CS419-Project

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Introduction

Github: `https://github.com/alakhagr/CS419-Project`

The project aims to prepare a model and find optimal trading strategy using the data extracted from Bitmex. The projects consists of two stages. The first stage has three parts:

1. Extracting data from the Bitmex trading platform
2. Using candlestick diagrams to predict market sentiment. Also, enhance this result using the XGBoost algorithm. This is a classification problem
3. Predict the closing price of securities using an RNN and updating the weight matrix for historical data of different times

The second stage consists of:

1. Building an Recurrent Neural Network on the Bitmex data to predict the closing prices of securities for a given time interval. For this the LSTM library could be implemented.

Choosing the Cryptocurrency

Bitcoin is a cryptocurrency that was created in January 2009. It is the world's most valuable cryptocurrency and is traded on over 40 exchanges around the world, accepting over 30 different currencies. As a currency, Bitcoin offers a new opportunity for price forecasting as it has high volatility, which is much higher compared to traditional currencies. The bitcoin system is a set of decentralized nodes that run the bitcoin code and store its blockchain. Metaphorically, a blockchain can be considered a collection of blocks. In each block, there is a collection of transactions. Because all the computers running the blockchain has the same list of blocks and transactions, and can transparently see these new blocks being filled with new bitcoin transactions, no one can cheat the system. Bitcoin uses peer-to-peer technology to facilitate instant payments. Miners are responsible for processing transactions on the blockchain and are driven by repo fees.

Extracting Data

Bitmex trading platform provide API support for extracting tick level data on different cryptocurrencies using *bitmex* python library. The *update* function checks for changes in new data and the last saved data, updates the old data and saves the new one with the new timestamp.

The *fetch* function checks for an existing data file and then updates the old and new points using the *update* function. These are then used to update the data file which is then saved as a csv file.

Trading Strategy Prediction

We plan to identify candlestick patterns(signals) which indicate bullish or bearish sentiment of market and build trading strategies using these signals. As, these signals don't work with very good probability of success, our aim in this project is to increase our probability of success by filtering the earlier identified signals using XGBoost algorithm. Our XGBoost algorithm will take in various features like stock market indicators and other market indicators for each signal and predict whether we should act on that signal. This is a classification problem. We used the data extracted from Bitmex Trading platform using the API provided by the platform and ran XGBoost algorithm on it to predict the Market Sentiment Analysis and predict the Trading Strategy based on them.

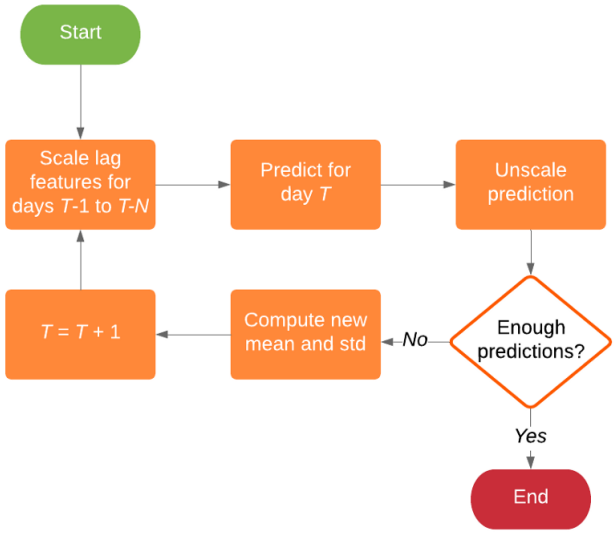

Figure 1: Model

Prediction of the Closing Price

Recurrent Neural Networks(RNN) are a type of Neural Network where the output from the previous step is fed as input to the current step. RNN is used in the price prediction as BTC price is most correlated with today's, not a month ago's.
Long short-term memory networks are an extension of recurrent neural networks, which basically extend the memory. Therefore it is well suited to learn from important experiences that have very long time lags in between. LSTMs enable RNNs to remember inputs over a long period of time. This is because LSTMs contain information in a memory, much like the memory of a computer. The LSTM can read, write and delete information from its memory.

We have created a model with two LSTM and two dense layers along with the Root-mean-squared optimizer, Linear activation function and Mean-squared-error loss. Multiple optimizer functions were tried to improve the results of the model.

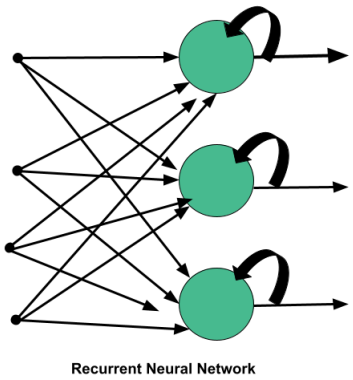

Figure 2: Recurrent Neural Networks

Results:

The data is successfully extracted from the Bitmex platform and then classified to *bearish* or *bullish* using the XGBoost algorithm. The RNN algorithm successfully predicts the closing prices with high accuracy. The RNN model uses two LSTM and two Dense Layers. Based on the results we can conclude that RNNs and LSTM are excellent technologies and have great architectures that can be used to analyze and predict time-series information.