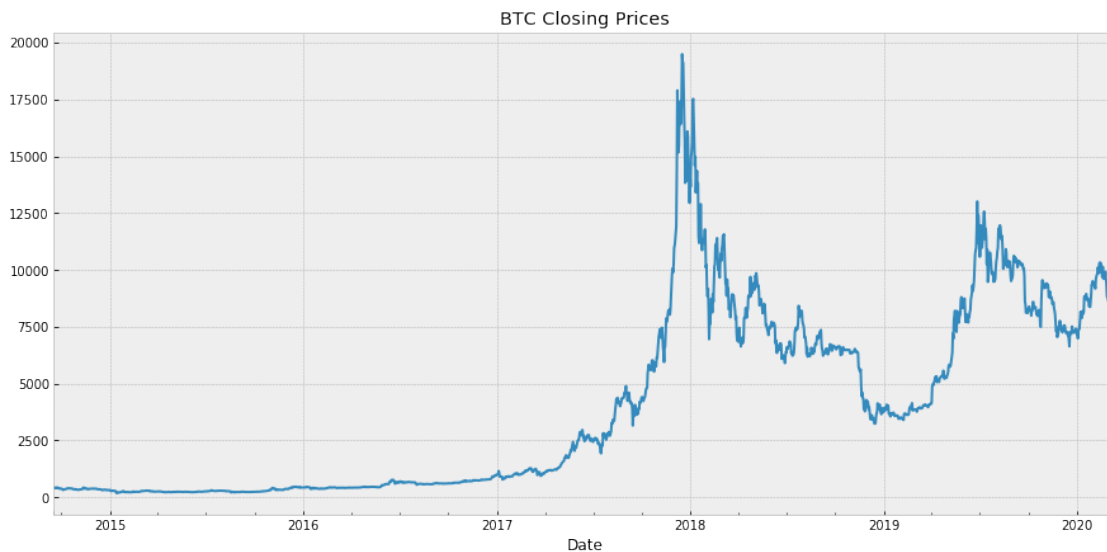
1.0.2 Datetime Conversion

```
[10]: # Datetime conversion
df['Date'] = pd.to_datetime(df.Date)

# Setting the index
df.set_index('Date', inplace=True)
```

1.1 Charting Values

```
[11]: # Viewing the Chart of Closing Values
df['Close'].plot(figsize=(15,7), title='BTC Closing Prices');
```



1.2 Creating the Technical Indicators

```
[12]: def SMA(df, periods=50):  
    """  
    Calculating the Simple Moving Average for the past n days  
  
    **Values must be descending**  
    """  
    lst = []  
  
    for i in range(len(df)):  
        if i < periods:  
  
            # Appending NaNs for instances unable to look back on  
            lst.append(np.nan)  
  
        else:  
            # Calculating the SMA  
            lst.append(round(np.mean(df[i:periods+i]), 2))  
  
    return lst
```

```
[13]: def Stoch(closes, lows, highs, periods=14, d_periods=3):  
    """  
    Calculating the Stochastic Oscillator for the past n days  
  
    **Values must be descending**  
    """  
    k_lst = []  
  
    d_lst = []  
  
    for i in range(len(closes)):  
        if i < periods:  
  
            # Appending NaNs for instances unable to look back on  
            k_lst.append(np.nan)  
  
            d_lst.append(np.nan)  
  
        else:  
  
            # Calculating the Stochastic Oscillator  
  
            # Calculating the %K line  
            highest = max(highs[i:periods+i])  
            lowest = min(lows[i:periods+i])
```

```

k = ((closes[i] - lowest) / (highest - lowest)) * 100

k_lst.append(round(k, 2))

# Calculating the %D line
if len(k_lst) < d_periods:
    d_lst.append(np.nan)
else:
    d_lst.append(round(np.mean(k_lst[-d_periods-1:-1])))

return k_lst, d_lst

```

```

[14]: def RSI(df, periods=14):
    """
    Calculates the Relative Strength Index

    **Values must be descending**
    """

    df = df.diff()

    lst = []

    for i in range(len(df)):
        if i < periods:

            # Appending NaNs for instances unable to look back on
            lst.append(np.nan)

        else:

            # Calculating the Relative Strength Index
            avg_gain = (sum([x for x in df[i:periods+i] if x >= 0]) / periods)
            avg_loss = (sum([abs(x) for x in df[i:periods+i] if x <= 0], .
↪00001) / periods)

            rs = avg_gain / avg_loss

            rsi = 100 - (100 / (1 + rs))

            lst.append(round(rsi, 2))

    return lst

```

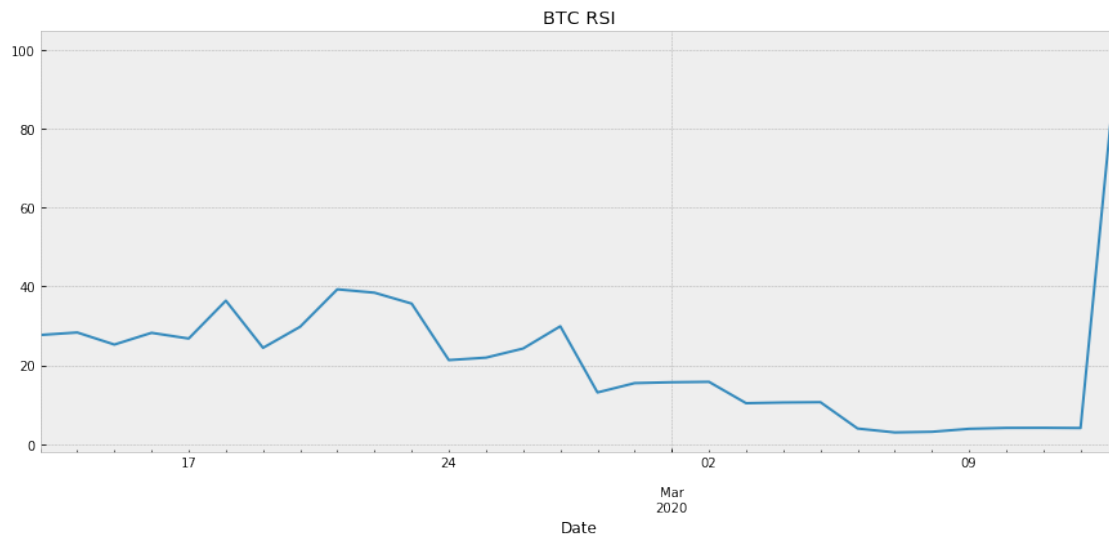
1.3 Creating New Values and Plotting

Based on the Indicators

RSI Indicator

```
[15]: df['RSI'] = RSI(df.Close)

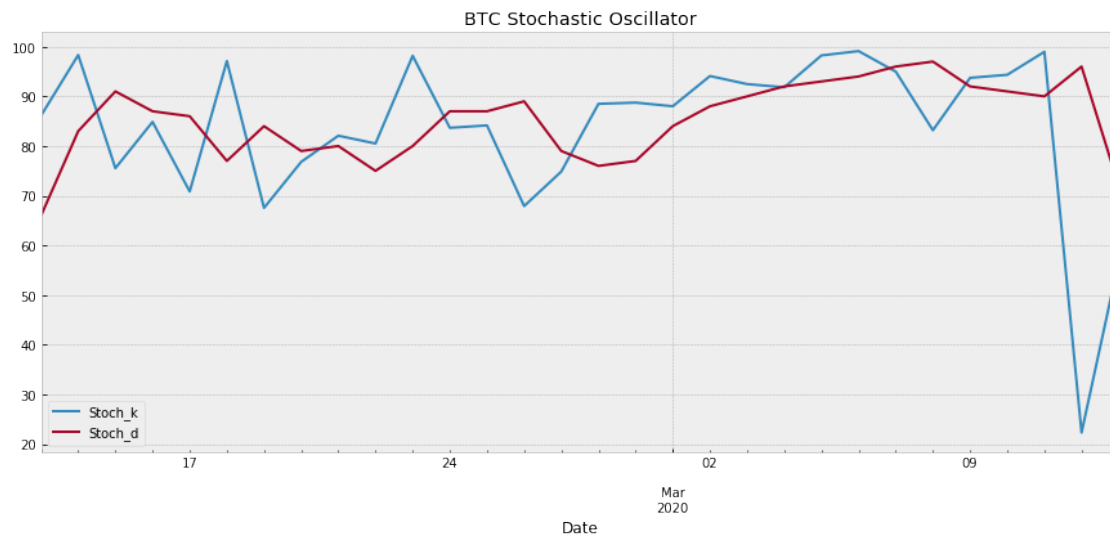
# Plotting
df['RSI'][-30:].plot(figsize=(15,6), title='BTC RSI');
```



Stochastic Oscillator

```
[16]: df['Stoch_k'], df['Stoch_d'] = Stoch(df.Close, df.Low, df.High)

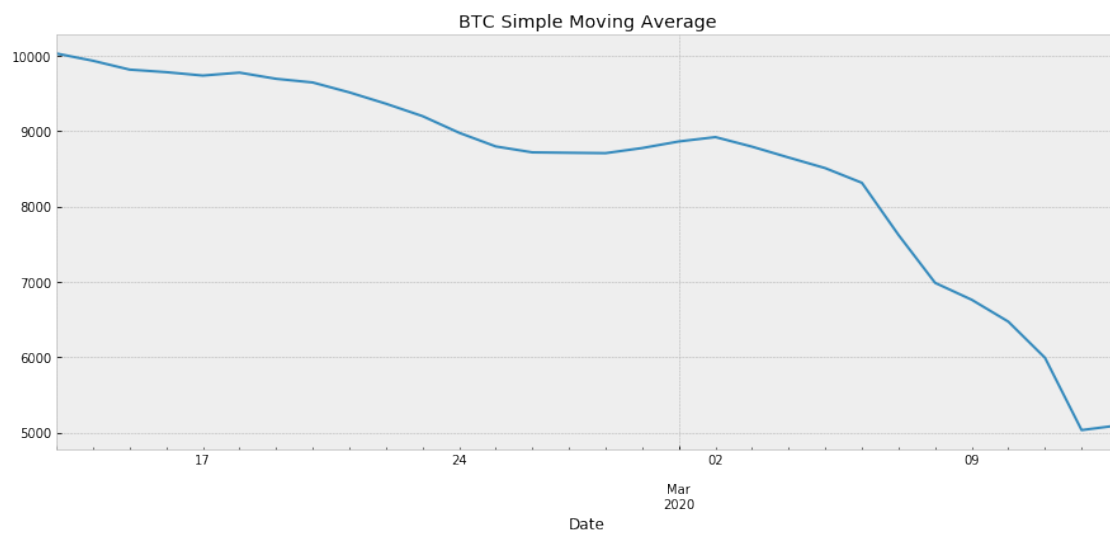
# Plotting
df[-30:].plot(y=['Stoch_k', 'Stoch_d'], figsize=(15,6), title='BTC Stochastic_
↪Oscillator');
```



Simple Moving Average

```
[17]: df['SMA'] = SMA(df.Close, 6)

# Plotting
df['SMA'][-30:].plot(figsize=(15,6), title='BTC Simple Moving Average');
```



```
[18]: df.tail(10)
```

```
[18]:
```

Date	Open	High	Low	Close	Adj Close	\
2020-04-10	5000.0	5000.0	5000.0	5000.0	5000.0	
2020-04-09	5000.0	5000.0	5000.0	5000.0	5000.0	
2020-04-08	5000.0	5000.0	5000.0	5000.0	5000.0	
2020-04-07	5000.0	5000.0	5000.0	5000.0	5000.0	
2020-04-06	5000.0	5000.0	5000.0	5000.0	5000.0	
2020-04-05	5000.0	5000.0	5000.0	5000.0	5000.0	
2020-04-04	5000.0	5000.0	5000.0	5000.0	5000.0	
2020-04-03	5000.0	5000.0	5000.0	5000.0	5000.0	
2020-04-02	5000.0	5000.0	5000.0	5000.0	5000.0	
2020-04-01	5000.0	5000.0	5000.0	5000.0	5000.0	

2020-03-04	8788.541992	8843.366211	8712.431641	8755.246094	8755.246094
2020-03-05	8760.285156	9142.054688	8757.253906	9078.762695	9078.762695
2020-03-06	9078.308594	9167.695313	9032.079102	9122.545898	9122.545898
2020-03-07	9121.600586	9163.220703	8890.744141	8909.954102	8909.954102
2020-03-08	8908.206055	8914.343750	8105.252930	8108.116211	8108.116211
2020-03-09	8111.146484	8177.793457	7690.098145	7923.644531	7923.644531
2020-03-10	7922.146973	8136.945313	7814.763184	7909.729492	7909.729492
2020-03-11	7910.089844	7950.814453	7642.812500	7911.430176	7911.430176
2020-03-12	7913.616211	7929.116211	4860.354004	4970.788086	4970.788086
2020-03-13	5032.356934	5837.304688	4121.311035	5095.102539	5095.102539

	Volume	RSI	Stoch_k	Stoch_d	SMA
Date					
2020-03-04	34746706368	10.54	91.83	92.0	8649.71
2020-03-05	39698054597	10.62	98.24	93.0	8508.79
2020-03-06	40826885650	3.93	99.11	94.0	8314.24
2020-03-07	36216930369	2.94	94.98	96.0	7622.28
2020-03-08	39973102120	3.10	83.18	97.0	6986.47
2020-03-09	46936995808	3.86	93.73	92.0	6762.14
2020-03-10	42213940993	4.09	94.34	91.0	6471.76
2020-03-11	38682762604	4.11	98.97	90.0	5992.44
2020-03-12	53980357243	4.06	22.31	96.0	5032.95
2020-03-13	70775234560	100.00	56.75	72.0	5095.10

1.4 Using a Technical Analysis Python Library

```
[19]: # Importing Library
import ta
```

```
[20]: # TA's RSI
df['ta_rsi'] = ta.momentum.rsi(df.Close)

# TA's Stochastic Oscillator
df['ta_stoch_k'] = ta.momentum.stoch(df.High, df.Low, df.Close)
df['ta_stoch_d'] = ta.momentum.stoch_signal(df.High, df.Low, df.Close)
```

```
[21]: # Showing our own custom indicators plus the libraries
df.drop(df.columns[:6], axis=1).tail(10)
```

	RSI	Stoch_k	Stoch_d	SMA	ta_rsi	ta_stoch_k	\
Date							
2020-03-04	10.54	91.83	92.0	8649.71	40.014444	19.184521	
2020-03-05	10.62	98.24	93.0	8508.79	47.501065	41.035878	
2020-03-06	3.93	99.11	94.0	8314.24	48.438964	43.993137	
2020-03-07	2.94	94.98	96.0	7622.28	44.300509	29.634000	
2020-03-08	3.10	83.18	97.0	6986.47	32.887521	0.155066	
2020-03-09	3.86	93.73	92.0	6762.14	30.914291	11.899609	

2020-03-10	4.09	94.34	91.0	6471.76	30.764346	13.193606
2020-03-11	4.11	98.97	90.0	5992.44	30.808518	17.615627
2020-03-12	4.06	22.31	96.0	5032.95	14.080537	2.563857
2020-03-13	100.00	56.75	72.0	5095.10	16.153175	19.296816

	ta_stoch_d
Date	
2020-03-04	20.248288
2020-03-05	26.206956
2020-03-06	34.737846
2020-03-07	38.221005
2020-03-08	24.594068
2020-03-09	13.896225
2020-03-10	8.416094
2020-03-11	14.236281
2020-03-12	11.124364
2020-03-13	13.158767

1.4.1 Using only the TA library's Indicators

Dropping our own custom indicators

```
[25]: df.drop(df.columns[6:], axis=1, inplace=True)
```

```
[40]: # Adding all the indicators
df = ta.add_all_ta_features(df, open="Open", high="High", low="Low",
    ↪close="Close", volume="Volume", fillna=True)
```

```
[42]: # Dropping everything else besides 'Close' and the Indicators
df.drop(['Open', 'High', 'Low', 'Adj Close', 'Volume'], axis= 1, inplace=True)
df
```

```
[42]:
```

	Close	volume_adl	volume_obv	volume_cmf	\
Date					
2014-09-17	457.334015	-7.924336e+06	21056800	-0.376331	
2014-09-18	424.440002	-2.454020e+07	-13426400	-0.441847	
2014-09-19	394.795990	-4.448391e+07	-51346100	-0.475969	
2014-09-20	408.903992	-3.937687e+07	-14482500	-0.302148	
2014-09-21	398.821014	-5.037763e+07	-41062600	-0.321074	
2014-09-22	402.152008	-4.974146e+07	-16935000	-0.274768	
2014-09-23	435.790985	-1.610777e+07	28164500	-0.071232	
2014-09-24	423.204987	-3.825869e+07	-2463200	-0.149007	
2014-09-25	411.574005	-5.703557e+07	-29277600	-0.201132	
2014-09-26	404.424988	-6.580018e+07	-50738400	-0.215715	
2014-09-27	399.519989	-7.385019e+07	-65767700	-0.230737	
2014-09-28	377.181000	-9.242139e+07	-89381000	-0.268920	
2014-09-29	375.467010	-1.087491e+08	-121878700	-0.289093	

2014-09-30	386.944000	-9.000780e+07	-87171400	-0.219061
2014-10-01	383.614990	-1.022057e+08	-113400800	-0.233821
2014-10-02	375.071991	-1.166056e+08	-135178500	-0.254105
2014-10-03	359.511993	-1.423567e+08	-166079700	-0.290649
2014-10-04	328.865997	-1.822998e+08	-213316200	-0.339462
2014-10-05	320.510010	-1.665553e+08	-296624296	-0.268493
2014-10-06	330.079010	-1.434237e+08	-217612496	-0.205083
2014-10-07	336.187012	-1.102698e+08	-168412596	-0.140683
2014-10-08	352.940002	-6.126977e+07	-113676296	-0.049121
2014-10-09	365.026001	-6.213157e+07	-30035192	-0.022241
2014-10-10	361.562012	-7.182317e+07	-73700892	-0.040544
2014-10-11	362.299011	-7.009444e+07	-60355692	-0.025052
2014-10-12	378.549011	-5.387418e+07	-42802892	-0.005295
2014-10-13	390.414001	-3.559150e+07	-7581492	-0.025285
2014-10-14	400.869995	-3.801354e+07	30910008	0.000315
2014-10-15	394.773010	-4.072957e+07	5642908	0.020989
2014-10-16	382.556000	-4.782394e+07	-21347092	0.022975
...
2020-02-13	10214.379883	8.775369e+11	625896693165	0.255428
2020-02-14	10312.116211	9.165162e+11	669234957326	0.306716
2020-02-15	9889.424805	8.754678e+11	625369902495	0.209350
2020-02-16	9934.433594	8.875694e+11	668744682800	0.196351
2020-02-17	9690.142578	8.805105e+11	622746384388	0.136835
2020-02-18	10141.996094	9.242217e+11	670017408341	0.204697
2020-02-19	9633.386719	8.808182e+11	623025388632	0.113443
2020-02-20	9608.475586	9.026752e+11	578100128396	0.145818
2020-02-21	9686.441406	9.211409e+11	619030675908	0.157686
2020-02-22	9663.181641	9.312132e+11	583192650754	0.168945
2020-02-23	9924.515625	9.686016e+11	624377836515	0.239247
2020-02-24	9650.174805	9.481172e+11	579297339867	0.223677
2020-02-25	9341.705078	9.145725e+11	536782080738	0.153098
2020-02-26	8820.522461	8.821537e+11	486362029977	0.097671
2020-02-27	8784.494141	8.896827e+11	440891834282	0.093664
2020-02-28	8672.455078	8.853651e+11	396286383840	0.051889
2020-02-29	8599.508789	8.495727e+11	360493991296	-0.026877
2020-03-01	8562.454102	8.394622e+11	325144826996	-0.010338
2020-03-02	8869.669922	8.709320e+11	368002501404	-0.017061
2020-03-03	8787.786133	8.642452e+11	325615785584	-0.039484
2020-03-04	8755.246094	8.522222e+11	290869079216	-0.029679
2020-03-05	9078.762695	8.788612e+11	330567133813	-0.044336
2020-03-06	9122.545898	8.925038e+11	371394019463	0.020131
2020-03-07	8909.954102	8.613936e+11	335177089094	-0.031195
2020-03-08	8108.116211	8.217034e+11	295203986974	-0.070590
2020-03-09	7923.644531	8.197206e+11	248266991166	-0.125490
2020-03-10	7909.729492	8.023926e+11	206053050173	-0.094721
2020-03-11	7911.430176	8.311826e+11	244735812777	-0.087003
2020-03-12	4970.788086	7.810874e+11	190755455534	-0.167774

2020-03-13 5095.102539 7.906391e+11 261530690094 -0.161633

	volume_fi	volume_em	volume_sma_em	volume_vpt \
Date				
2014-09-17	0.000000e+00	0.000000	0.000000	-1.422178e+07
2014-09-18	-1.134291e+09	-3212.366691	-3212.366691	-2.109752e+07
2014-09-19	-1.132834e+09	-3288.687640	-3250.527166	-5.128636e+06
2014-09-20	-8.967045e+08	36.798834	-2154.751832	-1.331094e+06
2014-09-21	-8.068905e+08	-274.120355	-1684.593963	6.618911e+05
2014-09-22	-6.801392e+08	-31.656617	-1354.006494	-4.539104e+05
2014-09-23	-3.662477e+08	1695.136068	-845.816067	3.973973e+06
2014-09-24	-3.689952e+08	476.627823	-656.895511	2.887904e+06
2014-09-25	-3.608356e+08	-635.564367	-654.229118	-1.621496e+06
2014-09-26	-3.312053e+08	-627.501292	-651.259360	-1.109716e+06
2014-09-27	-2.944215e+08	-337.063812	-619.839805	-5.550532e+05
2014-09-28	-3.277180e+08	-1618.618146	-710.637836	-1.502608e+06
2014-09-29	-2.888584e+08	-357.187199	-681.183616	-1.468004e+06
2014-09-30	-1.906879e+08	176.035474	-615.243686	9.132299e+05
2014-10-01	-1.759207e+08	156.362329	-560.128971	8.352460e+05
2014-10-02	-1.773673e+08	-395.241741	-358.905760	-7.106437e+05
2014-10-03	-2.207181e+08	-734.641854	-176.473918	-1.766931e+06
2014-10-04	-3.959883e+08	-1846.065618	-310.964236	-5.308544e+06
2014-10-05	-4.388645e+08	-1867.937739	-424.808335	-6.143329e+06
2014-10-06	-2.681604e+08	447.149313	-390.607911	2.422075e+05
2014-10-07	-1.869213e+08	229.509613	-495.295515	3.269368e+06
2014-10-08	-2.921876e+07	541.745022	-490.644287	3.638066e+06
2014-10-09	1.193677e+08	1023.445024	-372.143616	5.591826e+06
2014-10-10	8.070694e+07	-60.315468	-331.630343	2.449813e+06
2014-10-11	7.058243e+07	-205.846382	-322.257669	-3.871721e+05
2014-10-12	1.012468e+08	824.937812	-147.717958	8.144887e+05
2014-10-13	1.464832e+08	1228.425980	-34.459874	1.891242e+06
2014-10-14	1.830523e+08	976.552879	22.719941	2.134828e+06
2014-10-15	1.348944e+08	-320.421918	-11.336077	6.465751e+05
2014-10-16	6.851845e+07	-911.425792	-48.206366	-1.219554e+06
...
2020-02-13	2.270028e+12	-7.683225	50.028022	-3.236642e+07
2020-02-14	2.550842e+12	-28.617726	49.097370	-1.190965e+08
2020-02-15	-4.623330e+11	-123.289499	40.289586	-1.383337e+09
2020-02-16	-1.173931e+11	-168.038571	30.203590	-1.600612e+09
2020-02-17	-1.705904e+12	-154.621530	15.710703	-9.337059e+08
2020-02-18	1.589165e+12	194.847679	38.630816	1.073145e+09
2020-02-19	-2.052228e+12	5.299720	16.064290	-1.523370e+08
2020-02-20	-1.918929e+12	-98.159507	-4.447305	-2.472768e+09
2020-02-21	-1.188913e+12	26.315414	-4.775144	2.159488e+08
2020-02-22	-1.138152e+12	-1.876960	-4.807551	2.460650e+08
2020-02-23	5.620254e+11	100.559627	-9.429918	1.027768e+09
2020-02-24	-1.285038e+12	-48.942456	-11.906144	-1.323240e+08

2020-02-25	-2.974986e+12	-217.154536	-26.918226	-2.605157e+09
2020-02-26	-6.303995e+12	-579.507359	-78.633495	-4.171991e+09
2020-02-27	-5.637455e+12	-214.773594	-93.425664	-2.998710e+09
2020-02-28	-5.546041e+12	-56.458865	-95.414317	-7.546338e+08
2020-02-29	-5.126738e+12	-2.029302	-86.752874	-8.699653e+08
2020-03-01	-4.581469e+12	-64.035192	-79.324062	-4.533763e+08
2020-03-02	-2.046037e+12	116.051760	-59.990255	1.385391e+09
2020-03-03	-2.249572e+12	35.402786	-71.379176	1.146399e+09
2020-03-04	-2.089727e+12	-9.569684	-72.441276	-5.199719e+08
2020-03-05	4.351646e+10	166.485743	-53.538044	1.338227e+09
2020-03-06	2.926615e+11	49.903434	-51.853186	1.663781e+09
2020-03-07	-8.490647e+11	-54.849611	-55.636946	-6.471077e+08
2020-03-08	-5.306619e+12	-1046.826168	-137.593074	-4.441318e+09
2020-03-09	-5.785466e+12	-598.335234	-176.835416	-4.665205e+09
2020-03-10	-5.042887e+12	31.985056	-159.039731	-1.142020e+09
2020-03-11	-4.313076e+12	-142.556797	-127.828976	-6.581640e+07
2020-03-12	-2.637362e+13	-7970.760717	-681.828056	-2.005593e+10
2020-03-13	-2.134905e+13	-3431.799535	-922.923818	-1.829423e+10

	volume_nvi	volatility_atr	...	momentum_uo	momentum_stoch \
Date			...		
2014-09-17	1000.000000	0.000000	...	50.000000	31.183428
2014-09-18	1000.000000	0.000000	...	50.000000	20.584704
2014-09-19	1000.000000	0.000000	...	50.000000	12.271320
2014-09-20	1035.734917	0.000000	...	50.000000	29.138447
2014-09-21	1010.195200	0.000000	...	50.000000	17.083524
2014-09-22	1018.632454	0.000000	...	50.000000	21.065966
2014-09-23	1018.632454	0.000000	...	50.000000	61.283773
2014-09-24	989.213520	0.000000	...	50.000000	46.236311
2014-09-25	962.026873	0.000000	...	50.000000	32.330638
2014-09-26	945.316521	25.504999	...	50.000000	23.783477
2014-09-27	933.851412	23.879596	...	50.000000	17.919199
2014-09-28	933.851412	24.160136	...	50.000000	3.035953
2014-09-29	933.851412	23.041224	...	50.000000	3.363791
2014-09-30	933.851412	22.490501	...	50.000000	15.327211
2014-10-01	925.817173	21.301351	...	50.000000	13.442449
2014-10-02	905.199482	20.426315	...	50.000000	4.085578
2014-10-03	905.199482	20.367284	...	50.000000	1.974939
2014-10-04	905.199482	22.190657	...	50.000000	2.576281
2014-10-05	905.199482	25.222091	...	50.000000	20.500336
2014-10-06	932.224703	26.957283	...	50.000000	26.784939
2014-10-07	949.475210	26.138056	...	50.000000	31.938630
2014-10-08	949.475210	26.241853	...	50.000000	47.416269
2014-10-09	949.475210	27.121568	...	50.000000	60.274440
2014-10-10	940.464971	26.619808	...	50.000000	61.593686
2014-10-11	942.381991	25.081830	...	50.000000	65.344041
2014-10-12	942.381991	24.902547	...	50.000000	87.431809

2014-10-13	942.381991	25.245193	...	50.000000	93.688492
2014-10-14	942.381991	24.849073	...	50.000000	91.153737
2014-10-15	928.048943	23.710266	...	56.540246	86.172622
2014-10-16	928.048943	23.912939	...	55.805860	76.191569
...
2020-02-13	395.164153	292.961014	...	63.219808	81.912234
2020-02-14	398.945282	283.311104	...	65.738248	89.179873
2020-02-15	398.945282	301.692787	...	54.687866	57.748689
2020-02-16	400.760963	304.681711	...	53.444037	61.095527
2020-02-17	400.760963	317.331314	...	55.707048	42.930133
2020-02-18	400.760963	338.553456	...	57.571597	75.606671
2020-02-19	380.663265	362.743325	...	48.267008	13.236889
2020-02-20	379.678901	340.000633	...	50.404628	10.614635
2020-02-21	382.759720	319.327718	...	49.132871	18.821656
2020-02-22	381.840611	297.145239	...	54.081452	16.373232
2020-02-23	381.840611	295.392043	...	56.219863	43.882384
2020-02-24	381.840611	307.323152	...	54.413135	15.004076
2020-02-25	369.635001	311.362418	...	40.672249	3.182667
2020-02-26	369.635001	345.261333	...	41.019850	6.621931
2020-02-27	368.125189	346.304535	...	42.023958	11.749039
2020-02-28	363.430052	351.426426	...	41.033552	9.711145
2020-02-29	360.373147	333.896088	...	39.461777	6.273825
2020-03-01	358.820324	326.064877	...	35.203111	5.303294
2020-03-02	358.820324	332.326163	...	41.761759	23.159874
2020-03-03	355.507736	318.754387	...	42.440774	18.400469
2020-03-04	354.191336	299.972405	...	47.867243	19.184521
2020-03-05	354.191336	308.656024	...	51.748405	41.035878
2020-03-06	354.191336	291.352043	...	53.564267	43.993137
2020-03-07	345.937262	289.464495	...	51.244736	29.634000
2020-03-08	345.937262	341.427127	...	37.800594	0.155066
2020-03-09	345.937262	356.053946	...	35.172298	11.899609
2020-03-10	345.329747	352.666764	...	34.430841	13.193606
2020-03-11	345.403997	348.200283	...	39.856198	17.615627
2020-03-12	345.403997	620.256475	...	20.638760	2.563857
2020-03-13	345.403997	729.830193	...	27.714073	19.296816

Date	momentum_stoch_signal	momentum_wr	momentum_ao	momentum_kama	\
2014-09-17	31.183428	-68.816572	0.000000	457.334015	
2014-09-18	25.884066	-79.415296	0.000000	424.440002	
2014-09-19	21.346484	-87.728680	0.000000	394.795990	
2014-09-20	20.664824	-70.861553	0.000000	408.903992	
2014-09-21	19.497764	-82.916476	0.000000	398.821014	
2014-09-22	22.429312	-78.934034	-8.296951	402.152008	
2014-09-23	33.144421	-38.716227	-11.527058	435.790985	
2014-09-24	42.862017	-53.763689	-8.264314	423.204987	
2014-09-25	46.616907	-67.669362	-5.888602	411.574005	

2014-09-26	34.116809	-76.216523	-3.736702	404.424988
2014-09-27	24.677771	-82.080801	-2.247520	404.034545
2014-09-28	14.912876	-96.964047	-6.049202	402.288769
2014-09-29	8.106314	-96.636209	-13.276501	401.599367
2014-09-30	7.242318	-84.672789	-18.023336	401.146576
2014-10-01	10.711151	-86.557551	-20.731467	400.771869
2014-10-02	10.951746	-95.914422	-23.483704	399.707420
2014-10-03	6.500989	-98.025061	-25.199150	388.527846
2014-10-04	2.878933	-97.423719	-28.639430	370.557029
2014-10-05	8.350519	-79.499664	-37.488265	355.667673
2014-10-06	16.620519	-73.215061	-46.314571	350.509179
2014-10-07	26.407968	-68.061370	-53.197108	348.345401
2014-10-08	35.379946	-52.583731	-56.376136	348.519717
2014-10-09	46.543113	-39.725560	-51.406301	348.741326
2014-10-10	56.428132	-38.406314	-40.778008	349.244453
2014-10-11	62.404056	-34.655959	-32.275256	349.664140
2014-10-12	71.456512	-12.568191	-24.045325	349.858515
2014-10-13	82.154781	-6.311508	-15.556549	351.914502
2014-10-14	90.758013	-8.846263	-8.925149	365.042089
2014-10-15	90.338284	-13.827378	-3.007538	373.820089
2014-10-16	84.505976	-23.808431	1.831121	375.173189
...
2020-02-13	92.157375	-18.087766	1006.084326	9699.998864
2020-02-14	88.605847	-10.820127	991.096764	9812.052833
2020-02-15	76.280265	-42.251311	958.737770	9813.879100
2020-02-16	69.341363	-38.904473	890.980625	9816.018640
2020-02-17	53.924783	-57.069867	740.349443	9814.838461
2020-02-18	59.877444	-24.393329	629.358151	9820.830220
2020-02-19	43.924564	-86.763111	530.419436	9815.026854
2020-02-20	33.152732	-89.385365	401.643423	9811.674610
2020-02-21	14.224393	-81.178344	333.618546	9805.941974
2020-02-22	15.269841	-83.626768	296.596912	9796.045182
2020-02-23	26.359091	-56.117616	243.020919	9798.761576
2020-02-24	25.086564	-84.995924	179.425141	9790.536901
2020-02-25	20.689709	-96.817333	137.618454	9770.159292
2020-02-26	8.269558	-93.378069	-2.998883	9676.953244
2020-02-27	7.184545	-88.250961	-192.600169	9605.119583
2020-02-28	9.360705	-90.288855	-423.026669	9393.403332
2020-02-29	9.244669	-93.726175	-640.968589	9247.937968
2020-03-01	7.096088	-94.696706	-811.399000	9121.348779
2020-03-02	11.578998	-76.840126	-859.968244	9096.180299
2020-03-03	15.621212	-81.599531	-834.593382	9063.316932
2020-03-04	20.248288	-80.815479	-799.290323	8998.343282
2020-03-05	26.206956	-58.964122	-734.326853	9003.459999
2020-03-06	34.737846	-56.006863	-626.021151	9006.092071
2020-03-07	38.221005	-70.366000	-556.714829	9004.985849
2020-03-08	24.594068	-99.844934	-589.393325	8941.716660

2020-03-09	13.896225	-88.100391	-720.298868	8862.213221
2020-03-10	8.416094	-86.806394	-872.216298	8793.680300
2020-03-11	14.236281	-82.384373	-1077.377948	8733.955214
2020-03-12	11.124364	-97.436143	-1504.250212	7507.742890
2020-03-13	13.158767	-80.703184	-2069.215316	6804.988914

	momentum_roc	others_dr	others_dlr	others_cr
Date				
2014-09-17	0.000000	-88.414661	0.000000	0.000000
2014-09-18	0.000000	-7.192558	-7.464335	-7.192558
2014-09-19	0.000000	-6.984264	-7.240151	-13.674475
2014-09-20	0.000000	3.573492	3.511124	-10.589639
2014-09-21	0.000000	-2.465855	-2.496766	-12.794369
2014-09-22	0.000000	0.835210	0.831742	-12.066019
2014-09-23	0.000000	8.364742	8.033259	-4.710568
2014-09-24	0.000000	-2.888081	-2.930607	-7.462604
2014-09-25	0.000000	-2.748309	-2.786782	-10.005818
2014-09-26	0.000000	-1.736994	-1.752257	-11.569012
2014-09-27	0.000000	-1.212833	-1.220248	-12.641532
2014-09-28	0.000000	-5.591457	-5.753862	-17.526143
2014-09-29	-17.900922	-0.454421	-0.455457	-17.900922
2014-09-30	-8.834229	3.056724	3.010937	-15.391380
2014-10-01	-2.832096	-0.860334	-0.864056	-16.119296
2014-10-02	-8.273825	-2.226972	-2.252144	-17.987296
2014-10-03	-9.856306	-4.148536	-4.237045	-21.389623
2014-10-04	-18.223460	-8.524332	-8.909717	-28.090633
2014-10-05	-26.453272	-2.540849	-2.573686	-29.917741
2014-10-06	-22.004934	2.985554	2.941854	-27.825397
2014-10-07	-18.316753	1.850467	1.833554	-26.489830
2014-10-08	-12.730417	4.983235	4.863049	-22.826645
2014-10-09	-8.633858	3.424378	3.367051	-20.183938
2014-10-10	-4.140980	-0.948970	-0.953502	-20.941369
2014-10-11	-3.507099	0.203838	0.203630	-20.780218
2014-10-12	-2.169562	4.485245	4.387568	-17.227016
2014-10-13	1.772353	3.134334	3.086217	-14.632634
2014-10-14	6.878147	2.678181	2.642946	-12.346342
2014-10-15	9.808022	-1.520938	-1.532623	-13.679500
2014-10-16	16.325799	-3.094692	-3.143589	-16.350854
...
2020-02-13	8.746043	-1.081486	-1.087376	2133.461660
2020-02-14	10.356519	0.956850	0.952302	2154.832545
2020-02-15	6.412029	-4.098978	-4.185355	2062.407449
2020-02-16	8.206881	0.455120	0.454088	2072.249006
2020-02-17	0.798038	-2.459033	-2.489772	2018.832682
2020-02-18	4.236410	4.663022	4.557569	2117.634324
2020-02-19	-1.659428	-5.014884	-5.144998	2006.422528
2020-02-20	-2.601525	-0.258592	-0.258927	2000.975495

2020-02-21	-4.252706	0.811428	0.808153	2018.023390
2020-02-22	-1.962436	-0.240127	-0.240416	2012.937443
2020-02-23	-2.779331	2.704430	2.668507	2070.080357
2020-02-24	-6.545384	-2.764274	-2.803199	2010.093387
2020-02-25	-8.543591	-3.196520	-3.248724	1942.643838
2020-02-26	-14.464478	-5.579095	-5.740769	1828.682795
2020-02-27	-11.172851	-0.408460	-0.409297	1820.804894
2020-02-28	-12.703075	-1.275418	-1.283622	1796.306593
2020-02-29	-11.255085	-0.841126	-0.844684	1780.356262
2020-03-01	-15.574271	-0.430893	-0.431824	1772.253937
2020-03-02	-7.927812	3.587941	3.525074	1839.429308
2020-03-03	-8.541308	-0.923189	-0.927476	1821.524716
2020-03-04	-9.613389	-0.370287	-0.370974	1814.409558
2020-03-05	-6.047894	3.695117	3.628484	1885.149234
2020-03-06	-8.080694	0.482260	0.481100	1894.722806
2020-03-07	-7.670542	-2.330400	-2.357983	1848.237789
2020-03-08	-13.205179	-8.999349	-9.430353	1672.909065
2020-03-09	-10.168082	-2.275148	-2.301429	1632.572752
2020-03-10	-9.958054	-0.175614	-0.175769	1629.530110
2020-03-11	-8.775196	0.021501	0.021499	1629.901979
2020-03-12	-42.196837	-37.169539	-46.473018	986.905396
2020-03-13	-40.494834	2.500900	2.470140	1014.087816

[2005 rows x 69 columns]

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