In [1]:

```
# !pip install plotly
import pandas as pd
# !pip install pandas_ta
import pandas_ta as ta
import numpy as np
import seaborn as sns
import datetime
from datetime import timedelta
import math
import requests
import plotly as py
import plotly.express as px
from plotly.subplots import make_subplots
import plotly.graph_objects as go
import matplotlib.pyplot as plt

import sklearn as sk
import sklearn.preprocessing
from sklearn import metrics

from sklearn.preprocessing import  (StandardScaler, MinMaxScaler, LabelBinarizer)
from sklearn.metrics import confusion_matrix, ConfusionMatrixDisplay
from sklearn import linear_model
from sklearn.linear_model import LinearRegression
from sklearn.metrics import mean_squared_error, r2_score
from sklearn.model_selection import train_test_split

# import chart_studio.tools as tls
```

In [2]:

```
#manipulatable variables
numDaysBack = str(365*5) #for daily you can go back multiple years worth, for daily you can only go back 90 day
myInterval = 'daily' # options are daily or hourly
theCoins = ['ethereum'] #can add more than one coin if you like
window_length = 14
mycom = 0.4
lower_macd_ema = 12
upper_macd_ema = 26
trigger_macd_ema = 9


def df_builder_clean(days, interval, coins, window, mycom, lower_macd_ema, upper_macd_ema, trigger_macd_ema):
    #manipulatable variables
    numDaysBack = days #for daily you can go back multiple years worth, for daily you can only go back 90 days
    myInterval = interval # options are daily or hourly
    theCoins = coins
    window_length = window

    #builds initial dataframe with ethereum as first market but just to log the dates we are working with
    geckoReq = 'https://api.coingecko.com/api/v3/coins/ethereum/market_chart?vs_currency=usd&days='+numDaysBack
    r = requests.get(geckoReq).json()
    ts = r['prices'][0][0]
    ts = ts/1000
    HistPricesList = []
    for i in range(len(r['prices'])):
        currentUnix = r['prices'][i][0]
        price = r['prices'][i][1]
        currentUnix = currentUnix/1000
#         currentTS = datetime.datetime.fromtimestamp(currentUnix).strftime("%d-%m-%Y %H:%M:%S") #adding dd-mm-
        currentTS = datetime.datetime.fromtimestamp(currentUnix).strftime("%m-%d-%Y") #just the date mm-dd-yyy
        HistPricesList.append([currentTS])
    global df
    df = pd.DataFrame(HistPricesList, columns = ['date'])


    #looping through each coin and adding in all data points and input variables
    for coin in theCoins:
        price_data(coin)
        add_ewm(coin, mycom)
        add_rsi(coin, window_length)
        add_macd(coin, lower_macd_ema, upper_macd_ema, trigger_macd_ema)
        print('just added: ', coin)
    df['date'] = pd.to_datetime(df['date'])
    df = df.set_index('date')
#     print('r')
#     display(r)
    return df


def price_data(coin):
    global df
    # geckoReq = 'https://api.coingecko.com/api/v3/coins/ethereum/market_chart?vs_currency=usd&days=60&interva
    geckoReq = 'https://api.coingecko.com/api/v3/coins/'+coin+'/market_chart?vs_currency=usd&days='+numDaysBack

    r = requests.get(geckoReq).json()
    ts = r['prices'][0][0]
    # print(ts)
    ts = ts/1000
    print(datetime.datetime.fromtimestamp(ts).strftime("%m-%d-%Y"))
    # print('prices length',len(r['prices']))
    HistPricesList = []
    for i in range(len(r['prices'])):
        currentUnix = r['prices'][i][0]
        price = r['prices'][i][1]
        volume = r['total_volumes'][i][1]
        currentUnix = currentUnix/1000
        currentTS = datetime.datetime.fromtimestamp(currentUnix).strftime("%m-%d-%Y")
    #     print('price: ', price, 'TS: ', currentTS)
        HistPricesList.append([currentTS, price, volume])
    #     currentUnix = currentTS
#         print(HistPricesList)
    dfCoin = pd.DataFrame(HistPricesList, columns = ['date', coin, coin+'_volume'])
#     print('dfCoin')
#     display(dfCoin)
    df = pd.merge(df, dfCoin[coin], left_on = df['date'], right_on=dfCoin['date']).drop(['key_0'], axis = 1)
    df = pd.merge(df, dfCoin[coin+'_volume'], left_on = df['date'], right_on=dfCoin['date']).drop(['key_0'], ax

def add_ewm(coin, mycom):
    df[coin+'_ewm'] = df[coin].ewm(com=mycom).mean()

def add_rsi(coin, window_length):
    global df
    df['diff'] = df[coin].diff(1)
    df['gain'] = df['diff'].clip(lower=0).round(2)
    df['loss'] = df['diff'].clip(upper=0).abs().round(2)

    # Get initial Averages
    df['avg_gain'] = df['gain'].rolling(window=window_length, min_periods=window_length).mean()[:window_length+
    df['avg_loss'] = df['loss'].rolling(window=window_length, min_periods=window_length).mean()[:window_length+

    # Get WMS averages
    # Average Gains
    for i, row in enumerate(df['avg_gain'].iloc[window_length+1:]):
        df['avg_gain'].iloc[i + window_length + 1] =\
            (df['avg_gain'].iloc[i + window_length] *
             (window_length - 1) +
             df['gain'].iloc[i + window_length + 1])\
            / window_length
    # Average Losses
    for i, row in enumerate(df['avg_loss'].iloc[window_length+1:]):
        df['avg_loss'].iloc[i + window_length + 1] =\
            (df['avg_loss'].iloc[i + window_length] *
             (window_length - 1) +
             df['loss'].iloc[i + window_length + 1])\
            / window_length

    df['rs'] = df['avg_gain'] / df['avg_loss']

    df['rsi'] = 100 - (100 / (1.0 + df['rs']))
    df = pd.DataFrame(df)
    df = df.drop(['gain', 'loss', 'avg_loss', 'avg_gain', 'rs'], axis = 1)

    #renaming diff and rsi columns
    dict = {'diff': coin+'_diff',
        'rsi': coin+'_rsi'}
    df.rename(columns=dict,
              inplace=True)

def add_macd(coin, lower_macd_ema, upper_macd_ema, trigger_macd_ema):
    global df
    #get ema for lower
    k = df[coin].ewm(span=lower_macd_ema, adjust = False, min_periods = lower_macd_ema).mean()

    #get ema for upper
    d = df[coin].ewm(span=upper_macd_ema, adjust=False, min_periods=upper_macd_ema).mean()

    macd = k-d

    # Get the 9-Day EMA of the MACD for the Trigger line
    macd_s = macd.ewm(span=trigger_macd_ema, adjust=False, min_periods=trigger_macd_ema).mean()
    # Calculate the difference between the MACD - Trigger for the Convergence/Divergence value
    macd_h = macd - macd_s
    # Add all of our new values for the MACD to the dataframe
    df['macd'] = df.index.map(macd)
    df['macd_h'] = df.index.map(macd_h)
    df['macd_s'] = df.index.map(macd_s)



mydf = pd.DataFrame(df_builder_clean(numDaysBack, myInterval, theCoins, window_length, mycom, lower_macd_ema, u
display(mydf)
```

```
07-22-2017
C:\Users\fooba\anaconda3\lib\site-packages\pandas\core\indexing.py:1732: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#ret
urning-a-view-versus-a-copy
  self._setitem_single_block(indexer, value, name)
just added:  ethereum
```

	ethereum	ethereum_volume	ethereum_ewm	ethereum_diff	ethereum_rsi	macd	macd_h	macd_s
date								
2017-07-22	226.718599	2.044678e+08	226.718599	NaN	NaN	NaN	NaN	NaN
2017-07-23	224.913407	1.442842e+08	225.314561	-1.805192	NaN	NaN	NaN	NaN
2017-07-24	206.810505	3.580211e+08	211.781744	-18.102902	NaN	NaN	NaN	NaN
2017-07-25	200.328556	2.912707e+08	203.546013	-6.481949	NaN	NaN	NaN	NaN
2017-07-26	203.189322	1.557632e+08	203.290748	2.860766	NaN	NaN	NaN	NaN
...	...	...	...	...	...	...	...	...
2022-07-20	1488.975794	2.168190e+10	1492.140810	0.000000	61.868846	69.262089	41.973093	27.288996
2022-07-20	1527.413931	2.172813e+10	1517.335896	38.438137	64.019527	73.845298	37.245041	36.600256
2022-07-20	1527.413931	2.168190e+10	1524.534492	0.000000	64.019527	76.594589	31.995466	44.599123
2022-07-20	1488.975794	2.172813e+10	1499.135422	-38.438137	60.088919	74.809429	24.168245	50.641184
2022-07-20	1488.975794	2.168190e+10	1491.878545	0.000000	60.088919	72.558271	17.533669	55.024601

1832 rows × 8 columns

In [3]:

```
mydf = mydf.dropna()
# display(mydf)


# display(my_data.tail(10))
# mydf.drop(mydf.tail(10).index,
#         inplace = True)
display(mydf)
mydf.corr()
```

	ethereum	ethereum_volume	ethereum_ewm	ethereum_diff	ethereum_rsi	macd	macd_h	macd_s
date								
2017-08-24	329.025281	4.519507e+08	326.457443	7.239983	69.654547	20.372867	0.419856	19.953011
2017-08-25	329.865783	3.338393e+08	328.891971	0.840502	69.894479	20.626894	0.539106	20.087788
2017-08-26	343.341337	3.700521e+08	339.212947	13.475555	73.513669	21.665826	1.262431	20.403396
2017-08-27	344.201131	5.198744e+08	342.775936	0.859794	73.730643	22.301488	1.518474	20.783014
2017-08-28	366.809590	7.671665e+08	359.942832	22.608458	78.676407	24.348890	2.852701	21.496189
...	...	...	...	...	...	...	...	...
2022-07-13	1112.920783	1.793689e+10	1098.951561	72.123637	41.988562	-67.788266	17.479501	-85.267768
2022-07-14	1191.130837	1.647422e+10	1164.793901	78.210054	48.359970	-58.631347	21.309137	-79.940484
2022-07-15	1234.099139	1.681719e+10	1214.297642	42.968302	51.511001	-47.361288	26.063357	-73.424645
2022-07-16	1355.045640	1.902583e+10	1314.831927	120.946501	59.079833	-28.343586	36.064847	-64.408433
2022-07-17	1344.720284	1.579765e+10	1336.180753	-10.325356	58.243628	-13.944348	40.371268	-54.315616

1789 rows × 8 columns

Out[3]:

	ethereum	ethereum_volume	ethereum_ewm	ethereum_diff	ethereum_rsi	macd	macd_h	macd_s
ethereum	1.000000	0.532233	0.999824	0.030610	0.091851	0.185069	-0.002743	0.196870
ethereum_volume	0.532233	1.000000	0.533278	-0.041297	0.235115	0.278609	-0.115095	0.330872
ethereum_ewm	0.999824	0.533278	1.000000	0.012615	0.086098	0.182843	-0.008451	0.196287
ethereum_diff	0.030610	-0.041297	0.012615	1.000000	0.233843	0.073065	0.191527	0.017845
ethereum_rsi	0.091851	0.235115	0.086098	0.233843	1.000000	0.604187	0.394895	0.517163
macd	0.185069	0.278609	0.182843	0.073065	0.604187	1.000000	0.331733	0.956027
macd_h	-0.002743	-0.115095	-0.008451	0.191527	0.394895	0.331733	1.000000	0.040476
macd_s	0.196870	0.330872	0.196287	0.017845	0.517163	0.956027	0.040476	1.000000

In [4]:

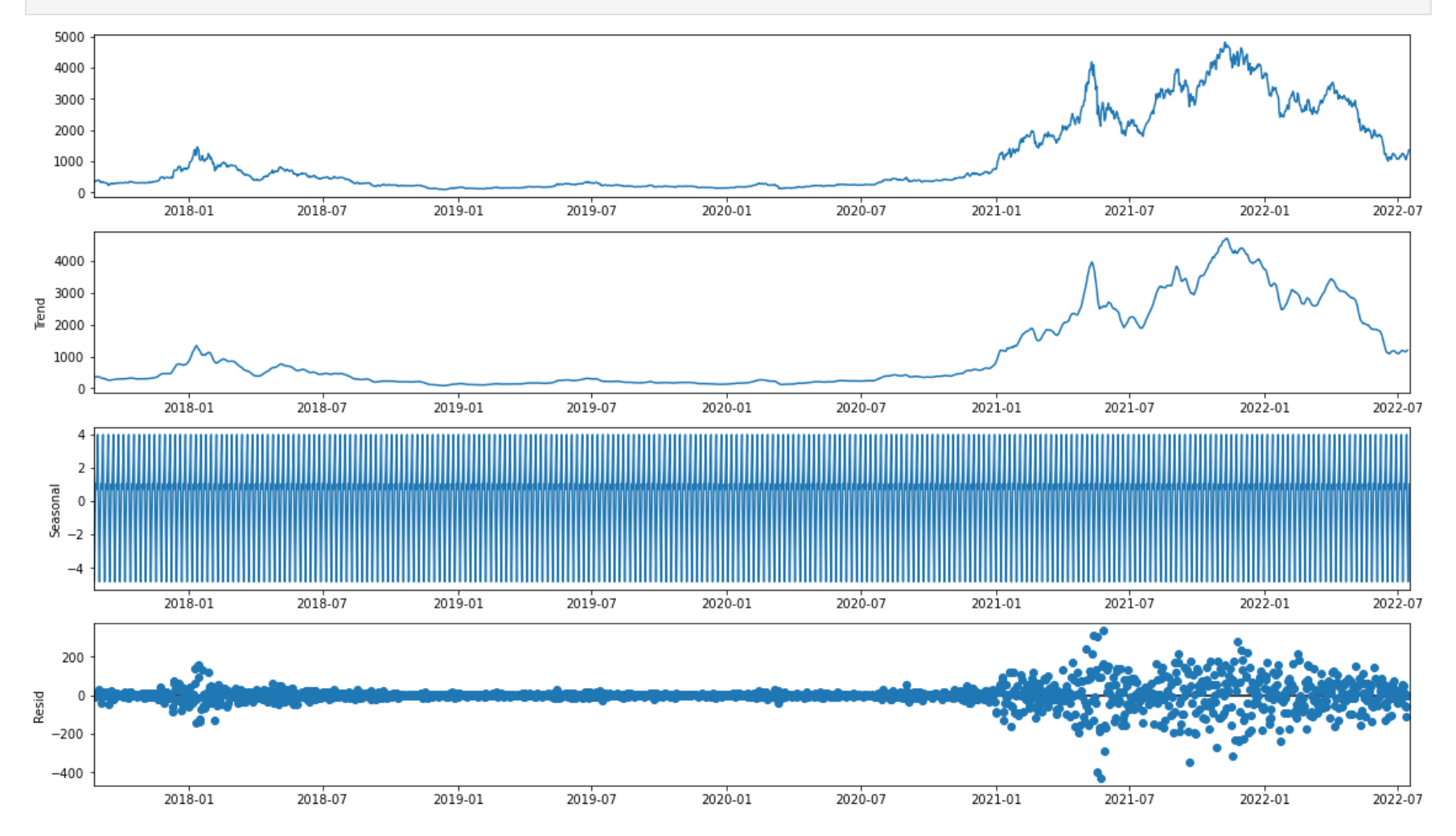
```
mydf.index
mydf['ethereum'].mean()
```

Out[4]:

```
1067.4288992475865
```

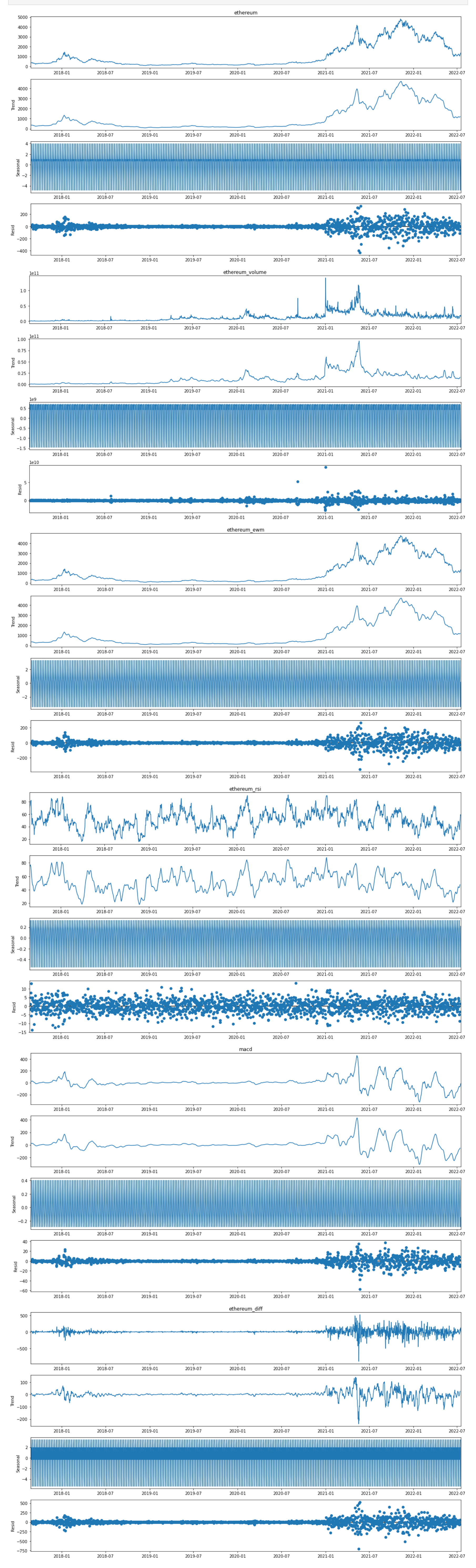
In [5]:

```
import statsmodels.api
import statsmodels as sm
a = pd.DataFrame(mydf['ethereum'])
res = sm.tsa.seasonal.seasonal_decompose(a,model='additive')
fig = res.plot()
fig.set_size_inches((16, 9))
fig.tight_layout()
plt.show()
```



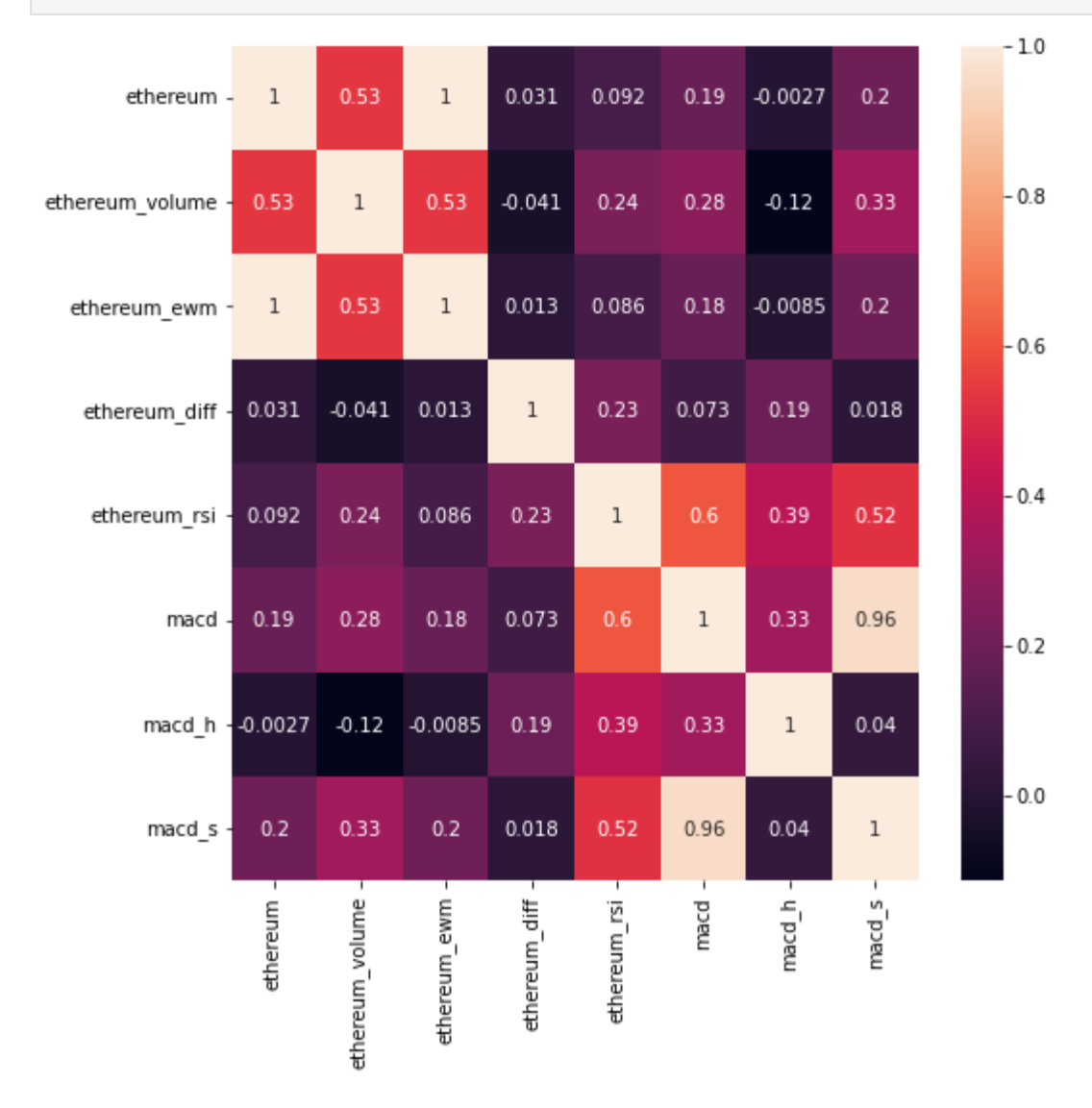
In [6]:

```
myCols = ['ethereum', 'ethereum_volume', 'ethereum_ewm', 'ethereum_rsi', 'macd', 'ethereum_diff']
for i in myCols:
    res = sm.tsa.seasonal.seasonal_decompose(mydf[i],model='additive')
    fig = res.plot()
    fig.set_size_inches((16, 9))
    fig.tight_layout()
    plt.show()
```



In [7]:

```
# my_data = mydf[myCols]
# display(mydf)
# mydf.corr()
plt.figure(figsize = (8,8))
sns.heatmap(mydf.corr(), annot=True)
plt.show()
```



In [8]:

```
sns.pairplot(mydf)
```

Out[8]:

```
<seaborn.axisgrid.PairGrid at 0x1a6cb5bf2b0>
```