1.0-initial-data-exploration

April 7, 2022

[ ]:
```
import pandas as pd

from sklearn.compose import ColumnTransformer
from sklearn.pipeline import Pipeline
from sklearn.preprocessing import MinMaxScaler

import plotly.graph_objects as go
from matplotlib import pyplot as plt
from matplotlib.dates import DateFormatter
```

[ ]:
```
bitcoin = pd.read_csv('../data/external/bitcoin.csv', parse_dates=['Date'])
cardano = pd.read_csv('../data/external/cardano.csv', parse_dates=['Date'])
ethereum = pd.read_csv('../data/external/ethereum.csv', parse_dates=['Date'])

df = pd.concat([bitcoin, cardano, ethereum], axis=0)
```

[ ]:
```
df.shape
```

[ ]:
```
(6525, 10)
```

[ ]:
```
df.head()
```

[ ]:
```
   SNo     Name Symbol                Date        High         Low  \
0    1  Bitcoin    BTC 2013-04-29 23:59:59  147.488007  134.000000
1    2  Bitcoin    BTC 2013-04-30 23:59:59  146.929993  134.050003
2    3  Bitcoin    BTC 2013-05-01 23:59:59  139.889999  107.720001
3    4  Bitcoin    BTC 2013-05-02 23:59:59  125.599998   92.281898
4    5  Bitcoin    BTC 2013-05-03 23:59:59  108.127998   79.099998

          Open       Close  Volume     Marketcap
0  134.444000  144.539993     0.0  1.603769e+09
1  144.000000  139.000000     0.0  1.542813e+09
2  139.000000  116.989998     0.0  1.298955e+09
3  116.379997  105.209999     0.0  1.168517e+09
4  106.250000   97.750000     0.0  1.085995e+09
```

[ ]:
```
df.value_counts(['Symbol'])
```

[ ]:
```
Symbol
BTC       2991
ETH       2160
ADA       1374
dtype: int64
```

0.1 Data Exploration

0.1.1 Bitcoin

[ ]:
```
print(f"Min Date: {df[df.Symbol == 'BTC'].Date.min()}, Max Date: {df[df.Symbol
↪== 'BTC'].Date.max()}")
```

```
Min Date: 2013-04-29 23:59:59, Max Date: 2021-07-06 23:59:59
```

[ ]:
```
df[df.Symbol == 'BTC'].describe()
```

[ ]:

	SNo	High	Low	Open	Close	\
count	2991.000000	2991.000000	2991.000000	2991.000000	2991.000000	
mean	1496.000000	6893.326038	6486.009539	6700.146240	6711.290443	
std	863.571653	11642.832456	10869.032130	11288.043736	11298.141921	
min	1.000000	74.561096	65.526001	68.504997	68.431000	
25%	748.500000	436.179001	422.879486	430.445496	430.569489	
50%	1496.000000	2387.610107	2178.500000	2269.889893	2286.409912	
75%	2243.500000	8733.926948	8289.800459	8569.656494	8576.238715	
max	2991.000000	64863.098908	62208.964366	63523.754869	63503.457930	

	Volume	Marketcap
count	2.991000e+03	2.991000e+03
mean	1.090633e+10	1.208761e+11
std	1.888895e+10	2.109438e+11
min	0.000000e+00	7.784112e+08
25%	3.036725e+07	6.305579e+09
50%	9.460360e+08	3.741503e+10
75%	1.592015e+10	1.499957e+11
max	3.509679e+11	1.186364e+12

[ ]:
```
fig = go.Figure(data=go.Ohlc(x=df[df.Symbol == 'BTC']['Date'],
                open=df[df.Symbol == 'BTC']['Open'],
                high=df[df.Symbol == 'BTC']['High'],
                low=df[df.Symbol == 'BTC']['Low'],
                close=df[df.Symbol == 'BTC']['Close']))
fig.update_layout(
    title='Bitcoin OHLC',
    yaxis_title='Stock Price (USD)'
)
fig.show()
```

0.2 Cardano

[ ]:
```
print(f"Min Date: {df[df.Symbol == 'ADA'].Date.min()}, Max Date: {df[df.Symbol
↪== 'ADA'].Date.max()}")
```

```
Min Date: 2017-10-02 23:59:59, Max Date: 2021-07-06 23:59:59
```

[ ]:
```
df[df.Symbol == 'ADA'].describe()
```

[ ]:
```
                SNo         High          Low         Open        Close  \
count   1374.000000  1374.000000  1374.000000  1374.000000  1374.000000
mean     687.500000     0.269807     0.239710     0.255287     0.256313
std      396.783946     0.433523     0.380928     0.408456     0.409691
min        1.000000     0.021050     0.017620     0.018414     0.018539
25%      344.250000     0.047565     0.044601     0.045898     0.045947
50%      687.500000     0.090274     0.083164     0.086867     0.087002
75%     1030.750000     0.194519     0.172442     0.181374     0.183379
max     1374.000000     2.461766     2.013285     2.300190     2.309113

              Volume     Marketcap
count   1.374000e+03  1.374000e+03
mean    8.934183e+08  7.603454e+09
std     2.107653e+09  1.303878e+10
min     1.739460e+06  4.806646e+08
25%     5.014830e+07  1.191263e+09
50%     1.186742e+08  2.270889e+09
75%     4.875977e+08  5.174547e+09
max     1.914198e+10  7.377224e+10
```

[ ]:
```
fig = go.Figure(data=go.Ohlc(x=df[df.Symbol == 'ADA']['Date'],
                open=df[df.Symbol == 'ADA']['Open'],
                high=df[df.Symbol == 'ADA']['High'],
                low=df[df.Symbol == 'ADA']['Low'],
                close=df[df.Symbol == 'ADA']['Close']))
fig.update_layout(
    title='Cardano OHLC',
    yaxis_title='Stock Price (USD)'
)
fig.show()
```

0.3 Ethereum

[ ]:
```
print(f"Min Date: {df[df.Symbol == 'ETH'].Date.min()}, Max Date: {df[df.Symbol
↪== 'ETH'].Date.max()}")
```

```
Min Date: 2015-08-08 23:59:59, Max Date: 2021-07-06 23:59:59
```

[ ]:
```
df[df.Symbol == 'ETH'].describe()
```

[ ]:
```
                SNo         High          Low         Open        Close  \
count   2160.000000  2160.000000  2160.000000  2160.000000  2160.000000
mean    1080.500000   398.258568   365.592589   382.879899   383.910691
std      623.682612   628.082281   566.611523   599.719862   601.078766
min        1.000000     0.482988     0.420897     0.431589     0.434829
25%      540.750000    14.265225    13.190950    13.757600    13.819200
50%     1080.500000   205.124631   193.302715   198.425096   198.643691
75%     1620.250000   396.494561   375.146804   386.264935   386.435272
max     2160.000000  4362.350542  3785.848603  4174.635873  4168.701049

              Volume     Marketcap
count   2.160000e+03  2.160000e+03
mean    7.057058e+09  4.172084e+10
std     1.064526e+10  6.909184e+10
min     1.021280e+05  3.221363e+07
25%     3.825102e+07  1.135576e+09
50%     2.148880e+09  2.070063e+10
75%     9.629136e+09  4.231010e+10
max     8.448291e+10  4.828819e+11
```

[ ]:
```
fig = go.Figure(data=go.Ohlc(x=df[df.Symbol == 'ETH']['Date'],
                open=df[df.Symbol == 'ETH']['Open'],
                high=df[df.Symbol == 'ETH']['High'],
                low=df[df.Symbol == 'ETH']['Low'],
                close=df[df.Symbol == 'ETH']['Close']))
fig.update_layout(
    title='Ethereum OHLC',
    yaxis_title='Stock Price (USD)'
)
fig.show()
```

0.4 Train Test Split

[ ]:
```
date_threshold = '2021-04-01'
train = df[df.Date < date_threshold]
test = df[df.Date >= date_threshold]
print(f'Train: {train.shape}, Test: {test.shape}, Proportion: {train.shape[0] /␣
 ↪df.shape[0]:.2%}')
```

```
Train: (6234, 10), Test: (291, 10), Proportion: 95.54%
```

0.5 Feature Engineering

TODO: Test min max scaler over windows

0.5.1 Columns Selection

[ ]:
```
class ColumnDropTransformer():
    def __init__(self,columns):
        self.columns=columns

    def transform(self,X,y=None):
        return X.drop(self.columns,axis=1)

    def fit(self, X, y=None):
        return self
```

[ ]:
```
df.columns
```

[ ]:
```
Index(['SNo', 'Name', 'Symbol', 'Date', 'High', 'Low', 'Open', 'Close',
       'Volume', 'Marketcap'],
      dtype='object')
```

[ ]:
```
minmax_transformer = Pipeline(steps=[
        ('minmax', MinMaxScaler())])

pipeline = Pipeline([
    ("column_dropper", ColumnDropTransformer(['SNo', 'Name'])),
    ('normalization', ColumnTransformer(
        remainder='passthrough',
        transformers=[
            ('mm', minmax_transformer , ['High', 'Low', 'Open',␣
 ↪'Close','Volume', 'Marketcap'])
        ]))
])
```

[ ]:
```
train = pipeline.fit_transform(train)
```

[ ]:
```
train[0]
```

[ ]:
```
array([0.0023906901581641727, 0.002259311720669535, 0.002195738911411989,
       0.0023598010859048656, 0.0, 0.001375737032009516, 'Bitcoin', 'BTC',
       Timestamp('2013-04-29 23:59:59')], dtype=object)
```

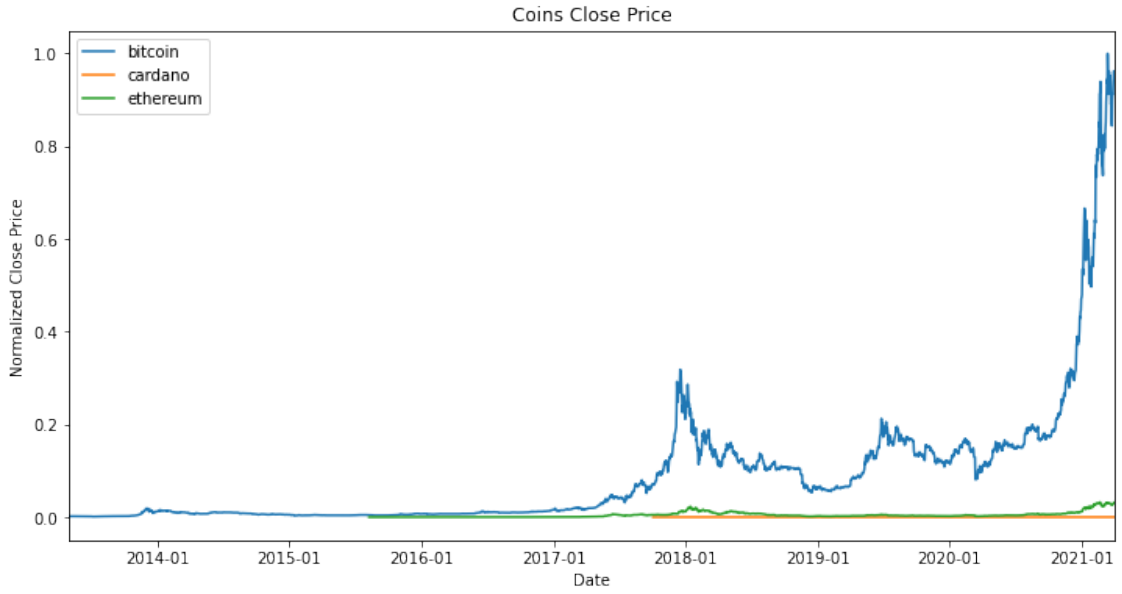
0.5.2 Coins Correlation

[ ]:
```
bitcoin_train = train[train[:,-2] == 'BTC']
cardano_train = train[train[:,-2] == 'ADA']
ethereum_train = train[train[:,-2] == 'ETH']
```

[ ]:
```
fig, ax = plt.subplots(figsize=(12, 6))
```

```
ax.plot(bitcoin_train[:,-1],bitcoin_train[:,3], label='bitcoin')
ax.plot(cardano_train[:,-1],cardano_train[:,3], label='cardano')
ax.plot(ethereum_train[:,-1],ethereum_train[:,3], label='ethereum')
ax.set(xlabel="Date",
       ylabel="Normalized Close Price",
       title="Coins Close Price",
       xlim=[min(train[:,-1]), max(train[:,-1])])
ax.legend(loc='best')

date_form = DateFormatter("%Y-%m")
ax.xaxis.set_major_formatter(date_form)
plt.show()
```



[ ]: