price_prediction

September 29, 2021

[2]:
```
%tensorflow_version 2.x
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.
```

[0]:
```
endpoint = 'https://min-api.cryptocompare.com/data/histoday'
res = requests.get(endpoint + '?fsym=BTC&tsym=CAD&limit=500')
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'
```

[0]:
```
hist.head(5)
```

[0]:

time	close	high	low	open	volumefrom	volumeto
2018-07-19	10019.36	10438.45	9638.56	9907.17	371.50	3703845.37
2018-07-20	9983.50	10543.04	9838.31	10019.36	688.42	6892089.32
2018-07-21	10016.82	10217.67	9817.27	9983.50	252.00	2493980.46
2018-07-22	9924.13	10148.85	9874.09	10016.82	275.64	2746431.43
2018-07-23	10353.83	10399.45	9698.87	9924.13	400.50	4110419.96

[0]:
```
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
```

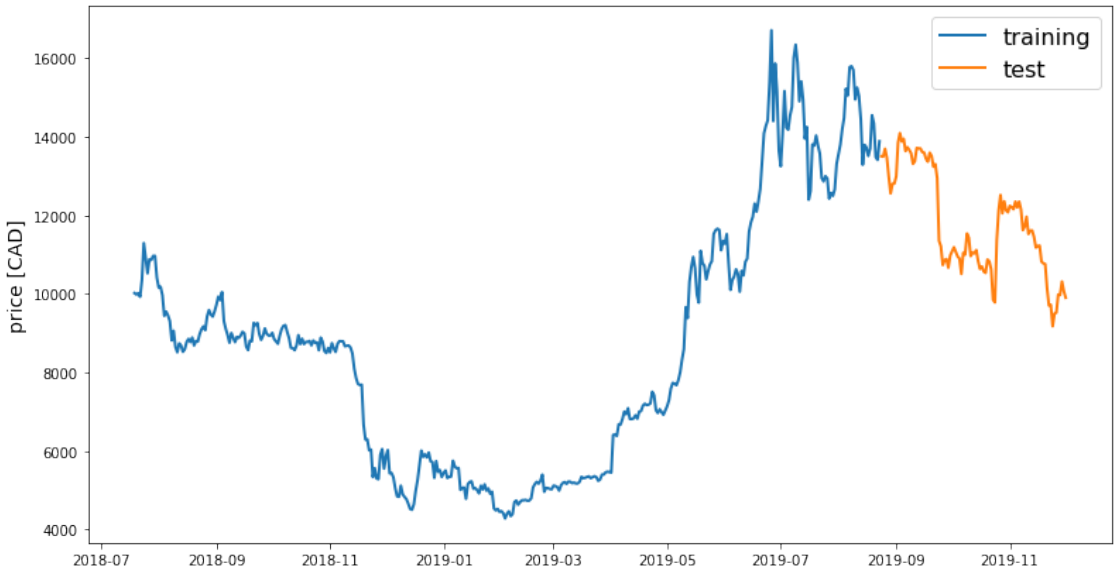
[0]:
```
train, test = train_test_split(hist, test_size=0.2)
```

[0]:
```
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);
```

[0]:
```
line_plot(train[target_col], test[target_col], 'training', 'test', title='')
```

```
/usr/local/lib/python3.6/dist-
packages/pandas/plotting/_matplotlib/converter.py:103: FutureWarning: Using an
implicitly registered datetime converter for a matplotlib plotting method. The
converter was registered by pandas on import. Future versions of pandas will
require you to explicitly register matplotlib converters.

To register the converters:
        >>> from pandas.plotting import register_matplotlib_converters
        >>> register_matplotlib_converters()
  warnings.warn(msg, FutureWarning)
```



[0]:
```
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]:
```
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]:
```
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]:
```
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]:
```
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]:
```
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)
```

[0]:
```
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)
```

```
WARNING:tensorflow:From /usr/local/lib/python3.6/dist-
packages/keras/backend/tensorflow_backend.py:66: The name tf.get_default_graph
is deprecated. Please use tf.compat.v1.get_default_graph instead.

WARNING:tensorflow:From /usr/local/lib/python3.6/dist-
packages/keras/backend/tensorflow_backend.py:541: The name tf.placeholder is
deprecated. Please use tf.compat.v1.placeholder instead.

WARNING:tensorflow:From /usr/local/lib/python3.6/dist-
packages/keras/backend/tensorflow_backend.py:4432: The name tf.random_uniform is
deprecated. Please use tf.random.uniform instead.

WARNING:tensorflow:From /usr/local/lib/python3.6/dist-
packages/keras/backend/tensorflow_backend.py:148: The name
tf.placeholder_with_default is deprecated. Please use
tf.compat.v1.placeholder_with_default instead.

WARNING:tensorflow:From /usr/local/lib/python3.6/dist-
packages/keras/backend/tensorflow_backend.py:3733: 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 /usr/local/lib/python3.6/dist-
packages/keras/optimizers.py:793: The name tf.train.Optimizer is deprecated.
Please use tf.compat.v1.train.Optimizer instead.

WARNING:tensorflow:From /usr/local/lib/python3.6/dist-
packages/tensorflow_core/python/ops/math_grad.py:1424: where (from
tensorflow.python.ops.array_ops) is deprecated and will be removed in a future
version.
Instructions for updating:
Use tf.where in 2.0, which has the same broadcast rule as np.where
WARNING:tensorflow:From /usr/local/lib/python3.6/dist-
packages/keras/backend/tensorflow_backend.py:1033: The name tf.assign_add is
deprecated. Please use tf.compat.v1.assign_add instead.

WARNING:tensorflow:From /usr/local/lib/python3.6/dist-
packages/keras/backend/tensorflow_backend.py:1020: The name tf.assign is
```

```
deprecated. Please use tf.compat.v1.assign instead.

WARNING:tensorflow:From /usr/local/lib/python3.6/dist-
packages/keras/backend/tensorflow_backend.py:3005: The name tf.Session is
deprecated. Please use tf.compat.v1.Session instead.

Epoch 1/20
WARNING:tensorflow:From /usr/local/lib/python3.6/dist-
packages/keras/backend/tensorflow_backend.py:190: The name
tf.get_default_session is deprecated. Please use
tf.compat.v1.get_default_session instead.

WARNING:tensorflow:From /usr/local/lib/python3.6/dist-
packages/keras/backend/tensorflow_backend.py:197: The name tf.ConfigProto is
deprecated. Please use tf.compat.v1.ConfigProto instead.

WARNING:tensorflow:From /usr/local/lib/python3.6/dist-
packages/keras/backend/tensorflow_backend.py:207: The name tf.global_variables
is deprecated. Please use tf.compat.v1.global_variables instead.

WARNING:tensorflow:From /usr/local/lib/python3.6/dist-
packages/keras/backend/tensorflow_backend.py:216: The name
tf.is_variable_initialized is deprecated. Please use
tf.compat.v1.is_variable_initialized instead.

WARNING:tensorflow:From /usr/local/lib/python3.6/dist-
packages/keras/backend/tensorflow_backend.py:223: The name
tf.variables_initializer is deprecated. Please use
tf.compat.v1.variables_initializer instead.

396/396 [==============================] - 1s 4ms/step - loss: 0.0094
Epoch 2/20
396/396 [==============================] - 0s 286us/step - loss: 0.0047
Epoch 3/20
396/396 [==============================] - 0s 249us/step - loss: 0.0037
Epoch 4/20
396/396 [==============================] - 0s 253us/step - loss: 0.0034
Epoch 5/20
396/396 [==============================] - 0s 258us/step - loss: 0.0034
Epoch 6/20
396/396 [==============================] - 0s 257us/step - loss: 0.0031
Epoch 7/20
396/396 [==============================] - 0s 260us/step - loss: 0.0038
Epoch 8/20
396/396 [==============================] - 0s 245us/step - loss: 0.0036
Epoch 9/20
396/396 [==============================] - 0s 270us/step - loss: 0.0053
Epoch 10/20
```

```
396/396 [==============================] - 0s 249us/step - loss: 0.0030
Epoch 11/20
396/396 [==============================] - 0s 259us/step - loss: 0.0029
Epoch 12/20
396/396 [==============================] - 0s 254us/step - loss: 0.0042
Epoch 13/20
396/396 [==============================] - 0s 286us/step - loss: 0.0029
Epoch 14/20
396/396 [==============================] - 0s 262us/step - loss: 0.0053
Epoch 15/20
396/396 [==============================] - 0s 254us/step - loss: 0.0024
Epoch 16/20
396/396 [==============================] - 0s 235us/step - loss: 0.0025
Epoch 17/20
396/396 [==============================] - 0s 242us/step - loss: 0.0021
Epoch 18/20
396/396 [==============================] - 0s 255us/step - loss: 0.0024
Epoch 19/20
396/396 [==============================] - 0s 247us/step - loss: 0.0023
Epoch 20/20
396/396 [==============================] - 0s 247us/step - loss: 0.0026
```

[0]:
```
targets = test[target_col][window_len:]
preds = model.predict(X_test).squeeze()
mean_absolute_error(preds, y_test)
```

[0]:
```
0.027955859325876943
```

[0]:
```
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)
```