Prediction of Foreign Exchange Rates

using a variety of Machine Learning Algorithms

By.
Benita Rego
Meghshanth Sara

Overview

- ➔ Foreign Exchange Rate Market is the most valuable market when it comes to buying, selling and trading.
- ➔ The capacity to anticipate the foreign exchange rate is an useful talent.
- ➔ Forecasting the foreign exchange rate is a challenging time series issue.
- ➔ Deep learning models proven to be very efficient in the prediction of complex financial analytics problems.
- ➔ Recurrent Neural Networks (RNNs) - (LSTM & GRU) has proven to be favorable for time series problems.

Problem Statement

Predicting the foreign exchange rates using various ML algorithms.

- ➔ **Recent currency data from https://in.investing.com/currencies**

  Data Scrapped for 01/2016 - 01/2023

- ➔ **Data Processing and Visualization**
- ➔ **Training and testing various ML algorithms:**
  - ANN
  - LSTM
  - GRU

Machine Learning Algorithms Tested:

ANN

➔ Artificial neural networks (ANNs) used in supervised learning problems in which we know the target labels of the data.

LSTM

➔ Long Term Short Memory (LSTM) capable of picking up long-term dependencies, in issues involving sequence prediction.

GRU

➔ Gated Recurrent Unit (GRU) uses links through a series of nodes to carry out memory and clustering-related ML tasks.

Models:

```
from keras.layers import LSTM
K.clear_session()
model_lstm = Sequential()
model_lstm.add(LSTM(50, input_shape=(1, X_train.shape[1]),
                    activation='relu',
                    kernel_initializer='lecun_uniform',
                    return_sequences=False))
model_lstm.add(Dense(1))
model_lstm.summary()
```

```
Model: "sequential"
_________________________________________________________________
 Layer (type)                 Output Shape              Param #
=================================================================
 lstm (LSTM)                  (None, 50)                10400

 dense (Dense)                (None, 1)                 51

=================================================================
Total params: 10,451
Trainable params: 10,451
Non-trainable params: 0
_________________________________________________________________
```

LSTM

ANN

```
K.clear_session()

model = Sequential()
model.add(Dense(12, input_dim=1, activation='relu'))
model.add(Dense(1))
model.summary()
```

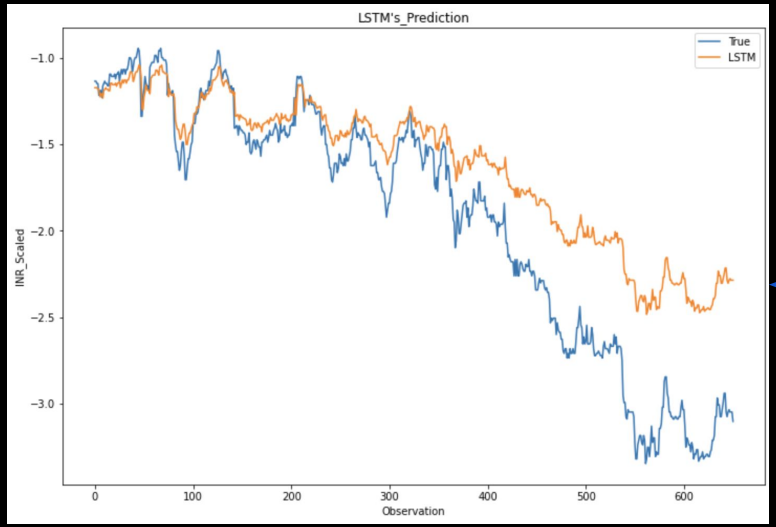
```
Model: "sequential"
_________________________________________________________________
 Layer (type)                 Output Shape              Param #
=================================================================
 dense (Dense)                (None, 12)                24

 dense_1 (Dense)              (None, 1)                 13

=================================================================
Total params: 37
Trainable params: 37
Non-trainable params: 0
_________________________________________________________________
```

GRU

```
from keras.layers import GRU
K.clear_session()
model_gru = Sequential()
model_gru.add(GRU(7, input_shape=(1, X_train.shape[1]),
                  activation='linear',
                  kernel_initializer='lecun_uniform',
                  return_sequences=False))
model_gru.add(Dense(1))
model_gru.summary()
```

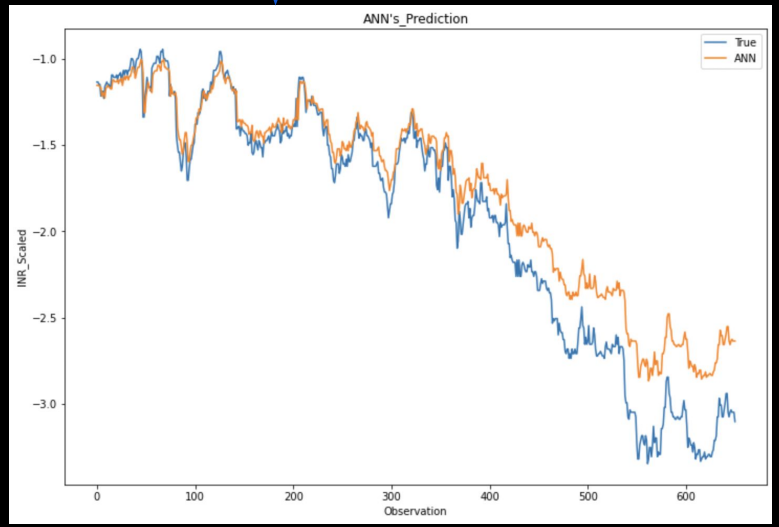
```
Model: "sequential"
_________________________________________________________________
 Layer (type)                 Output Shape              Param #
=================================================================
 gru (GRU)                    (None, 7)                 210

 dense (Dense)                (None, 1)                 8

=================================================================
Total params: 218
Trainable params: 218
Non-trainable params: 0
_________________________________________________________________
```

Prediction Graphs:



LSTM

ANN



GRU