Using Algo

July 7, 2020

1 Examples of how to use the build_algo.py script

```
[44]: from build_algo import DataAnlysis, Modelling
      import pandas as pd
      from sklearn.metrics import confusion_matrix
      from sklearn.metrics import f1_score
```

```
[6]: STOCK_NAME = "BTC-USD"
```

1.1 Data Analysis

```
[8]: da = DataAnlysis(STOCK_NAME)
```

```
[9]: da.create_laggedFeatures('Close', 1)
```

```
[9]:          Date     Open     High      Low    Close        Volume  Dividends  \
     0    2018-06-07  7650.82  7741.27  7650.82  7678.24    4485799936          0
     1    2018-06-08  7685.14  7698.19  7558.40  7624.92    4227579904          0
     2    2018-06-09  7632.52  7683.58  7531.98  7531.98    3845220096          0
     3    2018-06-10  7499.55  7499.55  6709.07  6786.02    5804839936          0
     4    2018-06-11  6799.29  6910.18  6706.63  6906.92    4745269760          0
     ..      ...       ...      ...      ...      ...          ...        ...
     757  2020-07-03  9124.84  9202.34  9058.79  9087.30   13078970999          0
     758  2020-07-04  9084.23  9183.30  9053.63  9132.49   12290528515          0
     759  2020-07-05  9126.09  9162.18  8977.02  9073.94   12903406143          0
     760  2020-07-06  9072.85  9375.47  9058.66  9375.47   17889263252          0
     761  2020-07-07  9323.49  9359.54  9216.21  9249.49   14392401920          0

          Stock Splits  Close_lagged
     0               0          NaN
     1               0      7678.24
     2               0      7624.92
     3               0      7531.98
     4               0      6786.02
     ..            ...          ...
     757             0      9123.41
     758             0      9087.30
```
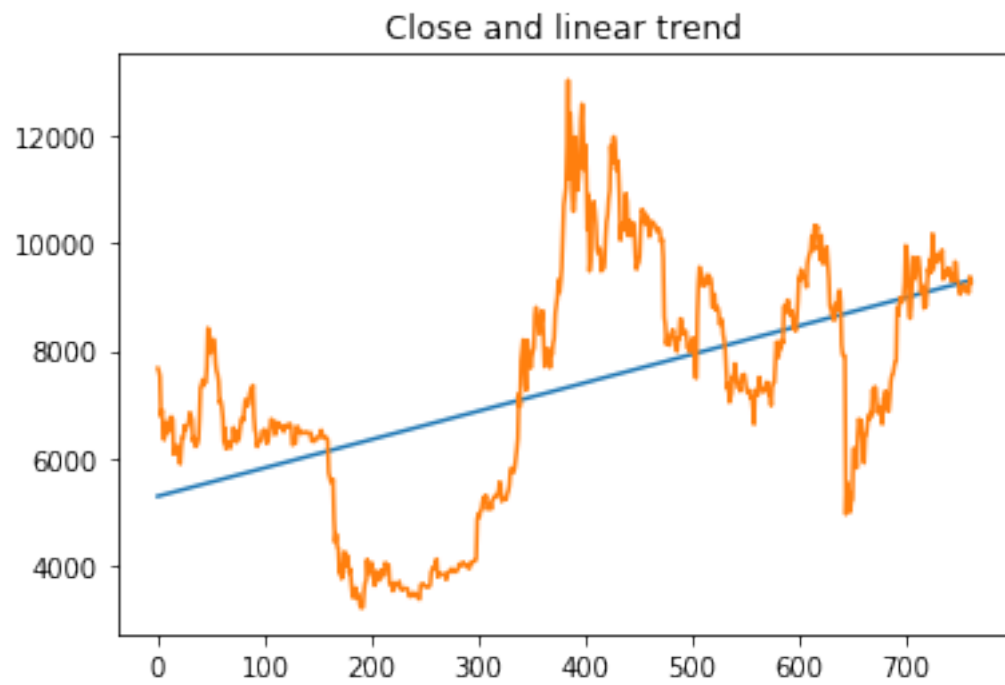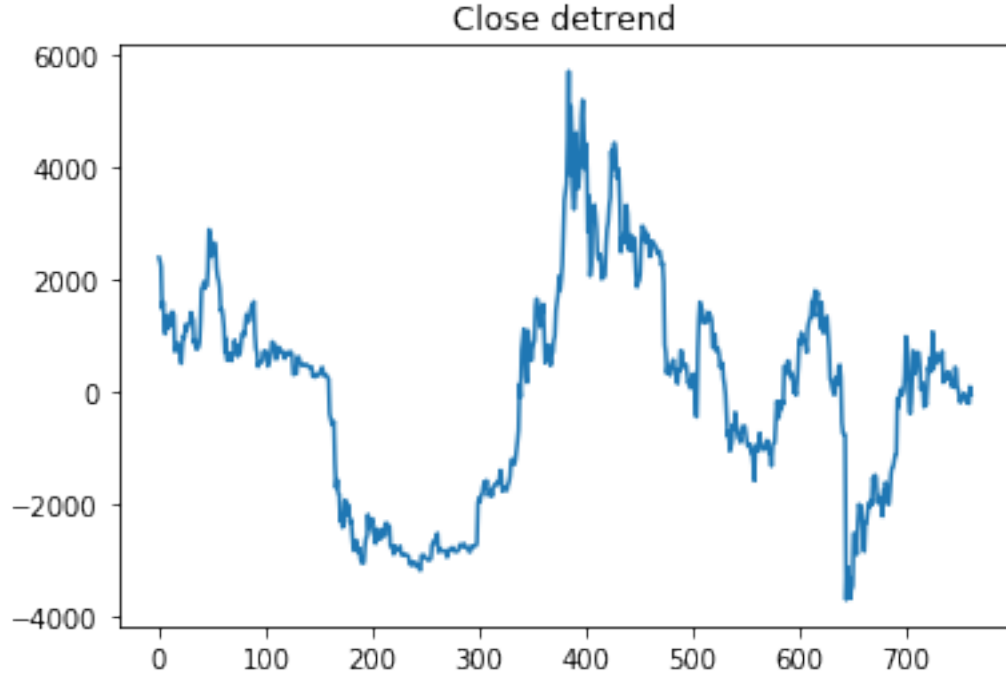
```
759          0    9132.49
760          0    9073.94
761          0    9375.47
```

[762 rows x 9 columns]

[10]: `da.detrend('Close')`

Close and linear trend

Close detrend

[10]: array([2.37191244e+03, 2.31333237e+03, 2.21513230e+03, 1.46391223e+03,
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       -1.35531525e+03, -1.25064532e+03, -1.14017539e+03, -1.13397546e+03,
       -1.45255530e+02, -2.93005599e+02, -9.20456686e+01,  2.65242621e+01,
       -6.98658072e+01, -5.99458766e+01,  2.52140541e+01,  2.85643985e+02,
        9.63143915e+02,  8.49033846e+02,  5.95003777e+02, -2.47726292e+02,
       -4.07616362e+02, -2.10196431e+02,  2.50053500e+02,  7.08523430e+02,
        2.97743361e+02,  3.41293292e+02,  6.29763222e+02,  6.80343153e+02,
        6.77543084e+02,  4.66223014e+02,  1.97429450e+01,  1.15302876e+02,
        1.36752806e+02, -2.87427263e+02, -1.76127332e+02, -2.53267402e+02,
        8.74425291e+01,  4.26912460e+02,  3.35022390e+02,  5.91052321e+02,
        3.46442252e+02,  1.04739218e+03,  4.04662113e+02,  5.26322044e+02,
        6.64981975e+02,  5.24611905e+02,  5.07501836e+02,  6.07411767e+02,
        6.14791697e+02,  6.33741628e+02,  7.02871559e+02,  1.49301489e+02,
        3.03101420e+02,  2.92281351e+02,  1.98531281e+02,  2.57181212e+02,
        3.39241143e+02,  2.76211073e+02,  2.02541004e+02,  7.34609347e+01,
        1.12520865e+02,  7.85507961e+01,  4.18380727e+02,  3.94060657e+02,
        7.27505882e+01,  1.86905188e+01, -8.84595505e+01, -2.11249620e+02,
       -1.18319689e+02, -7.63097584e+01, -1.34429828e+02, -4.93498971e+01,
       -1.59529966e+02, -2.00900036e+02, -1.60970105e+02, -2.24780174e+02,
        7.14897563e+01, -5.97503130e+01])
```

[11]: `da.ma_smoothing(7)`

[11]:
```
        Date      Open     High     Low      Close    Volume       Dividends  \
0    2018-06-07  7650.82  7741.27  7650.82  7678.24  4485799936          0
1    2018-06-08  7685.14  7698.19  7558.40  7624.92  4227579904          0
2    2018-06-09  7632.52  7683.58  7531.98  7531.98  3845220096          0
3    2018-06-10  7499.55  7499.55  6709.07  6786.02  5804839936          0
4    2018-06-11  6799.29  6910.18  6706.63  6906.92  4745269760          0
..          ...      ...      ...      ...      ...         ...        ...
757  2020-07-03  9124.84  9202.34  9058.79  9087.30  13078970999         0
758  2020-07-04  9084.23  9183.30  9053.63  9132.49  12290528515         0
759  2020-07-05  9126.09  9162.18  8977.02  9073.94  12903406143         0
760  2020-07-06  9072.85  9375.47  9058.66  9375.47  17889263252         0
761  2020-07-07  9323.49  9359.54  9216.21  9249.49  14392401920         0

     Stock Splits  Close_lagged       ma_7
0               0         NaN         NaN
1               0      7678.24         NaN
2               0      7624.92         NaN
3               0      7531.98  7065.762857
4               0      6786.02  6922.492857
..            ...          ...         ...
```
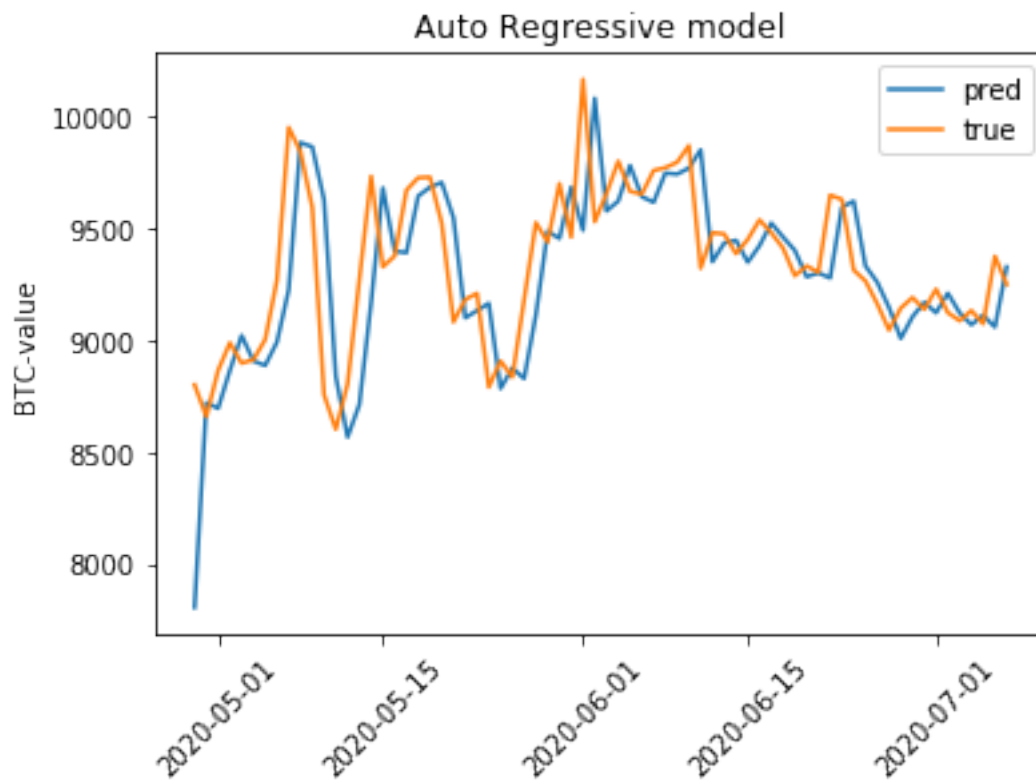
757	0	9123.41	9165.561429
758	0	9087.30	9181.490000
759	0	9132.49	NaN
760	0	9073.94	NaN
761	0	9375.47	NaN

[762 rows x 10 columns]

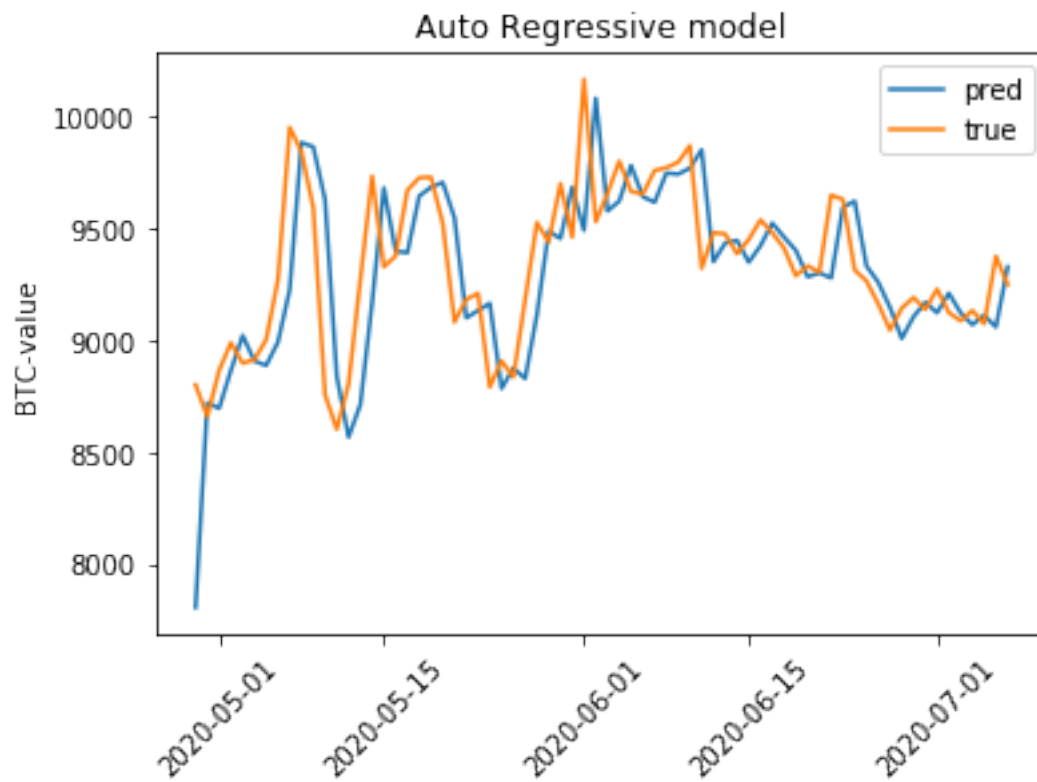## 1.2 Modelling

[12]: m = Modelling(da.df)

[13]: m.AutoRegressive()

RMSE of Auto Regressive: 290.24
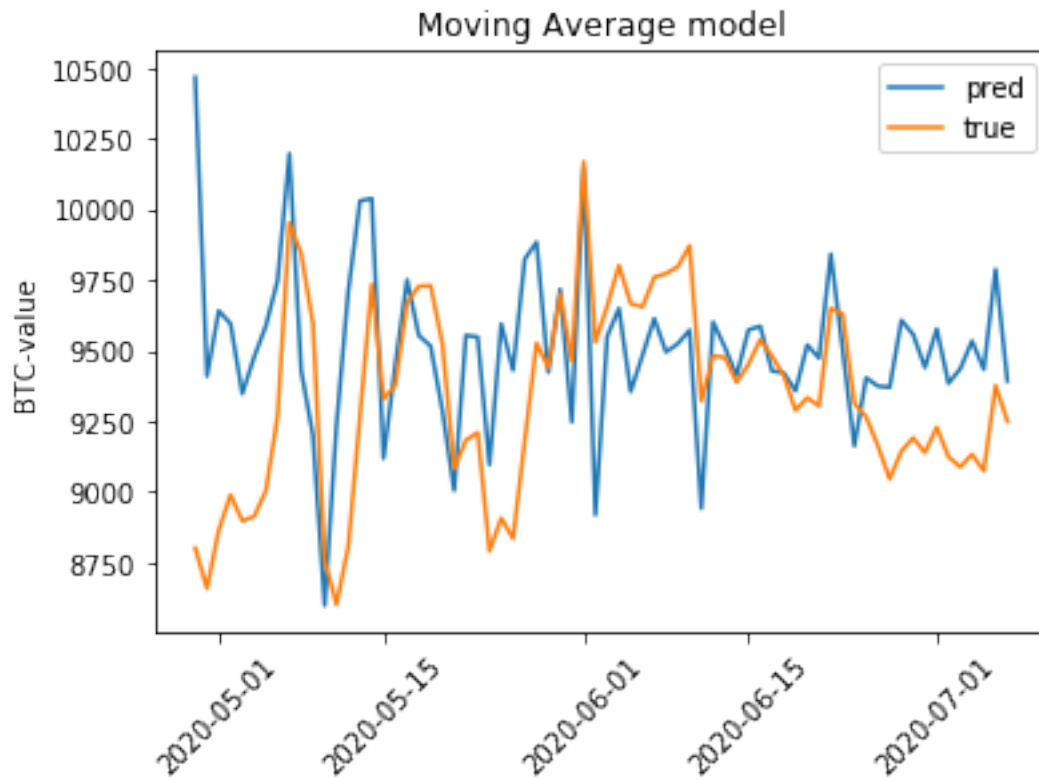
[13]: LinearRegression(copy_X=True, fit_intercept=True, n_jobs=None, normalize=False)

[14]: m.MovingAverage()

RMSE of Auto Regressive: 290.24

Moving Average model

RMSE of Auto Regressive: 416.67

[14]: LinearRegression(copy_X=True, fit_intercept=True, n_jobs=None, normalize=False)

[15]: y_pred = m.LSTM_model()

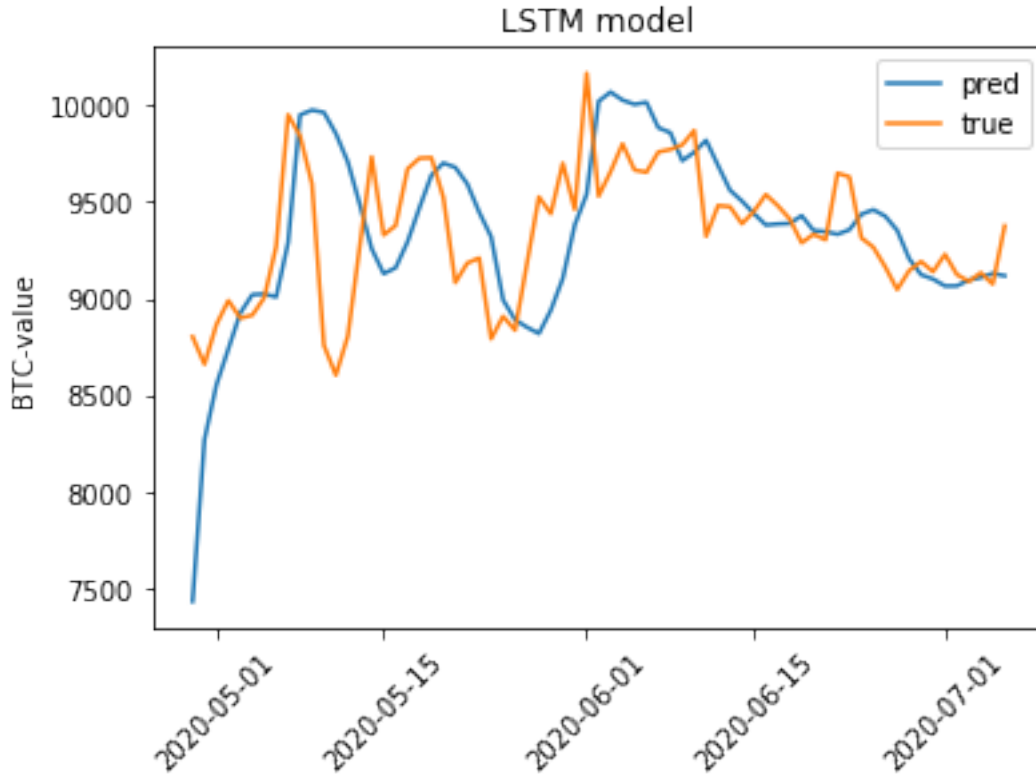Epoch 1 completed!
Epoch 2 completed!
Epoch 3 completed!
Epoch 4 completed!
Epoch 5 completed!

RMSE of LSTM: 407.16

```
[20]: df = da.df.copy()
```

```
[25]: TEST_SIZE = int(len(df)*(9/10))
      df_test = df[TEST_SIZE:]
      y_true = df_test[7:len(df_test)-1]['Close'].values
      table = pd.DataFrame({'y_pred': y_pred, 'y_true': y_true})
      table['y_true_lagged'] = table['y_true'].shift(1)
      table = table[1:]
      table['dif_true'] = table['y_true'] - table['y_true_lagged']
      table['dif_pred'] = table['y_pred'] - table['y_true_lagged']
      table['sign_true'] = table['dif_true'].apply(lambda x: 1 if x>=0 else 0)
      table['sign_pred'] = table['dif_pred'].apply(lambda x: 1 if x>=0 else 0)
```

```
[48]: table.head()
```

```
[48]:         y_pred    y_true  y_true_lagged  dif_true    dif_pred  sign_true  \
      1  8268.144531  8658.55        8801.04   -142.49 -532.895469          0
      2  8552.465820  8864.77        8658.55    206.22 -106.084180          1
      3  8738.349609  8988.60        8864.77    123.83 -126.420391          1
      4  8924.604492  8897.47        8988.60    -91.13  -63.995508          0
      5  9019.111328  8912.65        8897.47     15.18  121.641328          1
```

```
    sign_pred
1        0
2        0
3        0
4        0
5        1
```

[40]: `confusion_matrix(table['sign_true'], table['sign_pred'])`

[40]: array([[18, 14],
              [14, 22]])

[47]: `print('F1-score: {}'.format(round(f1_score(table['sign_true'], table['sign_pred']),2 )))`

F1-score: 0.61