Bitcoin Price Prediction using Recurrent Neural Nets (LSTM)

ZTDL Bootcamp: Sep 21st 2018

Just HODL it

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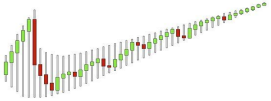

Predicting the price of BTC - inspired by a blogpost that seemed too good to be true (it was...)

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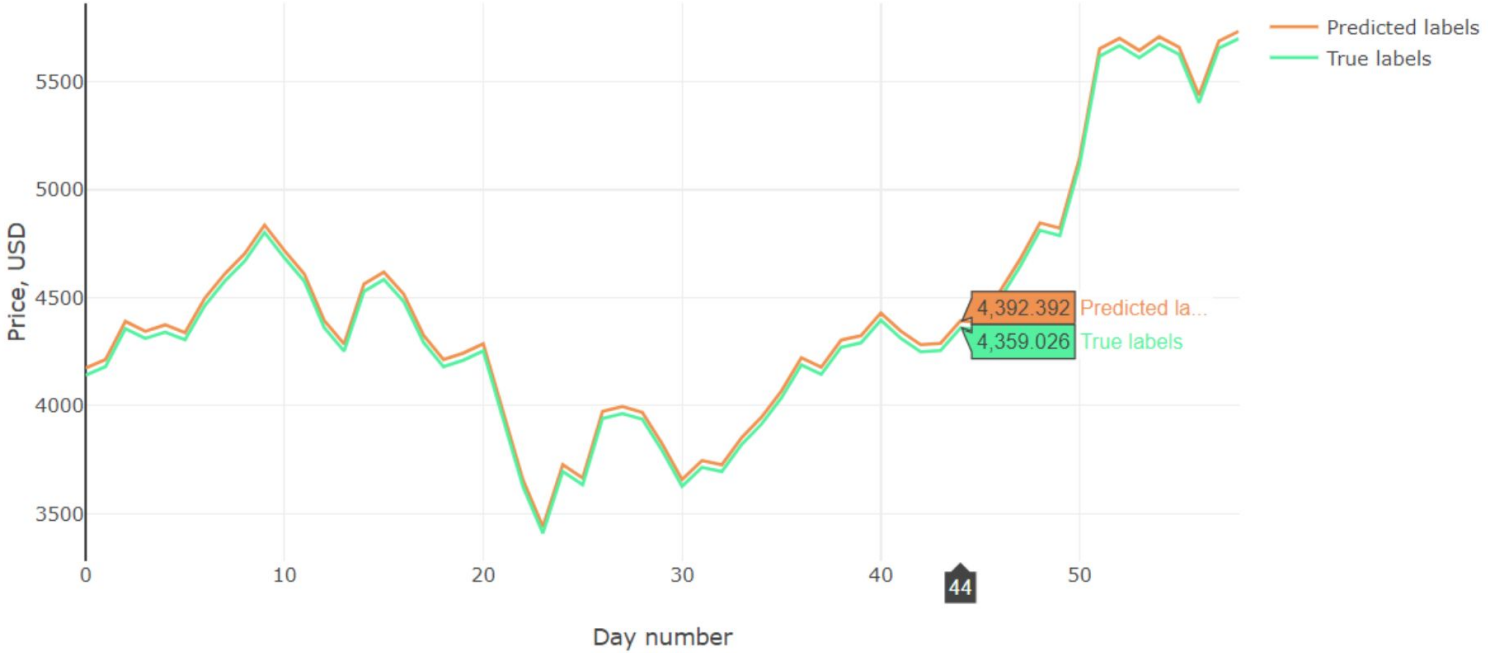
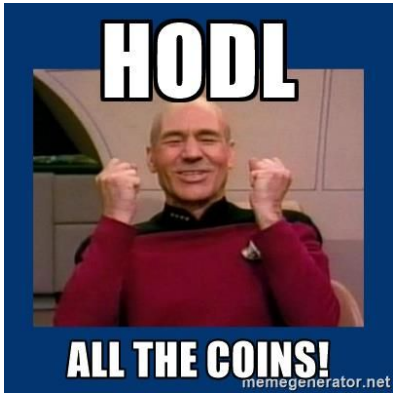
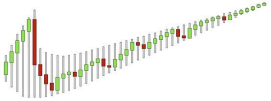




SOURCE: https://medium.com/activewizards-machine-learning-company/bitcoin-price-forecasting-with-deep-learning-algorithms-eb578a2387a3



The blogpost author had data leakage in the code (array slicing with [1:]), that led to the `unbelievable' results

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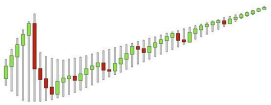
```
# get predictions and then make some transformations to be able to calculate RMSE prop
prediction = model.predict(X_test)
prediction_inverse = scaler.inverse_transform(prediction.reshape(-1, 1))
Y_test_inverse = scaler.inverse_transform(Y_test.reshape(-1, 1))
prediction2_inverse = np.array(prediction_inverse[:,0][1:])
Y_test2_inverse = np.array(Y_test_inverse[:,0])
```

Once corrected, this does not significantly improve a baseline of 'use yesterday's price'

SOURCE: https://github.com/activewizardslab/time-series/blob/master/Bitcoin_price_forecasting_with_LSTM_and_GRU-v.2.ipynb

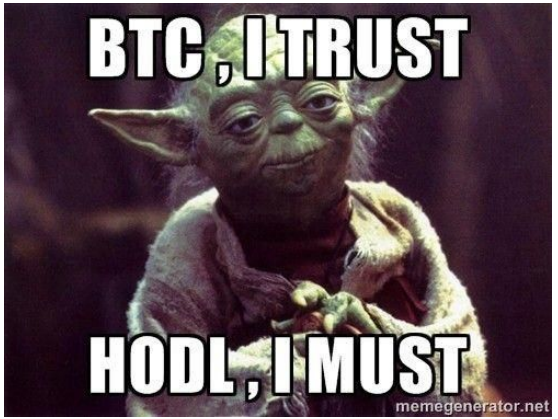


Regression is hard ... We changed the problem to predicting if price is UP or DOWN (classification) given the past (4.5Y of price data and transaction volume)

Two reasonable baselines to compare models to:

Bayesian Rationalist: P(UP) = P(DOWN) = 0.5

Overall Accuracy: 50.07%



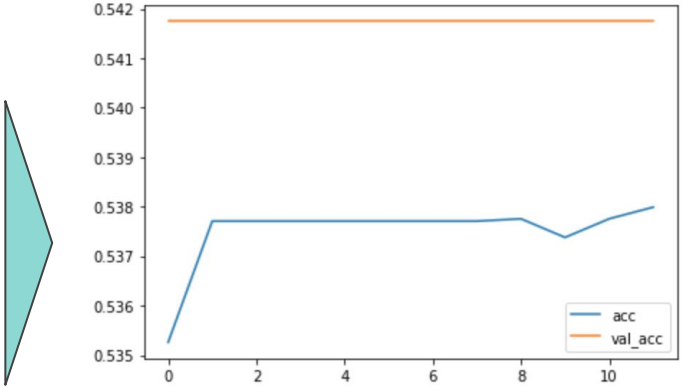
Bitcoin Maximalist Strategy: P(UP) = 1

Overall Accuracy: 52.98%

Regardless of the architecture, sample frequency, window size (24x7x4 hours) or # of epochs we could NOT substantially improve performance beyond baseline

```
from keras.layers import Dense, CuDNNLSTM, Dropout
from keras import Sequential
from keras.callbacks import EarlyStopping

model = Sequential()
model.add(CuDNNLSTM(32,input_shape=(window_size+1,1),return_sequences=True))
model.add(Dropout(0.2))
model.add(CuDNNLSTM(32))
model.add(Dropout(0.2))
model.add(Dense(32,activation='relu'))
model.add(Dropout(0.2))
model.add(Dense(2,activation='softmax'))
model.summary()
```



overall accuracy: 53.77%

Our most successful model did **slightly better than the 'bitcoin optimist' baseline** on the overall data but not enough to be Bitcoin BIllionaires

SOURCE: https://github.com/adidoit/z2dl-bitcoin-price-prediction

Price based predictive modeling may have limited usefulness: past asset prices are not predictive of future prices (price information is not a source of alpha)

- **Features** such as twitter sentiment, press coverage, network size (users), transaction velocity, # of nodes in the network, crypto ecosystem developments etc. **would likely be predictive of price**
- However, **predicting volatile asset prices** in a high uncertainty, low signal-to-noise and small data environment is **likely not a good use case for ML/DL methods**
- **Strategic approaches / fundamental analyses** that take into account a number of factors are **more likely to be successful:**
  - New protocols and technical improvements (e.g. increased transactions/second)
  - Legislation (e.g. legalization of exchanges)
  - Adoption curve(s) of bitcoin and crypto in general
  - New and unforeseen applications / use-cases

DISCLAIMER: This is not financial advice. We bear no responsibility for your investment decisions