cryptocurrency-price-prediction

September 29, 2021

[1]:
```
import json
import requests
from keras.models import Sequential
from keras.layers import Activation, Dense, Dropout, LSTM
import matplotlib.pyplot as plt
import numpy as np
import pandas as pd
import seaborn as sns
from sklearn.metrics import mean_absolute_error
%matplotlib inline
```

```
Using TensorFlow backend.
/usr/local/lib/python3.6/dist-packages/statsmodels/tools/_testing.py:19:
FutureWarning: pandas.util.testing is deprecated. Use the functions in the
public API at pandas.testing instead.
  import pandas.util.testing as tm
```

[0]:
```
endpoint = 'https://min-api.cryptocompare.com/data/histoday'
res = requests.get(endpoint + '?fsym=BTC&tsym=USD&limit=2000')
hist = pd.DataFrame(json.loads(res.content)['Data'])
hist = hist.set_index('time')
hist.index = pd.to_datetime(hist.index, unit='s')
target_col = 'close'
```

[39]:
```
hist
```

[39]:

time	close	high	low	open	volumefrom	volumeto
2014-12-03	376.96	384.67	373.64	380.64	23504.51	8.950322e+06
2014-12-04	369.84	380.43	366.24	376.96	25331.17	9.521316e+06
2014-12-05	377.63	379.70	366.39	369.84	29989.83	1.125185e+07
2014-12-06	376.26	380.33	372.04	377.63	11072.87	4.181320e+06
2014-12-07	376.47	377.88	372.46	376.26	8811.71	3.334332e+06
…	…	…	…	…	…	…
2020-05-21	9059.11	9566.81	8811.54	9509.45	87116.97	7.982188e+08
2020-05-22	9170.74	9265.04	8936.82	9059.11	44400.90	4.052557e+08
2020-05-23	9186.19	9311.34	9101.08	9170.74	23636.66	2.178195e+08
2020-05-24	8718.49	9307.11	8707.14	9186.19	45736.61	4.127534e+08

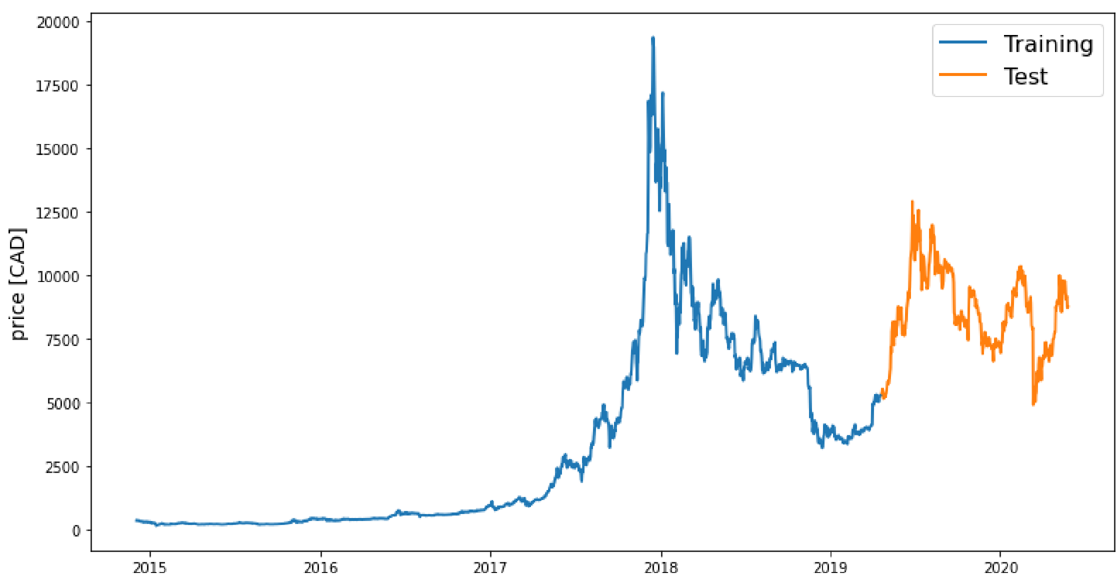
```
2020-05-25  8770.35  8879.46  8639.46  8718.49    25605.02  2.248634e+08

[2001 rows x 6 columns]
```

[0]:
```python
def train_test_split(df, test_size=0.2):
    split_row = len(df) - int(test_size * len(df))
    train_data = df.iloc[:split_row]
    test_data = df.iloc[split_row:]
    return train_data, test_data
```

[0]:
```python
train, test = train_test_split(hist, test_size=0.2)
```

[0]:
```python
def line_plot(line1, line2, label1=None, label2=None, title='', lw=2):
    fig, ax = plt.subplots(1, figsize=(13, 7))
    ax.plot(line1, label=label1, linewidth=lw)
    ax.plot(line2, label=label2, linewidth=lw)
    ax.set_ylabel('price [CAD]', fontsize=14)
    ax.set_title(title, fontsize=16)
    ax.legend(loc='best', fontsize=16);
```

[53]:
```python
line_plot(train[target_col], test[target_col], 'Training', 'Test', title='')
```



[0]:
```python
def normalise_zero_base(df):
    return df / df.iloc[0] - 1

def normalise_min_max(df):
    return (df - df.min()) / (data.max() - df.min())
```

[0]:
```python
def extract_window_data(df, window_len=5, zero_base=True):
    window_data = []
    for idx in range(len(df) - window_len):
        tmp = df[idx: (idx + window_len)].copy()
        if zero_base:
            tmp = normalise_zero_base(tmp)
        window_data.append(tmp.values)
    return np.array(window_data)
```

[0]:
```python
def prepare_data(df, target_col, window_len=10, zero_base=True, test_size=0.2):
    train_data, test_data = train_test_split(df, test_size=test_size)
    X_train = extract_window_data(train_data, window_len, zero_base)
    X_test = extract_window_data(test_data, window_len, zero_base)
    y_train = train_data[target_col][window_len:].values
    y_test = test_data[target_col][window_len:].values
    if zero_base:
        y_train = y_train / train_data[target_col][:-window_len].values - 1
        y_test = y_test / test_data[target_col][:-window_len].values - 1

    return train_data, test_data, X_train, X_test, y_train, y_test
```

[0]:
```python
def build_lstm_model(input_data, output_size, neurons=100, activ_func='linear',
                     dropout=0.2, loss='mse', optimizer='adam'):
    model = Sequential()
    model.add(LSTM(neurons, input_shape=(input_data.shape[1], input_data.
 ↪shape[2])))
    model.add(Dropout(dropout))
    model.add(Dense(units=output_size))
    model.add(Activation(activ_func))

    model.compile(loss=loss, optimizer=optimizer)
    return model
```

[0]:
```python
np.random.seed(42)
window_len = 5
test_size = 0.2
zero_base = True
lstm_neurons = 100
epochs = 20
batch_size = 32
loss = 'mse'
dropout = 0.2
optimizer = 'adam'
```

[0]:
```python
train, test, X_train, X_test, y_train, y_test = prepare_data(
    hist, target_col, window_len=window_len, zero_base=zero_base,␣
 ↪test_size=test_size)
```

[50]:

```
model = build_lstm_model(
    X_train, output_size=1, neurons=lstm_neurons, dropout=dropout, loss=loss,
    optimizer=optimizer)
history = model.fit(
    X_train, y_train, epochs=epochs, batch_size=batch_size, verbose=1,␣
 ↪shuffle=True)
```

```
Epoch 1/20
1596/1596 [==============================] - 1s 372us/step - loss: 0.0050
Epoch 2/20
1596/1596 [==============================] - 0s 179us/step - loss: 0.0035
Epoch 3/20
1596/1596 [==============================] - 0s 185us/step - loss: 0.0030
Epoch 4/20
1596/1596 [==============================] - 0s 191us/step - loss: 0.0024
Epoch 5/20
1596/1596 [==============================] - 0s 212us/step - loss: 0.0022
Epoch 6/20
1596/1596 [==============================] - 0s 211us/step - loss: 0.0023
Epoch 7/20
1596/1596 [==============================] - 0s 196us/step - loss: 0.0021
Epoch 8/20
1596/1596 [==============================] - 0s 185us/step - loss: 0.0020
Epoch 9/20
1596/1596 [==============================] - 0s 190us/step - loss: 0.0018
Epoch 10/20
1596/1596 [==============================] - 0s 186us/step - loss: 0.0019
Epoch 11/20
1596/1596 [==============================] - 0s 183us/step - loss: 0.0019
Epoch 12/20
1596/1596 [==============================] - 0s 189us/step - loss: 0.0018
Epoch 13/20
1596/1596 [==============================] - 0s 183us/step - loss: 0.0018
Epoch 14/20
1596/1596 [==============================] - 0s 181us/step - loss: 0.0018
Epoch 15/20
1596/1596 [==============================] - 0s 184us/step - loss: 0.0017
Epoch 16/20
1596/1596 [==============================] - 0s 185us/step - loss: 0.0017
Epoch 17/20
1596/1596 [==============================] - 0s 183us/step - loss: 0.0017
Epoch 18/20
1596/1596 [==============================] - 0s 179us/step - loss: 0.0017
Epoch 19/20
1596/1596 [==============================] - 0s 189us/step - loss: 0.0017
Epoch 20/20
1596/1596 [==============================] - 0s 191us/step - loss: 0.0017
```

[51]:
```
targets = test[target_col][window_len:]
preds = model.predict(X_test).squeeze()
mean_absolute_error(preds, y_test)
```

[51]: 0.028985910174301795

[52]:
```
preds = test[target_col].values[:-window_len] * (preds + 1)
preds = pd.Series(index=targets.index, data=preds)
line_plot(targets, preds, 'actual', 'prediction', lw=3)
```