Bitcoin Cost Prediction using Deep Neural Network Technique

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ABSTRACT

The accusative of this paper is to predict the bitcoin price accurately by taking various parameters into consideration which affects the bitcoin value. Here multi-layer perceptron algorithms under deep learning are used to predict the price of crypto-currency. Many researchers have analysed the crypto-currency features in many ways such as, market price prediction, the impact of cryptocurrency in real life. It has the ability to make long-term prediction of the exchange price in crypto-currencies particularly in US dollar, based on historical trends. The bitcoin cost prediction is done based on the data set which consists of 13 features relating to the crypto-currency price recorded daily over the period of particular range.

Keywords : Bitcoin Cost Prediction, Neural Network Technique, Multi-Layer Perceptron, Crypto-Currencies, Artificial Neural Network, NMC

I. INTRODUCTION

Financial markets are so volatile and generate large amounts of data in daily basis. Investment is a commitment of money or other resources obtain benefits in the future. One type of securities is stock. It is one of the most popular financial market and its value changes every day. It is defined as capital participation by a person or an enterprise in a company.

The stock market provides opportunities for marketers and companies to invest on neutral ground. Stock prices are used to determine the prediction value of companies in future. Stock or other financial instruments are marketed on financial exchanges. However, the stock market is characterized by high-frequency multi polynomial components, nonlinearities and discontinuities because it interacts with many factors such as traders'

expectations, political events, and general economic conditions. Therefore, getting inferences from historical trends and making predictions of stock values are challenging.

One of the most popular cryptocurrency is Bit-coin, which is used worldwide for digital payment and for investment purposes. Bitcoin is decentralized i.e. it is not owned by anyone. Transactions made by Bitcoins are easy as they are not tied to any country. "Bit-coin exchanges" are the investments done through various marketplaces. These allow people to buy/sell Bit-coins using different cryptocurrencies. The exchange of the Bitcoins with other currencies is done on the exchange office, where "buy" or "sell" orders are stored on the order book.

In this paper, daily price changes for multiple cryptocurrencies are predicted. A few of them are NM, bitcoin, ripple etc., The proposed approach for the price prediction using one of the famous Deep

learning neural network concept, i.e. multi-layer perceptron neural network. The plan starts with data pre-processing, in which cleaning the dataset, scaling and normalization are carried out. Next, the independent features in the dataset are extracted which help in predicting the highest price of the cryptocurrency in future. At last, it can predict the costs of cryptocurrencies with different time periods.

Paper outline: Section 2 is about the literature survey in the area of cryptocurrencies' price prediction. The section 3, is about the dataset description. In section 4, the discussion is based on our dataset briefly and the approaches for proposed methodology. In section 5, the discussion is based on the experimental results.

II. RELATED WORK

Several studies have tried to explain various aspects of the Bitcoin such as its price fluctuations, systems dynamics economic value and price formation. Bitcoin is a new technology and currently there are many price prediction models available.

In [1], instead of directly focusing on the future price of the stock, the authors predict daily trends of the stock. The trends can be considered as a pattern. It performs both short term predictions such as day or week predictions and also long-term predictions in terms of months. It later produced better results with 79% accuracy. Based on the predicted output the performance evaluation decides to either buy, sell or hold the stock.

According to [2] author is analyzing what kind of implements has been done to predict the U.S. stock market. The conclusion of work is the mean square error of the prediction network as large as the standard deviation in excess return. Regardless, the author is providing evidence that several basic economic and financial factors have predictive power for the market in excess return.

In [3] this paper reveals a time series intelligently for prediction system which uses sliding window met a heuristic optimization for the purpose of predicting Taiwan construction companies stock prices. In particular, the one day prediction of 2597.TW stock prices is better than that of any construction company stock prices. Moreover, the system does achieve outstanding results for short-term investment. It looks for long term investments.

According to [4] author predicting daily price changes for multiple cryptocurrencies. A few of them are bitcoin, ripple and NMC. An approach for the price prediction is using one of the famous machine learning algorithms, i.e. multivariate linear regression. Here prices are predicted based on the prices seen in the past three years i.e. 2017, 2016 and 2015. Finally authors validate an approach and 99% of accuracy is obtained.

[5]This paper deals with daily time series data, 10-minute and 10-second time-interval data. They created three time series data sets for 30, 60 and 120 minutes by performing GLM/Random Forest on the datasets that produces three linear models. These three models are sequentially combined to predict the price of Bitcoin.

III. DATASET DESCRIPTION

In this experiment, the bitcoin_ticker dataset is the dataset from popular databank Kaggle. The dataset is of size 92MB and has the historical price of around 1384 types of cryptocurrencies running currently. The data consists of 627191 rows and fourteen columns. Each column represents a parameter of the data such as date_id, datetime_id, market, rpt_key, last, diff_24h, diff_per_24h, bid, ask ,low, high, volume, created_at and updated at. We choose dataset to analyze structure and behavior of the market price of each of the cryptocurrency. A brief description of the dataset is shown in the table:

TABLE I. DATASET DESCRIPTION

Parameter	Description
date_id	Id on which date is picked
market	Type of coin in market
rpt_key	Key for the different currency
last	Value of currency at last period
diff_24h	Value in 24hr difference
bid	Highest price buyer to buy
ask	Lowest price seller to accept
low	Low price of the day
high	High price of the day
volume	Total volume of the currency
Created_at	Date at which data is taken up
Updated_at	Date at which data gets updated

Here the actual historical hourly volatility data of Bitcoin ticker, which refers to the standard deviation of minute returns over 24hrs difference time period.Our dataset contains time series of second's volatility spanning more than two year, which outlines the fluctuation of Bitcoin market over time. In the last 2 years, trading volume of BTC_USD over the OKCoin exchange office was approximately 39% of the total traded BTC_USD volume, which implies data source (OkCoin) can be used as a good for BTC trading.

Bid: the highest price that a buyer is willing to pay for a BTC.

IV. ROPOSED METHODOLOGY

A. PROPOSED WORK

In the proposed work the price of the currencies at day for all included between Jan, 1st 2016 and Apr 24th, 2018. The analysis considers all currencies whose age is larger than fifty days since their launching and whose volume is larger than $100000. To discount for the effect of the overall market movement we consider cryptocurrencies prices expressed in Bitcoin.

Block Diagram:
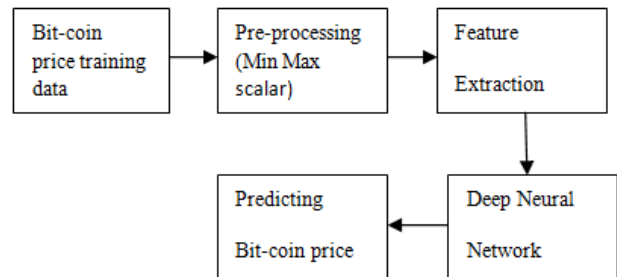
In the block diagram we load the dataset from the open source kaggle and pre –processing the data (alignment of the data). If any missing words in the data that is replaced by pre-processing and then go for feature extraction, is mainly to extract only particular prize level out of other features and also taken special years like 2002. Then go for neural network to predict the bitcoin prize level. During this research project Keras API provides an easy to use interface for neural networks in Python on top of Tensorflow. Tensorflow is a library by Google that includes neural network implementations. The results of the neural network are strongly dependent on the input. By the raw transaction data following inputs are calculated.

B. PREDICTION PERFORMANCE

The Bitcoin's value varies just like a stock albeit differently. There are a number of algorithms used on stock market data for price prediction. However, the parameters affecting Bitcoin are different. Therefore it is necessary to predict the value of Bitcoin so that correct investment decisions can be made. The price of Bitcoin does not depend on the business events or intervening government unlike stock market. Thus, to predict the value of cryptocurrency, it is necessary to leverage Deep learning technology to predict the price of Bitcoin.

V. EXPERIMENTAL RESULTS

From the data set, particular values of bitcoin are extracted, and the data is filtered that contains only the usd currency. Here, the filtration of the date is done from June 28, from which the value in proper manner to take last value from the column. Then rescaling is done to have maximum and minimum as 0 & 1by scikit-learn. Split the data in to training data and testing data and reshape the given array values for the neural network algorithm.

TABLE II. SUMMARY OF FEATURES EXTRACTION USING DEEP NN MODEL

Id	Date_id		Date_id	Datetime
125423	2017-07-14	….....	2017-07-14	13:11:00
125424	2017-07-14	….....	2017-07-14	13:12:00
125425	2017-07-14	….....	2017-07-14	13:13:00
125426	2017-07-14	….....	2017-07-14	13:14:00
125427	2017-07-14	….....	2017-07-14	13:15:00
125428	2017-07-14	….....	2017-07-14	13:16:00
125429	2017-07-14	….....	2017-07-14	13:17:00
125430	2017-07-14	….....	2017-07-14	13:18:00
125431	2017-07-14	….....	2017-07-14	13:19:00
125432	2017-07-14	….....	2017-07-14	13:20:00

47676 rows * 15 columns   (31942 , 15734)

From the train and the test data, For example, take 100 data's which are trained for 256 iterations repeatedly for predicting the training and testing data. After doing above execution same steps is repeated for its inverse data's. At last shift the train and test predictions for plotting the graph using matplotlib packages.

TABLE III. RESULTS OF TRAINING AND TESTING SCORE USING EPOCHS DATA

Test data	No. of sec	P -value
Epoch 1/100	-0s - loss	8.4687e-05
Epoch 2/100	-0s - loss	8.5147e-05
Epoch 3/100	-0s - loss	8.4775e-05
Epoch 4/100	-0s − loss	8.5377e-05
Epoch 5/100	-0s - loss	8.4927e-05
Epoch 6/100	-0s - loss	8.3409e-05
Epoch 7/100	-0s − loss	8.3732e-05
Epoch 8/100	-0s − loss	8.4187e-05
Epoch 9/100	-1s - loss	8.3280e-05
Epoch 10/100	-1s − loss	8.2372e-05
Epoch 11/100	-1s − loss	8.4691e-05

Train Score: 4.86 RMSE

Test Score: 5.66 RMSE
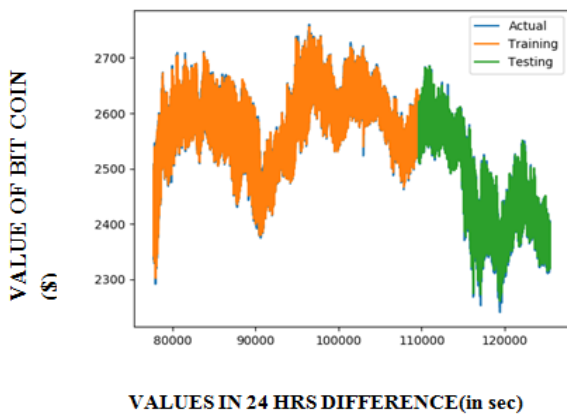
Fig.1. Visualization of multi-layer perceptron neural network model

The model makes use of specific features as mentioned, to predict the highest price for Bitcoin on a given date. This can be shown in the figure where variation between the last and difference of 1 day in seconds for the bitcoin cryptocurrency. The above shown metrics are modelled from where it is concluded and validated from the approach by computing the accuracy and 99% of result is obtained.

VI. CONCLUSION AND FUTURE WORK

Several Artificial Neural Network models are there for our Classification issues. This paper tends to measure the performance of the model by their prediction accuracy. The price prediction helps more number of users who are using cryptocurrencies for multiple types of transactions every day.On comparing different algorithmic rule prediction accuracy of just about hour was achieved by the Neural Network models. We tend to see clearly that our Neural Network model has some prognostic price as a result to predict the sign of the basis with hour accuracy. The drawback of our model is not able to conclude prediction for all cryptocurrencies in one program. For future sake, we extend our implementation using switch case for various cryptocurrencies (litecoin, etherium, Ripple) etc.., in

python code for prediction in one program. By the mode of prediction. In future analysis will improve the prediction accuracy considerably, that may mean this analysis able to use these models to form a profit of by commercialism Bitcoin.

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