In [14]:

```
import pandas as pd
import yfinance as yf
import mplfinance as mpf

import warnings
warnings.filterwarnings('ignore')
```

Getting the Data

In [15]:

```
eth_usd = yf.Ticker("ETH-USD").history('5y')
eth_usd
```

Out[15]:

	Open	High	Low	Close	Volume	Dividends	Stock Splits
Date							
2017-11-09	308.644989	329.451996	307.056000	320.884003	893249984	0	0
2017-11-10	320.670990	324.717987	294.541992	299.252991	885985984	0	0
2017-11-11	298.585999	319.453003	298.191986	314.681000	842300992	0	0
2017-11-12	314.690002	319.153015	298.513000	307.907990	1613479936	0	0
2017-11-13	307.024994	328.415009	307.024994	316.716003	1041889984	0	0
...	...	...	...	...	...	...	...
2022-06-08	1814.100708	1830.676025	1770.231201	1793.572266	18041476023	0	0
2022-06-09	1793.512817	1827.293091	1779.867554	1789.826050	12013083393	0	0
2022-06-10	1789.689941	1797.607788	1663.433960	1665.042236	18504740451	0	0
2022-06-11	1665.217896	1679.314209	1507.038940	1529.663452	21127089064	0	0
2022-06-12	1529.692871	1538.799316	1436.854004	1471.175293	25444452352	0	0

1677 rows × 7 columns

In [16]:

```
eth_usd.to_csv("eth-usd.csv")
```

In [17]:

```
data = pd.read_csv("eth-usd.csv")
data
```

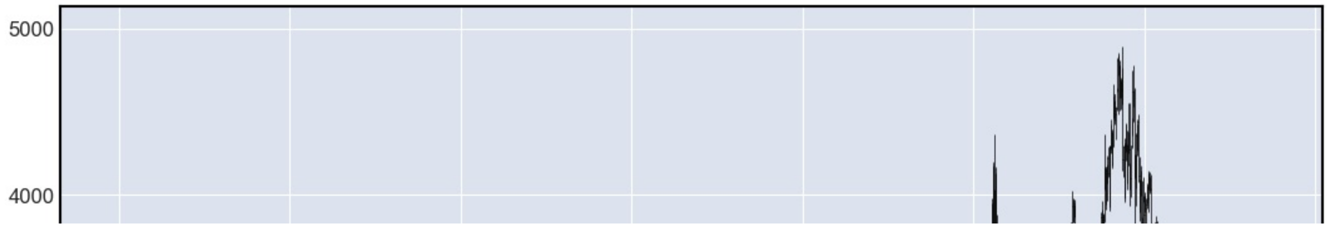
Out[17]:

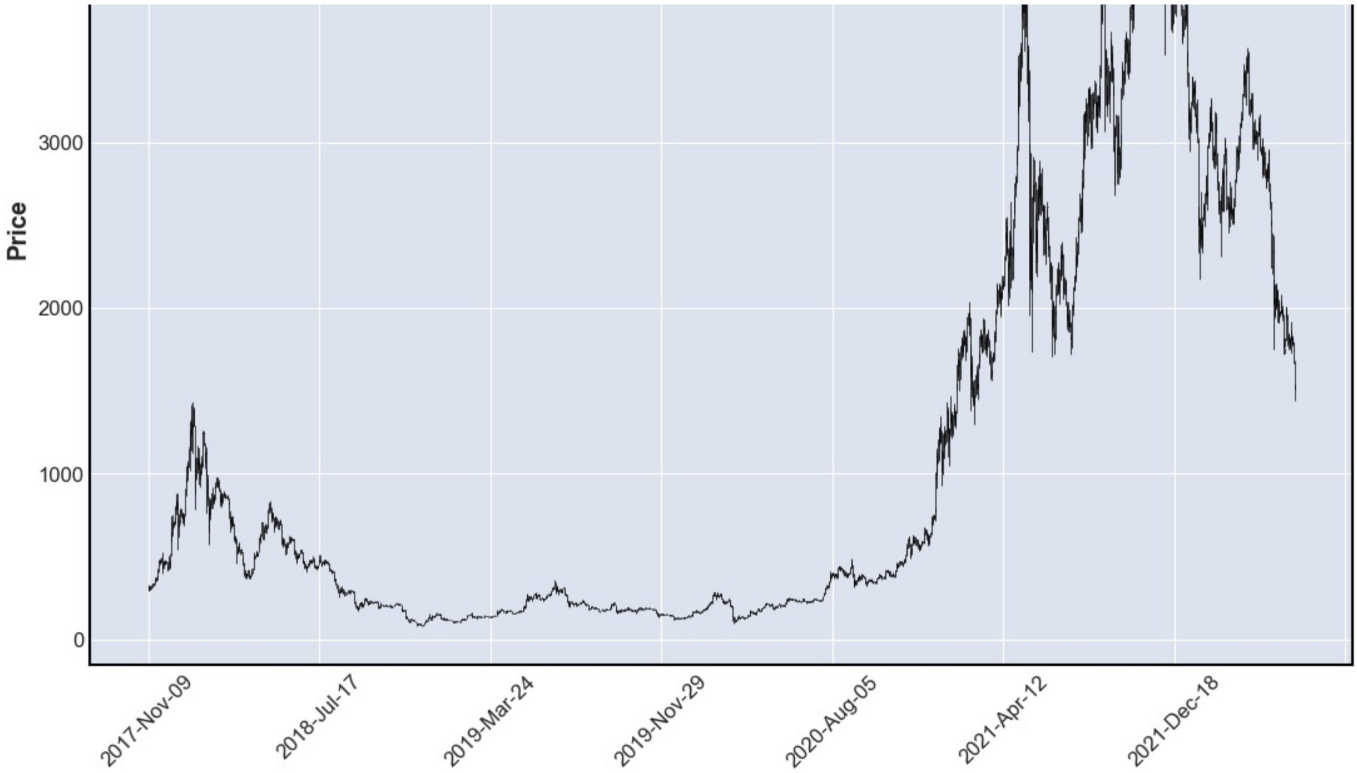
	Date	Open	High	Low	Close	Volume	Dividends	Stock Splits
0	2017-11-09	308.644989	329.451996	307.056000	320.884003	893249984	0	0
1	2017-11-10	320.670990	324.717987	294.541992	299.252991	885985984	0	0
2	2017-11-11	298.585999	319.453003	298.191986	314.681000	842300992	0	0
3	2017-11-12	314.690002	319.153015	298.513000	307.907990	1613479936	0	0
4	2017-11-13	307.024994	328.415009	307.024994	316.716003	1041889984	0	0
...	...	...	...	...	...	...	...	...
1672	2022-06-08	1814.100708	1830.676025	1770.231201	1793.572266	18041476023	0	0
1673	2022-06-09	1793.512817	1827.293091	1779.867554	1789.826050	12013083393	0	0
1674	2022-06-10	1789.689941	1797.607788	1663.433960	1665.042236	18504740451	0	0
1675	2022-06-11	1665.217896	1679.314209	1507.038940	1529.663452	21127089064	0	0
1676	2022-06-12	1529.692871	1538.799316	1436.854004	1471.175293	25444452352	0	0

1677 rows × 8 columns

In [19]:

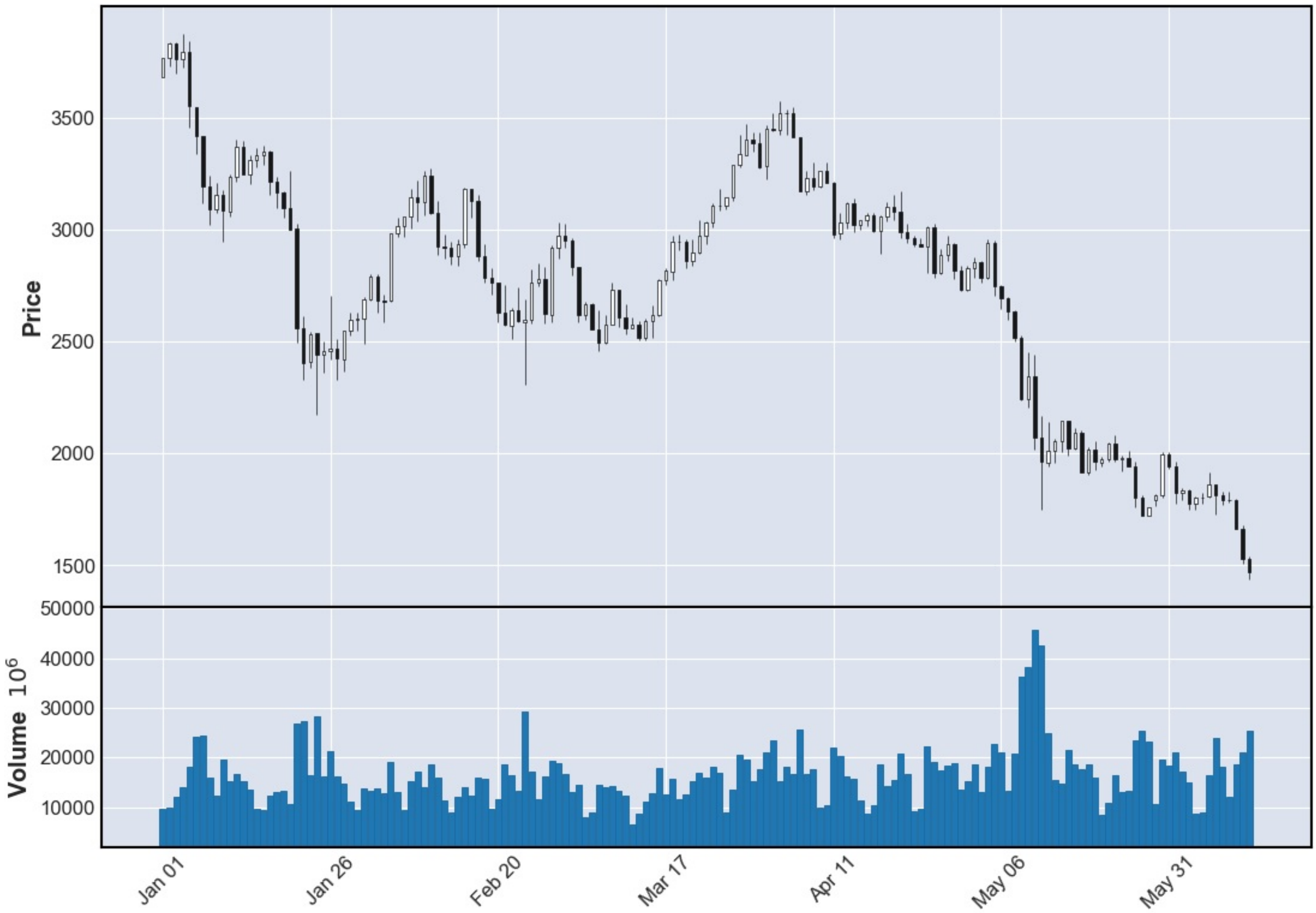
```
mpf.plot(eth_usd, figsize=(14,10))
```





```
In [20]: mpf.plot(eth_usd, savefig='image1.png')
```

```
In [47]: mpf.plot(eth_usd["2022-01-01":"2022-06-12"], figsize=(14,10), type="candle", volume=True)
```



```
In [48]: data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
DatetimeIndex: 1677 entries, 2017-11-09 to 2022-06-12
Data columns (total 7 columns):
 #   Column        Non-Null Count  Dtype  
---  ------        --------------  -----  
 0   Open          1677 non-null   float64
 1   High          1677 non-null   float64
 2   Low           1677 non-null   float64
 3   Close         1677 non-null   float64
 4   Volume        1677 non-null   int64  
 5   Dividends     1677 non-null   int64  
 6   Stock Splits  1677 non-null   int64  
dtypes: float64(4), int64(3)
memory usage: 169.4 KB
```

Preprocessing of mpf

In [78]:

```
data.Date = pd.to_datetime(data.Date)
data = data.set_index("Date")
```

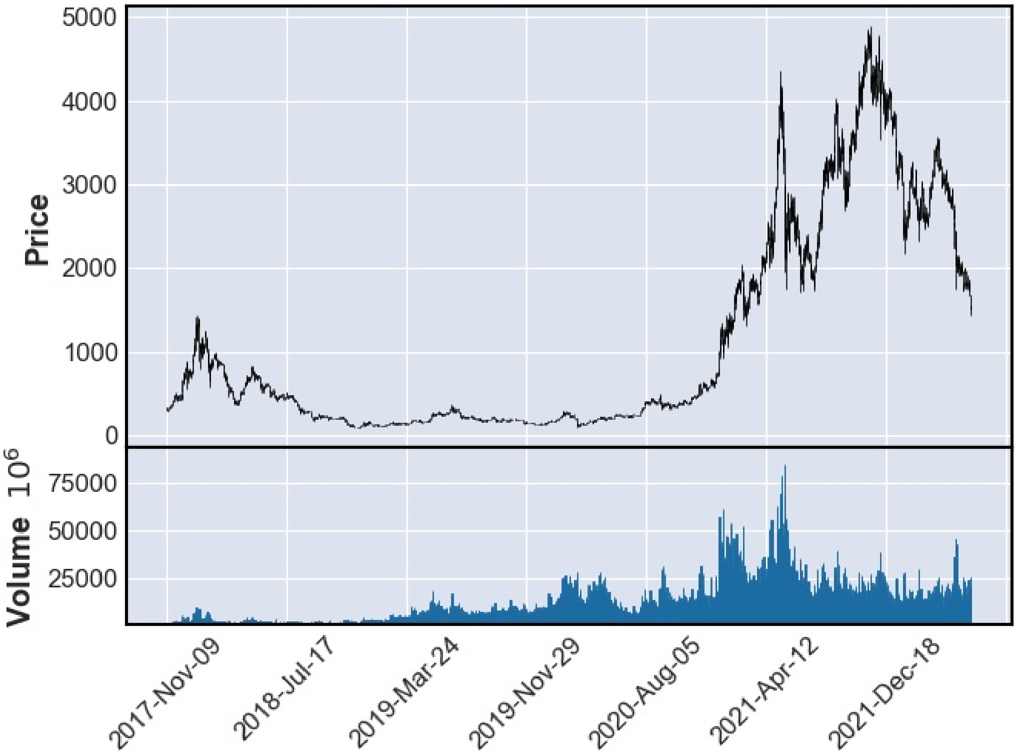
```
---------------------------------------------------------------------------
AttributeError                            Traceback (most recent call last)
<ipython-input-78-7a6fc06df5ac> in <module>
----> 1 data.Date = pd.to_datetime(data.Date)
      2 data = data.set_index("Date")

~\anaconda3\lib\site-packages\pandas\core\generic.py in __getattr__(self, name)
   5463             if self._info_axis._can_hold_identifiers_and_holds_name(name):
   5464                 return self[name]
-> 5465             return object.__getattribute__(self, name)
   5466 
   5467     def __setattr__(self, name: str, value) -> None:

AttributeError: 'DataFrame' object has no attribute 'Date'
```

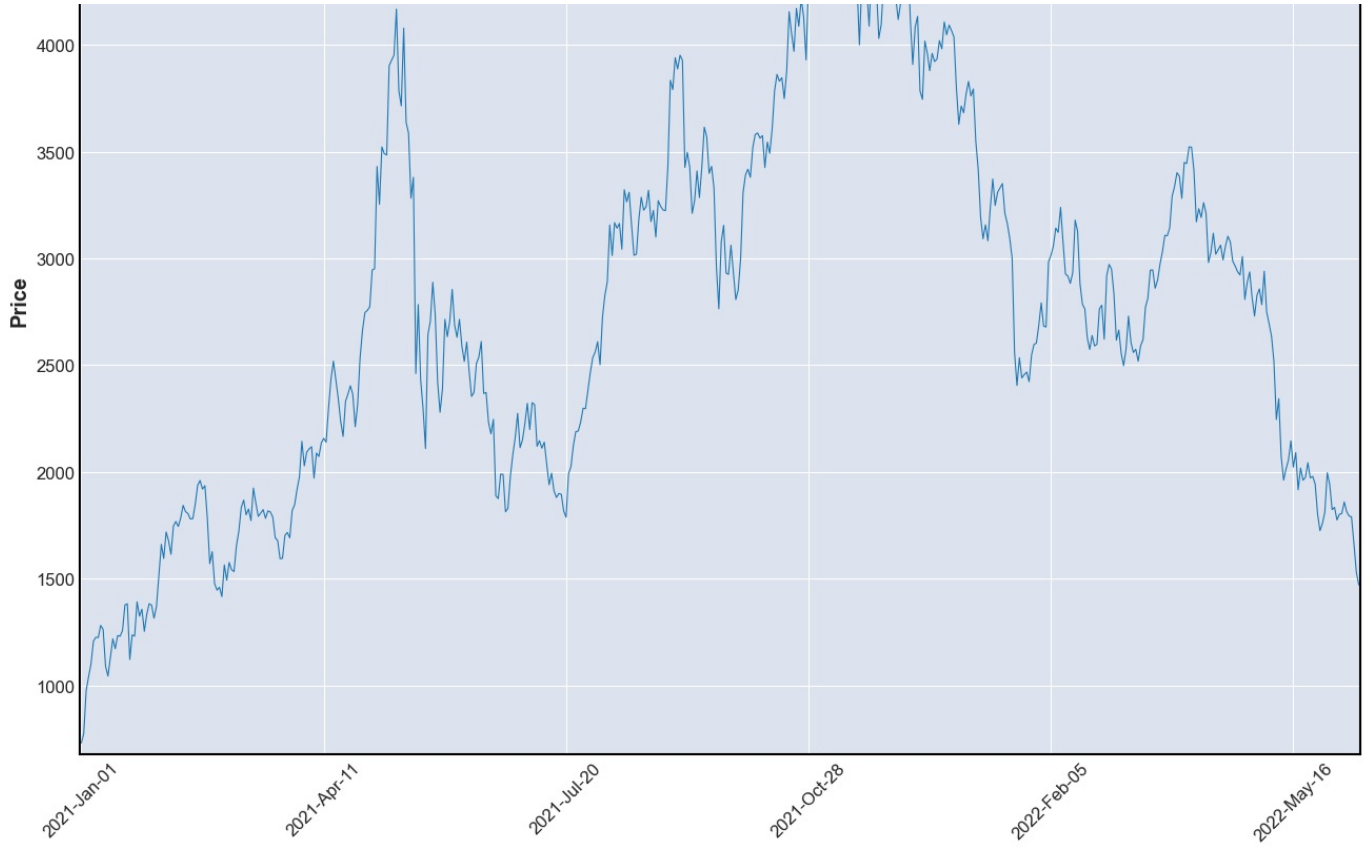
In [79]:

```
mpf.plot(data, volume=True)
```



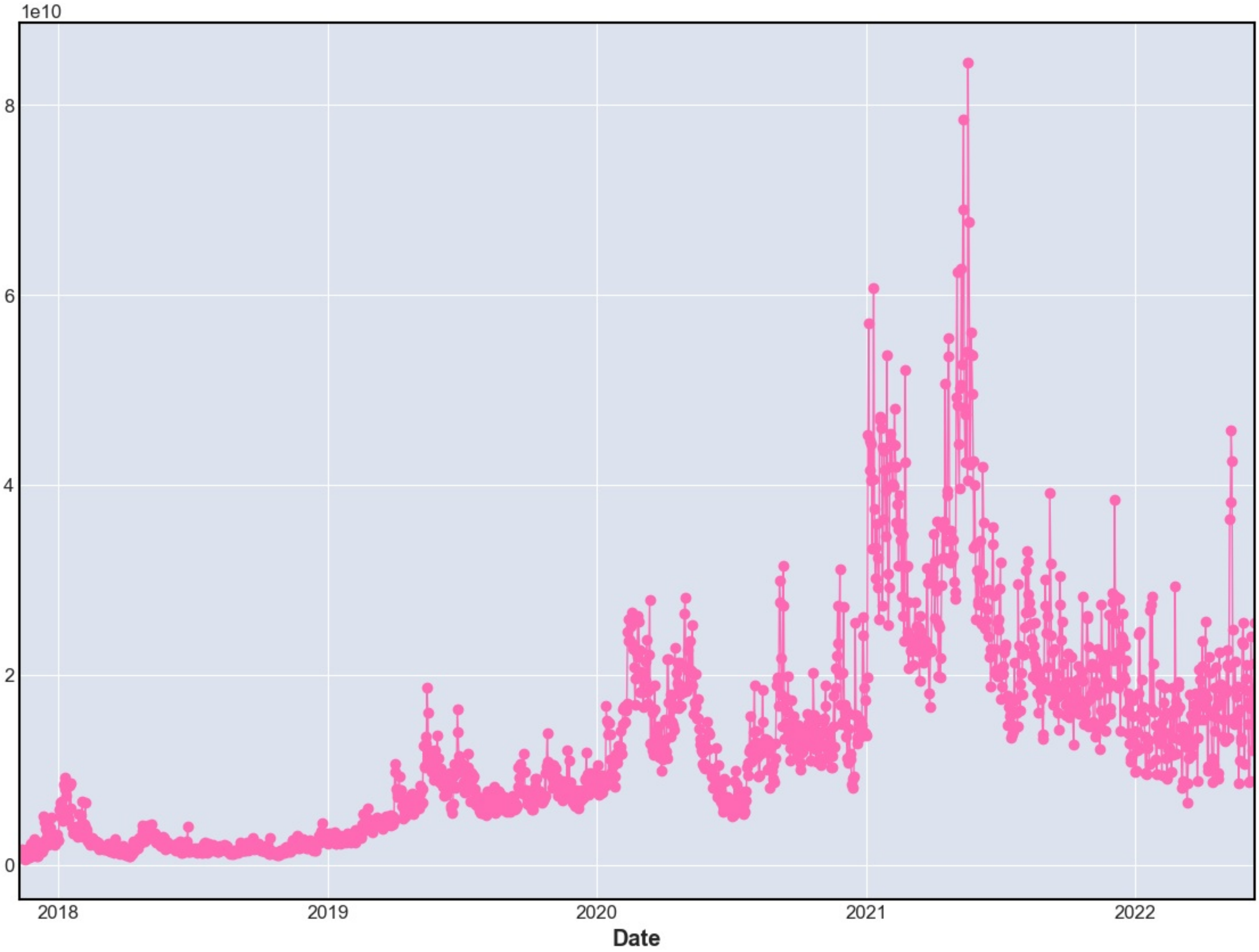
In [80]:

```
mpf.plot(data['2021':'2022'], type='line', figsize=(14,10), tight_layout=True)
```



In [73]:
```
data["Volume"].plot(figsize=(14,10), marker="o", color="hotpink", lw=1, grid=True)
```

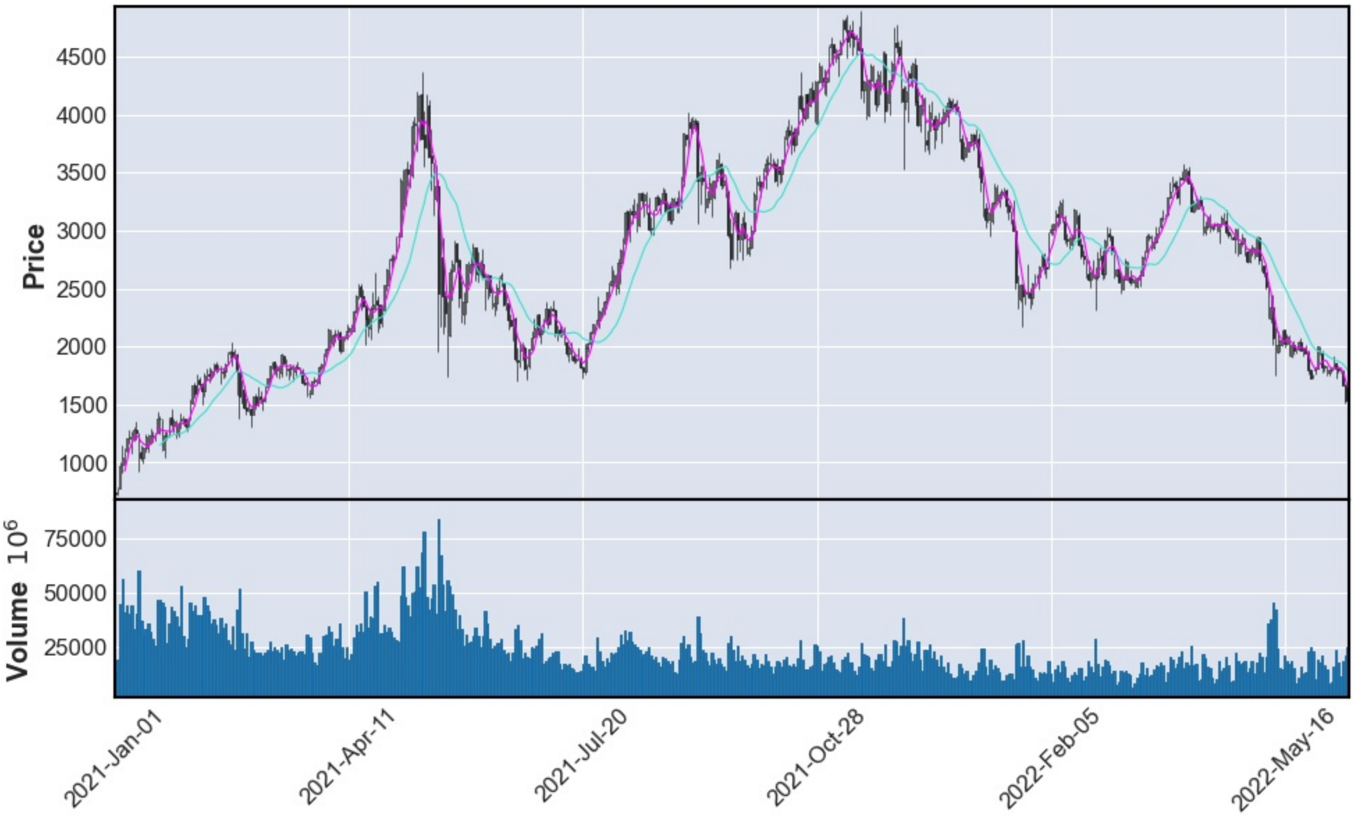
Out[73]:
```
<AxesSubplot:xlabel='Date'>
```



In [76]:

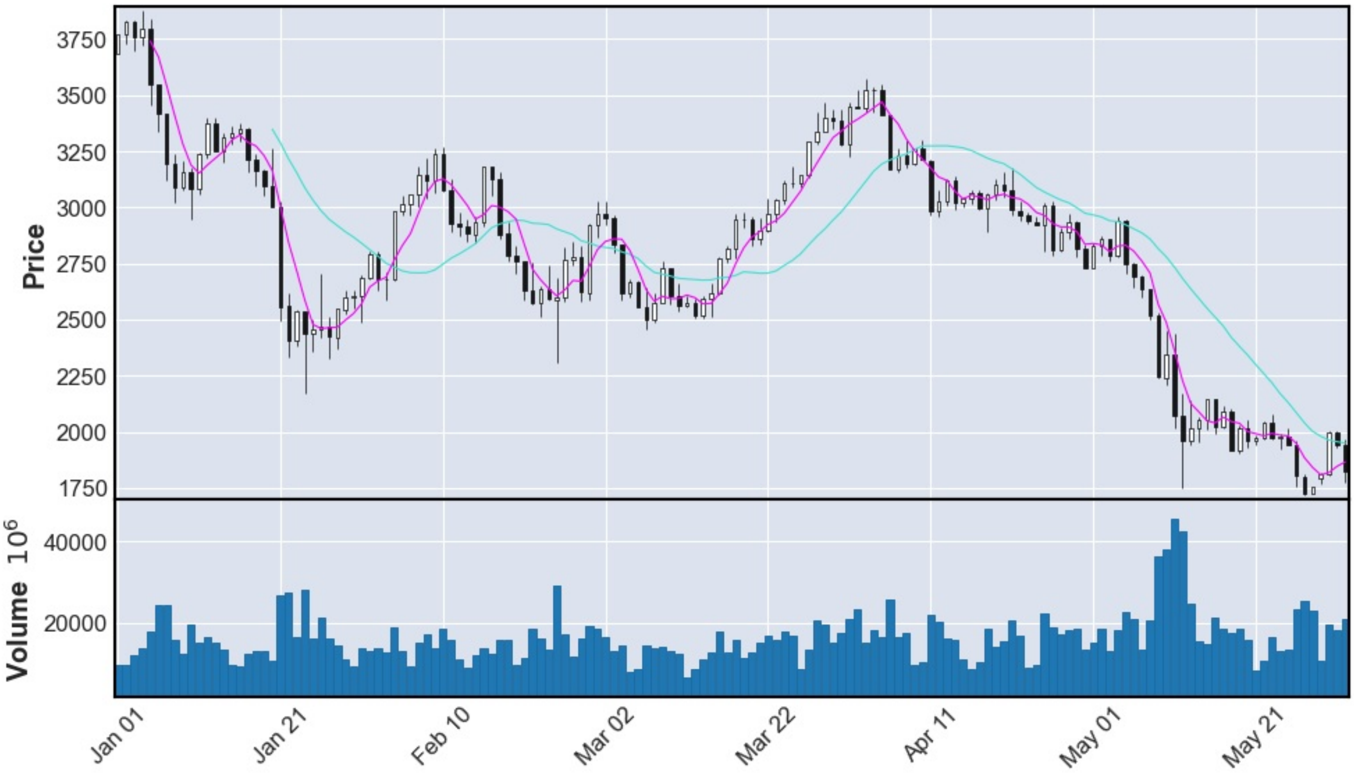
In [76]:

```
mpf.plot(data['2021':'2022'], type='candle', volume=True, #Moving Average
        mav=(20,5), tight_layout=True, figratio=(16,9))
```



In [77]:

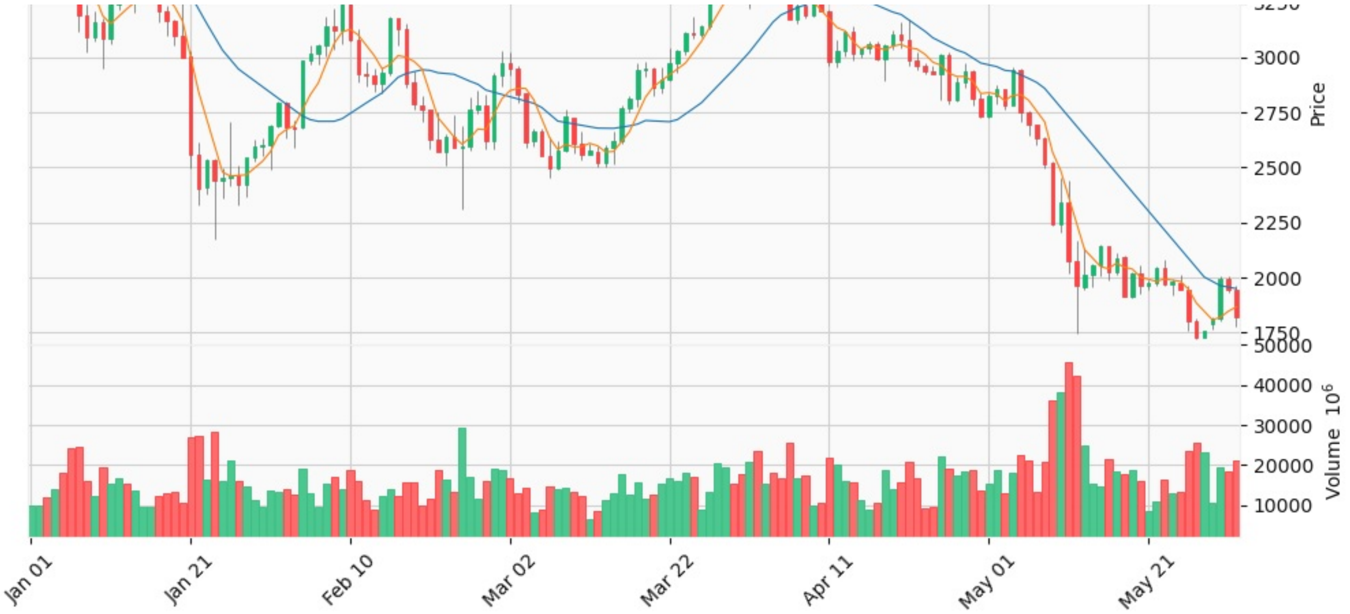
```
mpf.plot(data['2022-01-01':'2022-06-01'], type='candle', volume=True, #Moving Average
        mav=(20,5), tight_layout=True, figratio=(16,9))
```



In [81]:

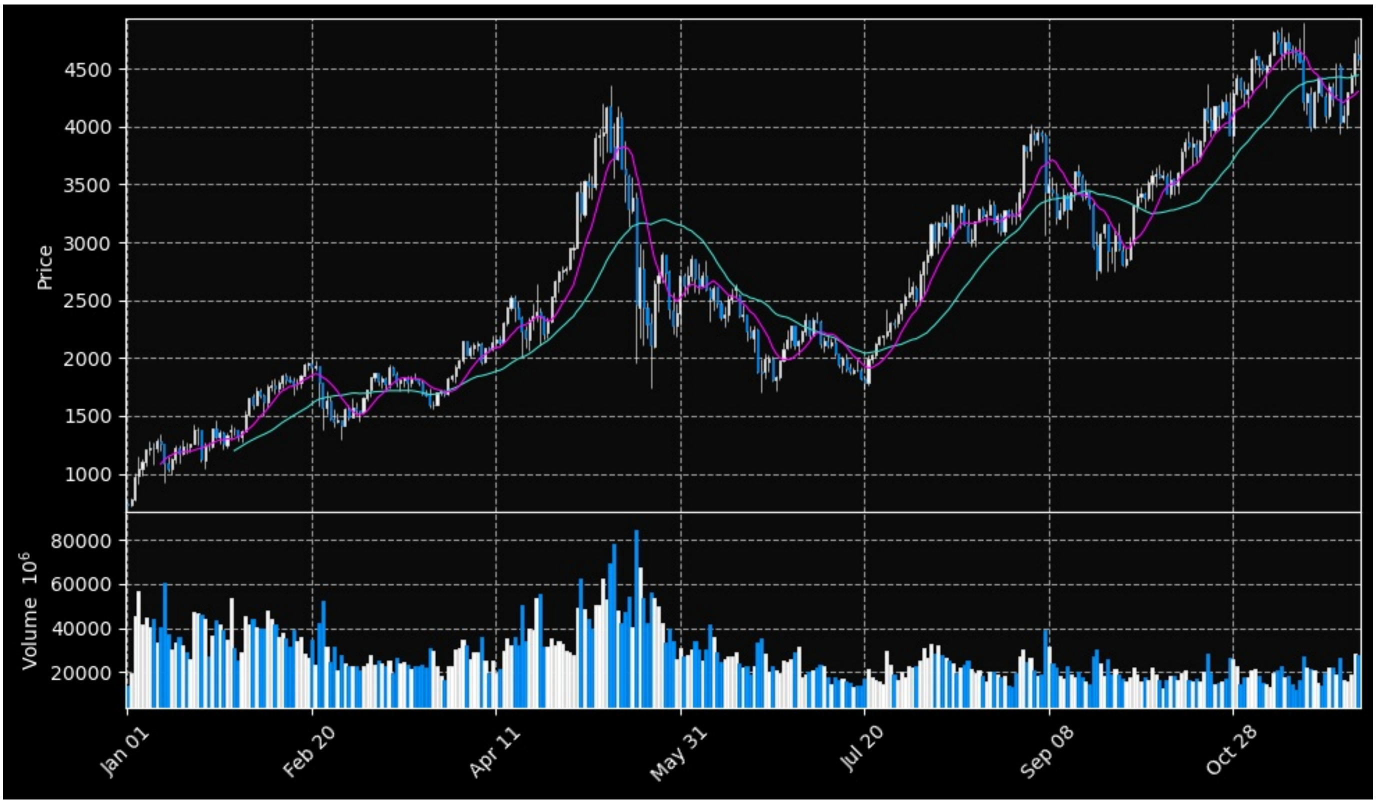
```
mpf.plot(data['2022-01-01':'2022-06-01'], type='candle', volume=True, #Moving Average
        mav=(20,5), tight_layout=True, figratio=(16,9), style='yahoo')
```

3750
3500
3250



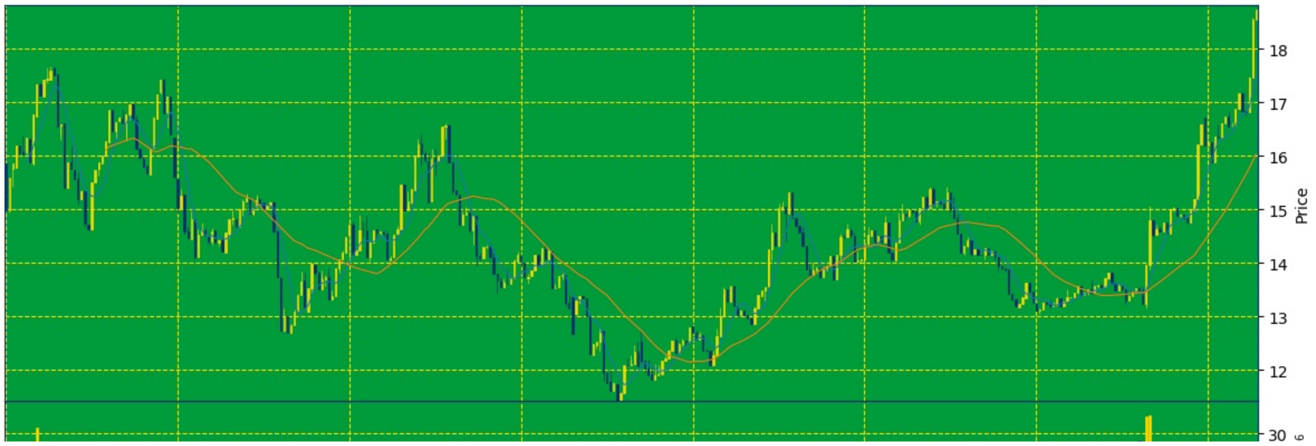
In [85]:

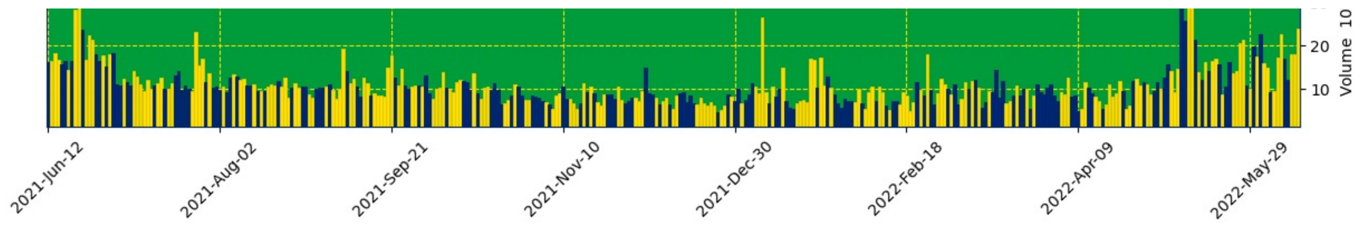
```
mpf.plot(data['2021-01-01':'2021-12-01'], type='candle', volume=True,
         mav=(30,10), tight_layout=True, figratio=(16,9), style='nightclouds')
```



In [140…

```
mpf.plot(yf.Ticker("BTC-ETH").history(period='1y'), type='candle', volume=True, figratio=(18,8), mav=(7,30),
         style='brasil', tight_layout=True) # Current Situation of BTC and USD for 1 year
```





In [141…

```
def BollingerBand(data, n_lookback, n_std=2):
    hlc_avg = (data.High + data.Low + data.Close)
    mean, std = hlc_avg.rolling(n_lookback).mean(), hlc_avg.rolling(n_lookback).std()
    upper, lower = mean + std * n_std, mean - std * n_std
    return upper, lower
```

In [142…

```
data["BBUp"], data["BBDown"] = BollingerBand(data , 20, 2)
```

In [143…

```
data = data.dropna()
data
```

Out[143…

	Open	High	Low	Close	Volume	Stock Splits	BBUp	BBDown
Date								
2017-12-17	696.237000	735.825012	696.237000	719.974976	2147389952	0	2214.628384	934.241531
2017-12-18	721.731995	803.927979	689.231018	794.645020	3249230080	0	2327.794039	907.683378
2017-12-19	793.901001	881.943970	785.341980	826.822998	4096549888	0	2473.866397	873.531811
2017-12-20	827.515991	845.062012	756.004028	819.085999	3969939968	0	2576.024886	882.003123
2017-12-21	820.236023	880.543030	792.689026	821.062988	3569060096	0	2679.691928	891.019483
...	...	...	...	...	...	...	...	...
2022-06-08	1814.100708	1830.676025	1770.231201	1793.572266	18041476023	0	6165.753816	5071.411845
2022-06-09	1793.512817	1827.293091	1779.867554	1789.826050	12013083393	0	6124.649958	5057.935540
2022-06-10	1789.689941	1797.607788	1663.433960	1665.042236	18504740451	0	6102.886615	5001.889337
2022-06-11	1665.217896	1679.314209	1507.038940	1529.663452	21127089064	0	6100.123970	4870.613603
2022-06-12	1529.692871	1538.799316	1436.854004	1471.175293	25444452352	0	6127.671733	4686.058504

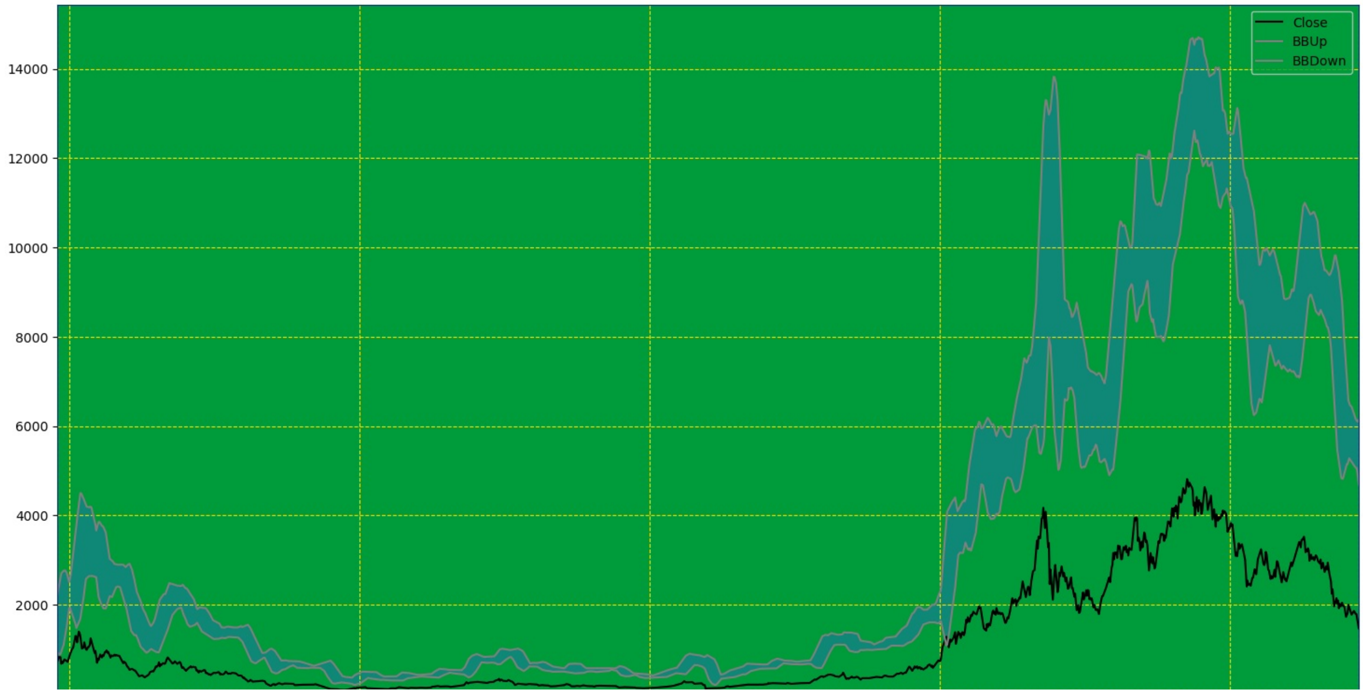
1639 rows × 8 columns

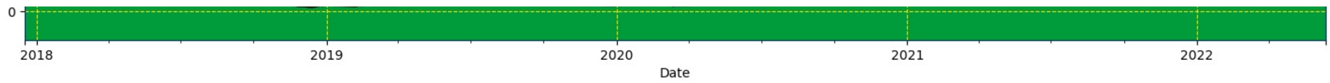
In [150…

```
import matplotlib.pyplot as plt
plt.rcParams["figure.figsize"] = (20,9)
ax = data[["Close", "BBUp", "BBDown"]].plot(figsize=(18,10), color=['black', 'grey', 'grey'])
ax.fill_between(data.index, data["BBUp"], data["BBDown"], alpha=0.5)
```

Out[150…

```
<matplotlib.collections.PolyCollection at 0x1aeb85fcdf0>
```





In [158…

```
#Calculate Bollinger Band

# Calculate SMA
data["sma"] = data["Close"].rolling(20).mean()
#Calculate STD
data["std"] = data["Close"].rolling(20).std()
#Calculate Lower Band
data["lb"] = data["sma"] - 2 * data["std"]
#Calculayte Upper Band
data["ub"] = data["sma"] + 2* data["std"]

data.dropna(inplace=True) #Inplace use to locate NaN
data
```

Out[158…

	Open	High	Low	Close	Volume	Stock Splits	BBUp	BBDown	sma	std	l
Date											
2018-01-05	975.750000	1075.390015	956.325012	997.719971	6683149824	0	2937.859819	1808.355879	796.777542	93.293366	610.19081
2018-01-06	995.153992	1060.709961	994.622009	1041.680054	4662219776	0	3060.340775	1780.372427	812.862796	106.195769	600.47125
2018-01-07	1043.010010	1153.170044	1043.010010	1153.170044	5569880064	0	3232.188911	1714.678899	830.789047	130.449307	569.89043
2018-01-08	1158.260010	1266.930054	1016.049988	1148.530029	8450970112	0	3391.862147	1648.745775	846.874399	148.517630	549.83913
2018-01-09	1146.000000	1320.979980	1145.489990	1299.739990	7965459968	0	3619.704639	1555.509076	870.907098	179.451779	512.00354
...	...	...	...	...	...	...	...	...	...	...	.
2022-06-08	1814.100708	1830.676025	1770.231201	1793.572266	18041476023	0	6165.753816	5071.411845	1870.954907	94.622277	1681.71035
2022-06-09	1793.512817	1827.293091	1779.867554	1789.826050	12013083393	0	6124.649958	5057.935540	1862.380426	93.769179	1674.84206
2022-06-10	1789.689941	1797.607788	1663.433960	1665.042236	18504740451	0	6102.886615	5001.889337	1846.906622	99.641252	1647.62411
2022-06-11	1665.217896	1679.314209	1507.038940	1529.663452	21127089064	0	6100.123970	4870.613603	1821.231287	111.821897	1597.58749
2022-06-12	1529.692871	1538.799316	1436.854004	1471.175293	25444452352	0	6127.671733	4686.058504	1796.180957	130.743085	1534.69478

1620 rows × 12 columns

In [193…

```
import plotly.express as px
import plotly.graph_objects as go
import numpy as np
plt.rcParams["figure.figsize"] = (22,10)
fig = px.line(data['2021':'2022'], y=["Close", "sma", "lb", "ub"])
fig
```

In [194…

```
#Find Out the Signals
```

In [238…

```
def find_signal(close, lower_band, upper_band):
    if close < lower_band:
        return 'Buy'
    elif close > upper_band:
        return 'Sell'

data["signal"] = np.vectorize(find_signal)(data['Close'], data['lb'], data['ub'])
data
```

Out[238…

	Open	High	Low	Close	Volume	Stock Splits	BBUp	BBDown	sma	std	l
Date											
2018-01-05	975.750000	1075.390015	956.325012	997.719971	6683149824	0	2937.859819	1808.355879	796.777542	93.293366	610.19081
2018-01-06	995.153992	1060.709961	994.622009	1041.680054	4662219776	0	3060.340775	1780.372427	812.862796	106.195769	600.47125
2018-01-07	1043.010010	1153.170044	1043.010010	1153.170044	5569880064	0	3232.188911	1714.678899	830.789047	130.449307	569.89043
2018-01-08	1158.260010	1266.930054	1016.049988	1148.530029	8450970112	0	3391.862147	1648.745775	846.874399	148.517630	549.83913
2018-01-09	1146.000000	1320.979980	1145.489990	1299.739990	7965459968	0	3619.704639	1555.509076	870.907098	179.451779	512.00354
...	...	...	...	...	...	...	...	...	...	...	.
2022-06-08	1814.100708	1830.676025	1770.231201	1793.572266	18041476023	0	6165.753816	5071.411845	1870.954907	94.622277	1681.71035
2022-06-09	1793.512817	1827.293091	1779.867554	1789.826050	12013083393	0	6124.649958	5057.935540	1862.380426	93.769179	1674.84206
2022-06-10	1789.689941	1797.607788	1663.433960	1665.042236	18504740451	0	6102.886615	5001.889337	1846.906622	99.641252	1647.62411
2022-06-11	1665.217896	1679.314209	1507.038940	1529.663452	21127089064	0	6100.123970	4870.613603	1821.231287	111.821897	1597.58749
2022-06-12	1529.692871	1538.799316	1436.854004	1471.175293	25444452352	0	6127.671733	4686.058504	1796.180957	130.743085	1534.69478

1620 rows × 13 columns

In [242…

```
import MetaTrader5 as mt5
from datetime import datetime, timedelta

mt5.initialize()
```

```
---------------------------------------------------------------------------
RuntimeError                              Traceback (most recent call last)
RuntimeError: module compiled against API version 0xf but this version of numpy is 0xe
```

```
---------------------------------------------------------------------------
ImportError                               Traceback (most recent call last)
<ipython-input-242-29f5c10e813d> in <module>
----> 1 import MetaTrader5 as mt5
      2 from datetime import datetime, timedelta
      3 
      4 mt5.initialize()

~\anaconda3\lib\site-packages\MetaTrader5\__init__.py in <module>
    255 
    256 # import C methods to our module
--> 257 from ._core import *
    258 
    259 # internal order send

ImportError: numpy.core.multiarray failed to import
```

In [234…

```python
class Position:
    def __init__(self, open_datetime, open_price, order_type, volume, sl, tp):
        self.open_datetime = open_datetime
        self.open_price = open_price
        self.order_type = order_type
        self.volume = volume
        self.sl = sl
        self.tp = tp
        self.close_datetime = None
        self.close_price  = None
        self.profit = None
        self.status = "Open"

    def close_position(self, close_datetime, close_price):
        self.close_datetime = close_datetime
        self.close_price = close_price
        self.profit = (self.close_price - self.open_price) * self.volume if self.order_type == "Buy" \
                                                                else (self.open_price - self.close_price)
        self.status = "closed"

        def _asdict(self):
            return{
                'open_datetime': self.open_datetime,
                'open_price': self.open_price,
                'order_type': self.order_type,
                'volume': self.volume,
                'sl': self.sl,
                'tp': self.tp,
                'close_datetime': self.close_datetime,
                'close_price': self.close_price,
                'profit': self.profit,
                'status': self.status
            }
class Strategy:
    def __init__(self, df, starting_balance, volume):
        self.starting_balance = starting_balance
        self.volume = volume
        self.position = []
        self.data = df

    def get_position_df(self):
        df = pd.DataFrame([position.asdict() for position in self.position])
        df['pnl'] = df['profit'].cumsum() +self.starting_balance
        return df
    def add_position(self, position):
        self.position.append(position)
    def trading_allowed(self):
        for pos in self.positions:
            if pos.status == 'open':
                return False

        return True

    def run(self):
        for i, data in self.data.iterrow():

            if data.signal == 'buy' and self.trading_allowed():
                sl = data.close - 3 * data.std
                tp = data.close + 2 * data.std
                self.add_position(Position(date.time, data.close, data.signal, self.volume, sl, tp))
            elif data.signal == 'sell' and self.trading_allowed():
                sl = data.close - 3 * data.std
                tp = data.close + 2 * data.std
                self.add_position(Position(date.time, data.close, data.signal, self.volume, sl, tp))

            for pos in self.positions:
                if pos.status == 'open':
                    if (pos.sl >= data.close and pos.order_type == 'buy'):
                        pos.close_position(date.time, pos.sl)
                    elif (pos.sl <= data.close and pos.order_type == 'sell'):
                        pos.close_position(date.time, pos.sl)
                    elif (pos.sl <= data.close and pos.order_type == 'buy'):
                        pos.close_position(date.time, pos.tp)
                    elif (pos.sl >= data.close and pos.order_type == 'sell'):
                        pos.close_position(date.time, pos.tp)

        return self.get_position_df()
```

In [ ]:

In [ ]:

```

```

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