2020 Information Technology International Seminar (ITIS)
Surabaya, Indonesia, October 14-16, 2020

Realtime monitoring of Bitcoin prices on several Cryptocurrency markets using Web API, Telegram Bot, MySQL Database, and PHP-Cronjob

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2020 6th Information Technology International Seminar (ITIS) | 978-1-7281-7726-7/20/$31.00 ©2020 IEEE | DOI: 10.1109/ITIS50118.2020.9321109

***Abstract*—Various ways have been done by researchers from all over the world to predict the price of Bitcoin which is the first digital commodity based on blockchain. Various forecasting and computational techniques have been widely applied and continue to be refined to find a prediction package that has the closest accuracy. The purpose of this research is to test hundreds of API data shared by hundreds of Cryptocurrency Markets and as a result we have succeeded in extracting the latest bitcoin price data from 20 Crypto Markets via shared APIs. This data will then be stored in a MySQL database on hosting automatically when a condition is reached. This data can then be mined continuously using Cronjob, and to facilitate the reading of data that has been collected, we use a telegram bot as well as using a web-based application. This step is expected to help in efforts to monitor bitcoin price movements and predict future price movements.**

Keywords—Bitcoin, Web API, PHP-Cronjob, MySQL, Telegram Bot.

I. INTRODUCTION

Various ways have been done to predict the price of bitcoin [8], [12], [35], including using monitoring techniques for high and low price movements [19], [21], data mining, forecasting [15], and also intelligent computing. We conducted an experiment to monitor bitcoin prices by extracting data on Bitcoin price movements from several well-known exchange markets that have been listed on coinmarketcap. Here we retrieve bitcoin price movement data from the share API provided by several stock exchanges that provide an easy API for us to code with PHP, Javascript, and html based programming. Not all of these marketplaces present their API with an easy-to-read method, so we only selected a few exchanges from the hundreds of markets listed on coinmarketcap [7]. To make an application that is able to predict where the bitcoin price will be in each crypto market, of course the first foundation is to successfully code from the share API to the latest price data that can be presented more easily. Here we want to contribute in the form of API reading arrangement instructions that can be coded in the order we show in the table. This will make it easier for programmers to develop into a price movement prediction indicator application.

II. LITERATURE REVIEW

A. Bitcoin Overview

Bitcoin is now a Blockhain-based commodity with the largest market capitalization based on the coinmarketcap page [7]. Bitcoin has been widely researched since its first appearance in satoshi nakamoto's paper [25]. There have been many research studies on Bitcoin and other cryptocurrencies that can be found on the Web of Science and Sciencedirect databases both in terms of concept introduction, price movements [26], volatility, relationships with various financial indicators, determinants of Bitcoin movement, levels of use, regulation, and time. ahead of its development and adaptation [33]. Even bitcoin price movements have been able to affect sentiment in various comments on social media [36] such as Twitter [36]. Positive comments from netizens, especially big world Figs, who are big Figs in the blockchain and cryptocurrency fields, world leaders, and big entrepreneurs are able to drive bitcoin prices higher. Great attention from the world community has also made Bitcoin has colored various areas of life such as the economy, technology, and government related to various regulations that will be applied to Bitcoin [6]. Some of the user's motivations for owning Bitcoin such as the revolution in the financial system, individual empowerment, and the perception of the real value of Bitcoin [18] cause a high level of participation in the sustainability of the Bitcoin community. Ownership in bitcoin digital wallets is anonymous, so we can't really know who plays a big role in moving the bitcoin price, so the movement data that appears to the public is general so predicting its movements requires deepening steps of the data that has been mined .

B. Bitcoin Volatility

Bitcoin's price movements produce data that is difficult to understand in simple terms. For that we need a more concise and simple way of presenting data. These data can be collected and then processed using the concepts of Bayesian regression, data mining, LSTM[11], [28], [32], neural network [17], machine learning [2], [23], [29], [30], and Deep Learning [1], [13], [14]. Bitcoin's volatility caused by the fast trading of Bitcoin in the market where buy and sell orders meet to form the final price is very interesting to predict, so it can be guessed how big the chances of the next increase or decrease in Bitcoin price [10]. Monitoring daily price movements to detect volatility [27] which is intended to gain daily profits [20].

C. Prediction of bitcoin price movements

various techniques and methods have been developed to predict the next steps of the Bitcoin price movement. There are researchers who try to get patterns and trends by analyzing the existence of events and their coincidences with the reading of trading indicators both technical and fundamental sides. To be able to make accurate predictions, of course, real data is needed from the value of Bitcoin from

time to time, trends that are being experienced, and patterns that affect the movement of the value of bitcoin [16], [22].

III. Research Methodology

The sequence of our research steps is:

1. Sorting out several bitcoin exchange markets that provide easy access to Web API services
2. Encoding the Web API in JSON form into a browser display that is easier to read using PHP CURL
3. Encoding the Web API into a Bitcoin monitoring application based on charts and supporting indicators such as moving averages
4. Encoding the Web API using PHP, Javascript, and html so that it can display and store Bitcoin price data into the MySQL database and combine it with the Cronjob service so that it can save data automatically.
5. Coded the Web API so that it can be accessed via Telegram using the Bot Service

In total, we have coded 20 bitcoin exchange markets with PHP CURL to read the JSON API shares shared by each market. In this step we find that there are some differences in the order of accessing the latest Bitcoin price data in each market. In addition, there were also several pair variants of Bitcoin with the BTC code, namely paired with USDT, and others. To make it easier to read the differences in data sets, see Table I.

TABLE I. API STRUCTURE AND PAIR IN EACH MARKET

No.	Markets	Bitcoin Pair	api structure
1	LiteBit.eu	btceuro	['result'] ['btc'] ['sell']
2	DDEX	wbtcusdt	['data'] ['ticker'] ['price']
3	Altcoin-Trader	usdtbtc	['USDT_BTC'] ['Price']
4	Tokens.Net	btcusdt	['last']
5	okex-korea	btcusdt	['0'] ['4']
6	Ovis	btctrl	['data'] ['0'] ['last']
7	dYdX	pbtcusdc	['markets'] ['PBTC-USDC'] ['last']
8	Tidex	btcusdt	['btc_usdt'] ['last']
9	Cryptaldash	btcusdt	['price_ticker'] ['last_price']
10	Huobi Indonesia	btcusdt	['data'] ['20'] ['close']
11	Independent Reserve	btcusd	['LastPrice']
12	Nominex	btcusdt	['0'] ['price']
13	Kyber Network	ethwbtc	['data'] ['39'] ['last_traded']
14	Bitvast	btcusdc	['ticker'] ['last']
15	BtcTurk Pro	btcusdt	['data'] ['0'] ['last']
16	Huobi Russia	btcusdt	['data'] ['133'] ['close']
17	Idex	ethusdq	['ETH_USDQ'] ['last']
18	Bitstorage	btcusdt	['BTC_USDT'] ['last_price']
19	C2CX	usdtbtc	['data'] ['last']
20	Bgogo	btcusdt	['109'] ['ticker'] ['lastDone']

IV. Results and Discussions

In this section we will show some of the results of realtime Bitcoin price monitoring in several Cryptocurrency markets using the Web API, Telegram Bot, MySQL Database, and PHP-Cronjob.

A. *Basic Source Code PHP CURL as a basis*

The following is the basic PHP CURL code that is used as a reader for the Json structure for each market that shares its trading data history through the API services they provide. The details can be seen in Table II below:

TABLE II. PHP CURL CODE

```
<? php
echo '<font color = blue> || Enter the name Market
|| </font> </br> ';
$ content = file_get_contents ("|| Enter API Market
||");
$ content = utf8_encode ($ content);
$ result = json_decode ($ content, true);
echo "Low:" .number_format ((|| Enter lowest result
structure ||), 0, ',', '.'). ' USDT || ';
echo "Last:" .number_format ((|| Enter the current
result structure ||), 0, ',', '.'). ' USDT || ';
echo "High:" .number_format ((|| Enter the highest
data result / result structure ||), 0, ',', '.'). '
USDT || '; ?>
```

The code above can then be combined with detailed API data for each market as shown in Table 1.

B. *Example of the Tidex API as a Crypto market*

Here is a link from the Tidex market on cmc (https://coinmarketcap.com/exchanges/tidex/), the page is (https://tidex.com/), and the API page is (https://tidex.com / services / api-specification) which when the 8th api structure is accessed using Firefox, the data structure will appear as shown in Fig 1.

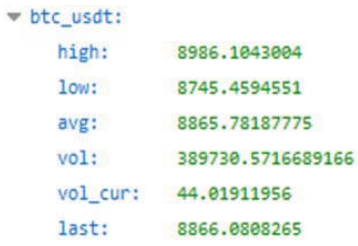

Fig 1. Json API Tidex structure

With the JSON structure as shown in Fig 1, if it is coded with PHP CURL, then the main code snippet is like in first code:

```
$ result ['btc_usdt'] ['low']
$ result ['btc_usdt'] ['last']
$ result ['btc_usdt'] ['high']
```

Which when fully encoded will appear as shown in Fig 2.

Fig 2. Tidex API reading results

C. Price Movement Chart Application Using The Web API

Using standard web programming languages such as a combination of HTML, PHP, and Javascript we create applications that can monitor bitcoin realtime movements on several selected timeframes from the Bibox And Coinex and exchange markets as examples.

Fig 3. Coinex Bitcoin monitoring chart application

On the charts shown in Fig 3 and Fig 4 we see the implementation of indicators such as double moving averages [3], [11], [24], [37] and stochastic which can provide short decision support when or where to buy the best.

Fig 4. Bibox Bitcoin monitoring chart application

D. Price Movement Chart Application Using Telegram Bots

Using standard web programming languages such as a combination of HTML, PHP, and Javascript, to control the Web API so that it can display a selection of results on telegram we created a telegram bot-based application that can monitor realtime bitcoin movements on the binance exchange market as an example.

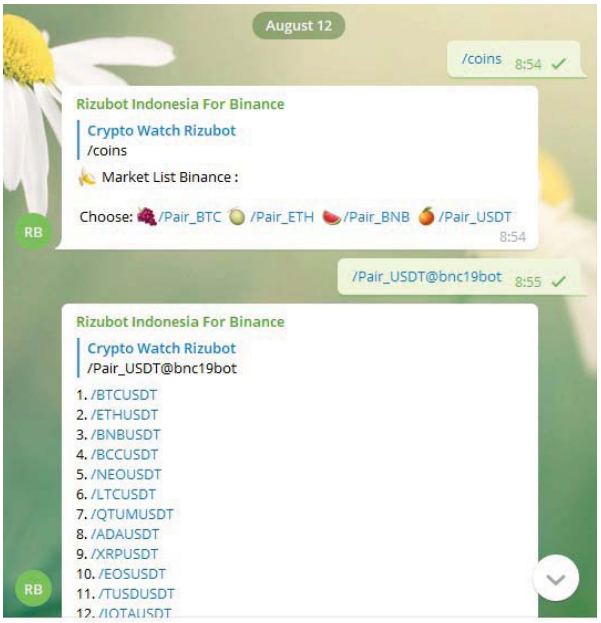

Fig 5. Binance Bitcoin monitoring telegram bots application (menu list)

from Fig 5 we see when given the command / coins it will display all the pairs that have been programmed, then if we choose one pair, all the coins / tokens registered in the pair will be displayed. For example we chose the BTC USDT pair on the Binance exchange market.

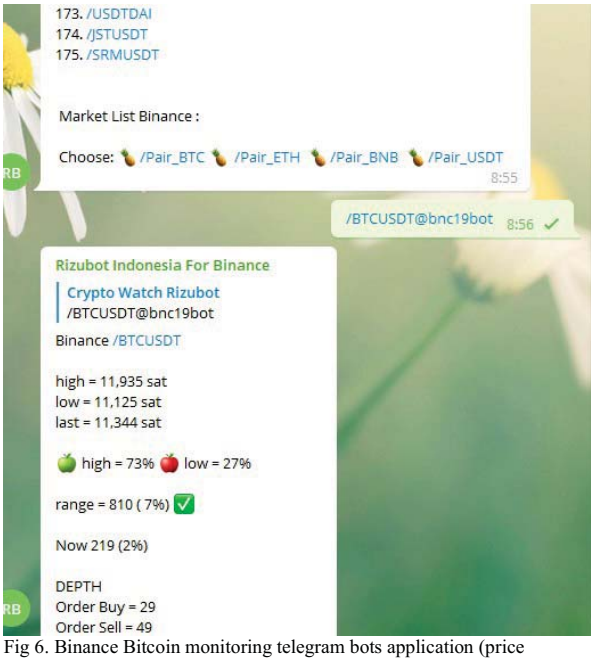

Fig 6. Binance Bitcoin monitoring telegram bots application (price movements).

Furthermore, as shown in Fig 6, when you click the BTC USDT pait option, it will automatically call an order to display details of the price movement of the BTC USDT pair

E. Price Movement Chart Application Using Mysql Database, and PHP-Cronjob

Sometimes for the sake of mining data into a dataset, we can take advantage of the Cronjob service to continue storing Bitcoin movement data simultaneously with certain criteria that must be met first and then the data will be stored in the mysql database. For example, we will use the API provided by the indodax exchange market to mine the BTC IDR price movement data, which will automatically store the BTC IDR price into the MySQL database every 10 seconds.

id_btcidr	date_idrbtc	time_idrbtc	high_idrbtc	low_idrbtc	last_idrbtc
233726	2020-08-12	10:37:46	174681000	166577000	168931000
233718	2020-08-12	10:22:24	174681000	166577000	168907000
233723	2020-08-12	10:34:52	174681000	166577000	168940000
233721	2020-08-12	10:32:18	174681000	166577000	168940000
233720	2020-08-12	10:28:04	174681000	166577000	168939000
233715	2020-08-12	10:19:11	174681000	166577000	168908000
233724	2020-08-12	10:36:34	174681000	166577000	168935000
233727	2020-08-12	10:39:02	174681000	166577000	168931000
233728	2020-08-12	10:42:49	174681000	166577000	168940000

Fig 7. Btc idr data collection in mysql.

As for the example of displaying data that has been successfully mined automatically using Cronjob and stored in the mysql database, it will look like in Fig 7. and the current display of the BTC IDR price monitoring application can be seen in Fig 8.

Fig 8. Display of the BTC IDR on indodax Market

so that the application can continue to store data automatically, even though no one accesses the application directly through the browser, it is necessary to do a cronjob setting so that it continues to execute this application at a certain time span continuously

	Executed	Scheduled
	-	Today, 11:23:00
	-	Today, 11:22:00
	-	Today, 11:21:00
	Today, 11:20:07	Today, 11:20:00
	Today, 11:19:05	Today, 11:19:00
	Today, 11:18:06	Today, 11:18:00
	Today, 11:17:05	Today, 11:17:00

Fig 9. btc idr data collection using cron-job.org

by using the web API, future research can also explore various activities on the Bitcoin blockchain [4], [5], [31], the influence of social media sentiment [34] on Bitcoin price movements and the relationship between the majority of information searches on interest in the development and movement of Bitcoin so that it becomes a signal of how much enthusiasm the public can trigger price movements and adaptation to the use of Bitcoin [9].

V. CONCLUSIONS

From the results and discussion, we can conclude that, firstly, Web APIs provided by various bitcoin exchange markets are a basic requirement for further development of monitoring applications. Secondly, the results of grouping the API reading order in the 20 exchange markets above will greatly facilitate programmers in building Indicator Applications to predict price movements. Thirdly, by using web-based programming languages such as PHP, Javascript, and html, we can develop third-party applications that are able to read data shared via the Web API. Fourthly, by using the Telegram Bot the results of managing the Web API will be able to be displayed more quickly and realtime without having to open the original page directly. Finally, by using a combination of the Mysql Database and the Cronjob Service as a complement, we can collect data automatically and continuously and then become a dataset.

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