price_prediction_update

September 29, 2021

[1]:
```
%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
```

[20]:
```
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'
```

[22]:
```
hist.drop(["conversionType", "conversionSymbol"], axis = 'columns', inplace =␣
↪True)
```

[23]:
```
hist.head(5)
```

[23]:

time	high	low	open	volumefrom	volumeto	close
2020-04-07	10550.00	9954.40	10397.20	100.45	1032566.57	10106.10
2020-04-08	10626.54	9541.47	10032.79	5334.00	54946325.82	10301.15
2020-04-09	10375.40	10050.00	10347.90	56.20	575285.83	10230.60
2020-04-10	10280.70	9522.40	10230.60	64.04	627563.31	9709.30
2020-04-11	9793.66	9358.38	9602.61	3264.99	31401771.76	9617.72

[24]:
```
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
```

[25]:
```
train, test = train_test_split(hist, test_size=0.2)
```

[26]:
```
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);
```

[27]:
```
line_plot(train[target_col], test[target_col], 'training', 'test', title='')
```

[28]:
```
def normalise_zero_base(df):
    return df / df.iloc[0] - 1

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

[29]:
```
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)
```

[30]:
```
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
```

[31]:
```
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
```

[32]:
```
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'
```

[33]:
```
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)
```

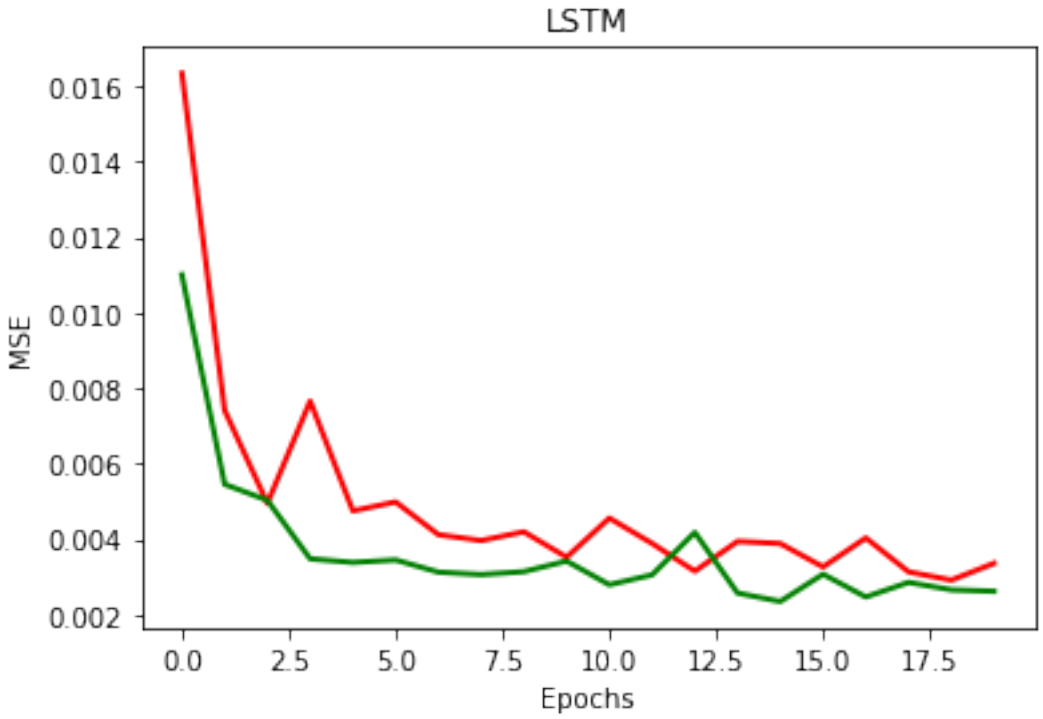
[50]:
```
model = build_lstm_model(
    X_train, output_size=1, neurons=lstm_neurons, dropout=dropout, loss=loss,
    optimizer=optimizer)
history = model.fit(
    X_train, y_train, validation_data=(X_test, y_test), epochs=epochs,␣
 ↪batch_size=batch_size, verbose=1, shuffle=True)
```

```
Epoch 1/20
```

```
13/13 [==============================] - 4s 74ms/step - loss: 0.0163 - val_loss:
0.0110
Epoch 2/20
13/13 [==============================] - 0s 16ms/step - loss: 0.0074 - val_loss:
0.0055
Epoch 3/20
13/13 [==============================] - 0s 14ms/step - loss: 0.0050 - val_loss:
0.0050
Epoch 4/20
13/13 [==============================] - 0s 14ms/step - loss: 0.0077 - val_loss:
0.0035
Epoch 5/20
13/13 [==============================] - 0s 15ms/step - loss: 0.0047 - val_loss:
0.0034
Epoch 6/20
13/13 [==============================] - 0s 16ms/step - loss: 0.0050 - val_loss:
0.0034
Epoch 7/20
13/13 [==============================] - 0s 15ms/step - loss: 0.0041 - val_loss:
0.0031
Epoch 8/20
13/13 [==============================] - 0s 14ms/step - loss: 0.0040 - val_loss:
0.0031
Epoch 9/20
13/13 [==============================] - 0s 14ms/step - loss: 0.0042 - val_loss:
0.0031
Epoch 10/20
13/13 [==============================] - 0s 14ms/step - loss: 0.0035 - val_loss:
0.0034
Epoch 11/20
13/13 [==============================] - 0s 14ms/step - loss: 0.0046 - val_loss:
0.0028
Epoch 12/20
13/13 [==============================] - 0s 15ms/step - loss: 0.0039 - val_loss:
0.0031
Epoch 13/20
13/13 [==============================] - 0s 14ms/step - loss: 0.0032 - val_loss:
0.0042
Epoch 14/20
13/13 [==============================] - 0s 13ms/step - loss: 0.0039 - val_loss:
0.0026
Epoch 15/20
13/13 [==============================] - 0s 16ms/step - loss: 0.0039 - val_loss:
0.0023
Epoch 16/20
13/13 [==============================] - 0s 14ms/step - loss: 0.0033 - val_loss:
0.0031
Epoch 17/20
```

```
13/13 [==============================] - 0s 16ms/step - loss: 0.0040 - val_loss:
0.0025
Epoch 18/20
13/13 [==============================] - 0s 11ms/step - loss: 0.0031 - val_loss:
0.0029
Epoch 19/20
13/13 [==============================] - 0s 15ms/step - loss: 0.0029 - val_loss:
0.0027
Epoch 20/20
13/13 [==============================] - 0s 14ms/step - loss: 0.0034 - val_loss:
0.0026
```

[51]:
```
import matplotlib.pyplot as plt
plt.plot(history.history['loss'],'r',linewidth=2, label='Train loss')
plt.plot(history.history['val_loss'], 'g',linewidth=2, label='Validation loss')
plt.title('LSTM')
plt.xlabel('Epochs')
plt.ylabel('MSE')
plt.show()
```



[43]:
```
targets = test[target_col][window_len:]
preds = model.predict(X_test).squeeze()
mean_absolute_error(preds, y_test)
```

[43]:
```
0.04291896664751478
```

[47]:
```
from sklearn.metrics import mean_squared_error
MAE=mean_squared_error(preds, y_test)
MAE
```

[47]:
```
0.0030774299401816274
```

[48]:
```
from sklearn.metrics import r2_score
R2=r2_score(y_test, preds)
R2
```

[48]:
```
0.6552325599972303
```

[36]:
```
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)
```