btc_prices_prediction-05312020

June 21, 2020

1 Bitcoin Prices Prediction with Deep Learning/Machine Learning

[1]:
```
# Data analysis and wrangling
import pandas as pd
import numpy as np
import os
import string
import csv

# Visualization
%matplotlib inline
import matplotlib.pyplot as plt
import seaborn
from datetime import datetime, timedelta

# Model prediction
import tensorflow as tf
from sklearn.preprocessing import MinMaxScaler
from tensorflow.keras import backend, models, layers
from tensorflow.keras.models import Model, Sequential
from tensorflow.keras.layers import Dense, Dropout, LSTM
```

[2]:
```
price_data = pd.read_csv('BTC-USD_05312020.csv',
                    header = 0,
                    error_bad_lines=False,
                    engine='python')

price_data.head()
```

[2]:

	Date	Open	High	Low	Close	Adj_Close	\
0	2014-11-20	380.307007	382.024994	356.781006	357.839996	357.839996	
1	2014-11-21	357.878998	357.878998	344.112000	350.847992	350.847992	
2	2014-11-22	351.604004	364.841003	350.877991	352.920013	352.920013	
3	2014-11-23	353.174988	370.845001	353.174988	367.572998	367.572998	
4	2014-11-24	366.947998	387.209015	366.669006	376.901001	376.901001	

```
     Volume
0  25233200
1  29850100
2  15273000
3  15151600
4  30930100
```

[3]:
```
price_data.tail()
```

[3]:
```
            Date         Open         High          Low        Close  \
2015  2020-05-27  8837.380859  9203.320313  8834.157227  9181.017578
2016  2020-05-28  9184.945313  9546.319336  9148.457031  9525.750977
2017  2020-05-29  9528.355469  9573.666992  9379.338867  9439.124023
2018  2020-05-30  9438.914063  9704.030273  9366.729492  9700.414063
2019  2020-05-31  9696.850586  9696.850586  9538.416016  9569.117188

        Adj_Close      Volume
2015  9181.017578  32740536902
2016  9525.750977  34367073114
2017  9439.124023  32896642044
2018  9700.414063  32722975141
2019  9569.117188  29666250752
```

1.1 Visualize with scaling the data

[4]:
```
signal = np.copy(price_data['Close'].values)
std_signal = (signal - np.mean(signal)) / np.std(signal)
series = pd.Series(std_signal)
series.describe(percentiles = [0.25,0.5,0.75,0.85,0.95])
```

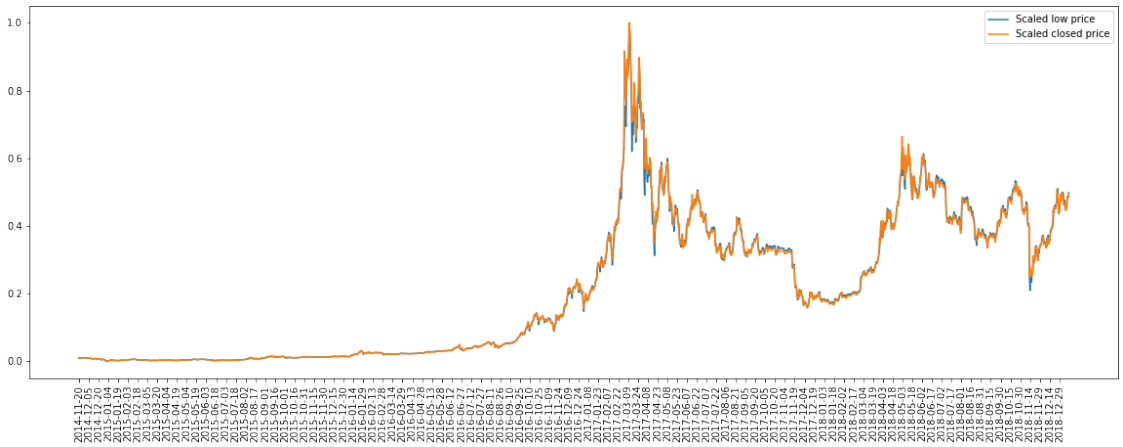
[4]:
```
count    2.020000e+03
mean    -2.978915e-17
std      1.000248e+00
min     -1.005636e+00
25%     -9.396601e-01
50%     -1.837176e-01
75%      8.051709e-01
85%      1.148393e+00
95%      1.639047e+00
max      3.813184e+00
dtype: float64
```

[5]:
```
# visualize with mim max scaler
scaler = MinMaxScaler()
# transform data
minmax = scaler.fit(price_data[['Low', 'Close']])
scaled = minmax.fit_transform(price_data[['Low', 'Close']])
```

[6]:
```
# The time-series can be visualized with the low and Close prices comparison␣
↪below:

plt.figure(figsize=(20,7))
plt.plot(np.arange(len(signal)), scaled[:,0], label = 'Scaled low price')
plt.plot(np.arange(len(signal)), scaled[:,1], label = 'Scaled closed price')

plt.xticks(np.arange(len(signal))[::20], price_data.Date[::15],␣
↪rotation='vertical')
plt.legend()
plt.show()
```



1.2 Training and Testing sets

[7]:
```
# Encode the date
price_data['date'] = pd.to_datetime(price_data['Date']).dt.date
group = price_data.groupby('date')
```

[8]:
```
# Split data
prediction_days = 60
Real_Price = group['Close'].mean()
price_train = Real_Price[:len(Real_Price)-prediction_days]
price_test = Real_Price[len(Real_Price)-prediction_days:]
```

[9]:
```
# Process data
training_set = price_train.values
training_set = np.reshape(training_set, (len(training_set), 1))
```

1.3 Scaling the training set

[10]:
```
# Define scaler
scaler = MinMaxScaler()

training_set = scaler.fit_transform(training_set)
X_train = training_set[0:len(training_set)-1]
y_train = training_set[1:len(training_set)]
```

1.4 Reshape the train data for the Model

[11]:
```
X_train = np.reshape(X_train, (len(X_train), 1, 1))
```

1.5 Build the Model

[12]:
```
# Build a RNN-LSTM model

backend.clear_session()
model = Sequential()

# Adding the input layer and the LSTM layer
model.add(LSTM(units = 100, activation = 'sigmoid', input_shape = (None, 1)))
model.add(layers.Dropout(0.2))

# Adding the output layer
model.add(Dense(units = 1, activation='linear'))

# Compiling the model
model.compile(loss = 'mean_squared_error',
              optimizer = 'adam',
              metrics = ['accuracy'])
model.summary()

# Fitting the model to the Training set
model.fit(X_train, y_train,
          batch_size = 10,
          epochs = 50,
          verbose = 0)

# Making the price predictions
test_set = price_test.values
inputs = np.reshape(test_set, (len(test_set), 1))
inputs = scaler.transform(inputs)
inputs = np.reshape(inputs, (len(inputs), 1, 1))
pred_btc_price = model.predict(inputs)
pred_btc_price_inverse = scaler.inverse_transform(pred_btc_price)
```

```
# Visualising the results
plt.figure(figsize = (25,15), dpi=50, facecolor='w', edgecolor='k')
ax = plt.gca()
plt.plot(test_set, color = 'red', label = 'Actual BTC Prices')
plt.plot(pred_btc_price_inverse, color = 'blue', label = 'Predicted BTC Prices')
plt.title('BTC Price Prediction', fontsize=20)
price_test = price_test.reset_index()
x = price_test.index
labels = price_test['date']
plt.xticks(x, labels, rotation = 'vertical')
for tick in ax.xaxis.get_major_ticks():
    tick.label1.set_fontsize(15)
for tick in ax.yaxis.get_major_ticks():
    tick.label1.set_fontsize(15)
plt.xlabel('Time(Date)', fontsize=20)
plt.ylabel('BTC Price(USD)', fontsize=20)
plt.legend(loc=2, prop={'size': 25})
plt.show()
```

```
WARNING:tensorflow:From C:\cuong\lib\site-
packages\tensorflow\python\ops\resource_variable_ops.py:435: colocate_with (from
tensorflow.python.framework.ops) is deprecated and will be removed in a future
version.
Instructions for updating:
Colocations handled automatically by placer.
WARNING:tensorflow:From C:\cuong\lib\site-
packages\tensorflow\python\keras\layers\core.py:143: calling dropout (from
tensorflow.python.ops.nn_ops) with keep_prob is deprecated and will be removed
in a future version.
Instructions for updating:
Please use `rate` instead of `keep_prob`. Rate should be set to `rate = 1 -
keep_prob`.
WARNING:tensorflow:From C:\cuong\lib\site-
packages\tensorflow\python\keras\utils\losses_utils.py:170: to_float (from
tensorflow.python.ops.math_ops) is deprecated and will be removed in a future
version.
Instructions for updating:
Use tf.cast instead.
_________________________________________________________________
Layer (type)                 Output Shape              Param #
=================================================================
lstm (LSTM)                  (None, 100)               40800
_________________________________________________________________
dropout (Dropout)            (None, 100)               0
_________________________________________________________________
dense (Dense)                (None, 1)                 101
=================================================================
```

```
Total params: 40,901
Trainable params: 40,901
Non-trainable params: 0
_________________________________________________________________
WARNING:tensorflow:From C:\cuong\lib\site-
packages\tensorflow\python\ops\math_ops.py:3066: to_int32 (from
tensorflow.python.ops.math_ops) is deprecated and will be removed in a future
version.
Instructions for updating:
Use tf.cast instead.
```