A Literature Review for
Mobile Assistant for Cryptocurrency Markets

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Abstract

The goal of our project is to develop a mobile application to assist users to track about their favourite crypto coins. To do so, this application suggests best coins to invest in by giving the user details (prices, fees etc.) about crypto coins fetched from various cryptocurrency markets. In this paper, we've found information about crypto coins and crypto coin trading. Also, in the development side, APIs and artificial intelligence algorithms used in general market applications are reviewed. This review is finalized with information about similar mobile market applications.

1. Introduction

Since blockchain technology evolved, people started to realize that crypto coins can be very profitable, and a ton of crypto coins are entered the scene of trading markets. As a result, more people started to invest in various crypto coins like Bitcoin, Ethereum, Ripple etc. This huge interest in crypto coins brought different markets for crypto coins. Since mobile applications got popular, people use mobile applications for nearly everything because of their practicality. As the scene of crypto coin trading gains more population, software companies discovered that there is a need of easy-to-use mobile applications for crypto coins, to compare prices and track detailed information from different cryptocurrency markets and developed different applications with features such as price comparing and tracking past prices of a crypto coins.

While people who are interested in economics can analyse values in graphs and numbers, others still search for "invest opportunities" that they can rely on to profit. In our project, the main feature is to analyse different crypto coin market data and assist the investors to find the best investment route which is the most profitable one among crypto coin markets for trading cryptocurrencies. This paper has information about crypto coins in general, how cryptocurrency markets introduced, cryptocurrency exchange(trading) and previous works about how artificial intelligence used for analysing stock prices in real money exchange markets.

2.Blockchain

In 2008, Blockchain was invented by Satoshi Nakamoto. It created to serve as the public transaction ledger of the cryptocurrency bitcoin. [1] The design of Bitcoin has inspired other applications. In addition, blockchains which are readable by the public are used by cryptocurrencies.

The validity of the coins of each crypto currency is provided by a blockchain. A blockchain is a continuously growing list of records called blocks. Blocks are secured by using a cryptography and blockchain. [1] Each block usually contains a hash pointer as a link to the previous block, timestamp, and process data. Once saved, the data in any block cannot be changed retrospectively. Blockchains are safe with design.

3.Cryptocurrency

The cryptocurrency or crypto currency is designed to work as a medium of exchange that uses cryptography to secure financial transactions, control the creation of additional units, and verify the transfer of assets. Cryptocurrency is a digital entity. [2] Cryptocurrencies are alternative of currency and digital currency. It is also a subset of the virtual currency. Cryptocurrencies use decentralized control. The centralized digital currency and central banking systems are separated from cryptocurrency in this aspect.

3.1 Types of cryptocurrency

Every cryptocurrency's decentralized control works through the blockchain. In 2009, Bitcoin, created and it was the first decentralized cryptocurrency. Then, many other cryptocurrencies were created. They are often referred to as altcoins. [2]

Decentralized cryptocurrencies such as Bitcoin and other altcoins [3] have effected the people’s attention and interest. Many people would call this the rise technological revolution, and the “wave of the future” [4]. Emerging altcoins like Ethereum and Counterparty expand Bitcoin by offering useful programming language for writing smart contracts. They are user-defined programs that defines rules governing transactions, and that are enforced by a network of peers**.**

Altcoin

Altcoin has various but similar definitions. Stephanie Yang from the Wall Street Journal described altcoins as "alternative digital currencies". [5] Also, Paul Vigna from the Wall Street Journal described altcoins as alternative versions of bitcoin. [5] Aaron Hankins of MarketWatch defined to any cryptocurrencies other than bitcoins as altcoins. [5]

As of 19 August 2018, the number of cryptocurrencies existing over 1600 and it is increasing. [4] We've become able to create a new crypto currency at any time. [2] With market capitalization, Bitcoin is now the largest block chain network, then Ethereum, Bitcoin Cash, Ripple, Litecoin and EOS. [6]

Bitcoin

In 2009, Bitcoin was offered as open source software. In general, it is considered first distributed cryptocurrency. Since the Bitcoin, more than 4,000 altcoins have been created. When Satoshi Nakamoto mobilized the Bitcoin block chain for the first time, he was simultaneously bringing two radical concepts, and they had not been untested before. Bitcoin, a decentralized peer-to-peer online currency. He gathered public attention in terms of both the political aspects of a currency that was not a central bank and extreme up and down volatility in price. [7]

Bitcoin is a decentralized currency that uses peer-to-peer technology to collectively perform all functions such as currency issuance, validation, and transaction processing by the network. Bitcoins are digitally generated by complex algorithms of powerful computers and by a mining process.

Ethereum

Ethereum blockchain similar to the Bitcoin blockchain. While many Bitcoins and Ethereum are examples of cryptocurrency, there are subtle differences about what they can be used for and how they work. Ethereum is a public, blockchain based, open source distributed computing platform and smart contract functionality. [4]

Litecoin

Litecoin is different from Bitcoin. The Litecoin Network goals to execute a block every 2.5 minutes. This number is 10 in Bitcoin. Developers think that this give Litecoin has a faster transaction confirmation. [8]

Litecoin use the scrypt algorithm, FPGA and ASIC devices produced for mining Litecoin are more expensive and more complex to produce than for Bitcoin using SHA-256. [9]

5. Cryptocurrency Mining

Cryptocurrency mining or cryptography. Cryptocurrency mining is a process in which transactions for various forms of cryptocurrency are verified and the blockchain is added to the digital ledger. Cryptocurrency mining, Bitcoin mining or altcoin mining has increased both as a activity and topic in the last few years. A cryptocurrency miner is responsible for ensuring the reliability of information and updating the block chain with the process. The mining process itself involves competing with other cryptomes to solve complex mathematical problems with cryptographic hash functions associated with a block that contains transaction data.

6.Cryptocurrency Wallet

A crypto currency wallet can be used to receive or spend the crypto currency and stores it in the public and private "keys" or "addresses". It is possible to write with a private key in the public ledger if we want to spend the associated cryptocurrency effectively. It is possible to send currency to others' wallets with the public key.[10]

A cryptocurrency wallet is a software program that interacts with various blockchains, so users can watch their balances, send money and do other things. If you want to use a Bitcoin

or other cryptocurrency, you need to get a digital wallet. All these are the records of the processes stored in the blockchain.

Coins are transferred to your wallet's address when a person sends you bitcoin or another digital currency. To spend this money and open funds, private key stored in wallet must then match the public address to which the currency is assigned. If the public and private keys match, the balance in your digital wallet increases. In addition, the senders will be reduced accordingly. There is no real exchange of real money. [10] The operation is a transaction record in the block chain, which is expressed by the change in the balance in your wallet with cryptocurrency.

7.Cryptocurrency Markets

With the emerge of the crypto coins like Bitcoin, new type of currency has been entered to the market. More than 500 cryptocurrencies are traded in several markets. Most popular one among them is Bitcoin and it has the largest market cap above all cryptocurrencies. According to the stats at year 2015, Bitcoin's value is $291 per unit and has a market cap of $4.05 billion. Bitcoin is followed by some other coins like Ethereum and Ripple. For the other cryptocurrencies which they called "altcoins", had a market cap about $619 million (2015). In recent years, altcoins are gaining value quickly, more than Bitcoin itself. At year 2013, Bitcoin had a market cap about $1.2 billion. At that time, Bitcoin was covered all the cryptocurrency market by 95%, with the help of blockchain and data mining, new altcoins started to show up and market cap percentage of Bitcoin started to decrease. [1]

A coin called Auroracoin is introduced. This cryptocurrency is a technically modified version of Litecoin and it is official crypto coin of Iceland. Auroracoin had reached market cap of 500 million USD at some point. [2]

Various cryptocurrencies are entered the market, and this arises a competition between crypto coins. Crypto coins are not only a currency, it is also having a financial aspect. According to the article "Competition in the Currency Markets" cryptocurrencies involve roles in market with multiple effects. [3,4]

One of the effects is called reinforcement effect. This means that, if specific cryptocurrency is becoming famous, then more investors will have faith in it. This results that, that specific cryptocurrency is gaining more reputation among other cryptocurrencies. Another effect is called substitution effect. Investors invest in other cryptocurrencies because people fear the volatility of a popular crypto coin like Bitcoin. [3,4]

By the date 05 November 2018, according to the coinmarketcap.com, Bitcoin has the most market capitalization among other cryptocurrencies with percentage of 31.01%. Below there is a figure.

1. Bitcoin (31.01%)

#	Source	Pair	Volume (24h)	Price	Volume (%)
1	CoinBene	BTC/USDT	$150,814,215	$6445.50	3.49%
2	DOBI trade	EOS/BTC	$125,415,806	$6451.64	2.90%
3	OKEx	BTC/USDT	$122,128,354	$6444.09	2.83%
4	DOBI trade	ETH/BTC	$114,739,423	* $6446.35	2.65%
5	Huobi	BTC/USDT	$111,738,795	$6445.67	2.59%
6	IDAX	BTC/USDT	$108,553,492	$6445.66	2.51%
7	Binance	BCC/BTC	$105,018,575	$6433.59	2.43%
8	CoinsBank	BTC/EUR	$74,584,095	$6406.89	1.73%
9	Binance	BTC/USDT	$67,146,292	$6443.21	1.55%
10	ZB.COM	BTC/USDT	$64,950,292	$6443.04	1.50%
		View More			
Total/Avg			**$4,321,839,695**	**$6441.40**	

Figure 1 – Volume of Bitcoin from coinmarketcap.com (05.11.2018)

8.Cryptocurrency Exchange

There is a huge cryptocurrency exchange called Cryptsy opened on May 20, 2013 and closed in January 2016. Over 230,000 users had registered to this exchange. At the last recorded day in Cryptsy, its trading volume was 106,950 USD, which have an accolade of tenth biggest cryptocurrency exchange in trade volume. At that time, Cryptsy had 541 trading pairs i.e. Bitcoin, Ripple, Litecoin. These stats make Cryptsy the third greatest exchange according to its size in the market. Cryptsy become famous as more and more different altcoins are available for the trade. [2]

The importance of decent currency exchange is crucial for cryptocurrency trading among digital currencies. The exchange market of digital currencies has grown fast over time. It is understandable that, this growth is not yet to end. Mt. Gox was one of the popular exchange until mid-2013. At that time, FBI closed an account belongs to Mt. Gox which includes about $2.9 million. This operation drained the exchange, which means that, it is now difficult to access by U.S customers. In February 2014, Mt. Gox has a security breach and there was a big loss of Bitcoins. At late 2013, the biggest Bitcoin exchange is BTC China with 35% of all the trades. For trades between USD and BTC, in early 2014, there were three big exchanges: BTC-e, Bitstamp and Bitfinex. BTC-e is the first one and has a volume about %25. Bitstamp is only trades BTC/USD and has a volume about 50% in the currency pair. Bitfinex is a later exchange and has a 25% of the exchange market. [4]

Bitcoin's value can be considered as its exchange rate comparing to other digital currencies. Most users of Bitcoin do not interest in data mining. They are buying Bitcoins from other users with their "local currencies". Exchange across different exchanges has its own ecology. This trading results in connecting Bitcoin and real economy. [5]

After the accident at Mt. Gox, many altcoins appeared out of nowhere. This results in more and more cryptocurrency exchanges entered in the market. The competition between cryptocurrencies is getting bigger and bigger as well as currency exchanges got much more bitter. Different from USD, only global currency is Chinese Yuan in the cryptocurrency

exchange market. There are two major cryptocurrency exchanges between BTC/CNY, BTCChina and OKCoin. BTCChina works only with Chinese Yuan while OKCoin allows both Chinese Yuan and USD. Also, BTC/EUR exchange is considered as well. However, Euro does not have a role as big as USD and CNY but, there is still has a remarkable percentage of trade. The biggest exchange which allows Euro as a currency is Kraken. Kraken has a volume about 3.3%. [3]

Cryptocurrency Exchanges / Markets List

Indexing 211 Cryptocoin Exchanges with a total 24h Volume of $5.35B on 7243 trading pairs!

Rank	Exchange Name	Markets	24h Trades	24h Volume	Marketshare
1	Binance	291	>2,790,132	$793,694,318	28%
2	Huobi	196	>1,664,897	$321,576,326	11%
3	HitBTC	379	>339,318	$224,549,193	8%
4	Bitfinex	165	>214,360	$211,059,425	7%
5	ZB.COM	75	>612,157	$164,416,424	6%
6	LBank	39	>123,110	$162,740,794	6%
7	upBit	264	>326,415	$155,849,347	6%
8	IDAX	34	>263,750	$96,372,530	3%
9	DigiFinex	6	>248,244	$90,117,249	3%
10	Kraken	70	>115,669	$83,077,665	3%

Figure 2 – Most popular cryptocurrency markets from cryptocoincharts.info (05.11.2018)

The price of same cryptocurrency can differ in different exchanges. This results in some trading opportunities between exchanges. There are some tests for these opportunities, which monitors potential trades concerning USD/BTC and compare the exchange rate between USD and BTC on different exchanges i.e. Bitstamp, BTC-e. After these tests, whole data shows that trades across exchanges are more profitable than trades within exchange. [3,4]

9.Using AI Algorithms to Foresee Changes in Trading

There are a lot of researches about using artificial intelligence algorithms in terms of forecasting changes of a stock price. Most of the researches have indicated that using ANNs (artificial neural networks) are unable to detect prior patterns, primarily because of that changes in stock prices don't have meaningful patterns. Besides the complexity of alterations in stock prices, also there are strong chance that the obtained data can have huge noise which complicates the process of determining appropriate patterns. [6]

9.1 Algorithms Used for Guessing Stock Market Prices

In first studies about using artificial intelligence algorithms, Kimoto et al. have intended to predict the most profitable time for selling or buying a stock with help of the modular neural networking. These neural networks are supposed to be able to understand the relationship between patterns in economical indexes and operations done prior to buying and selling. [7]

Artificial neural networks are based on human brain structure. Neurons in brain work as a transmitter – they take signals as input and fire signals as output. This indicates that neurons' outputs will be based on inputs they've taken. [8] Recurrent neural network is a model that

consists of three different layers named as input layer, hidden layer and output layer. Input layer takes observed data whereas hidden layer scales the input data and fires the output layer the scaled data. Finally, output layer divides the data by their likeliness and clusters them. [9]

Later on, Hassan and Nath developed a new approach using a finite state machine named as Hidden Markov Model to analyse stock prices of some airline companies. The reason behind their choice using Hidden Markov Model is told by them as this model is good at continuous data flow and strong in terms of foreseeing similar patterns. They used a stock's highest and lowest value with daily opening and closing values as inputs to predict the next day's closing price. [10]

Kim and Han proposed a hybrid model of genetic algorithms and artificial neural networks to detect patterns in stock prices. Their approach suggests that combining genetic algorithms with ANN can help to find patterns in a noise prone dataset such as stock prices. The reasoning behind that is ANNs are not well-fit to process datasets with huge noise besides being swift while classifying the data. Using generic algorithms help ANNs for processing of these data in a good way since genetic algorithms are able to discrete big amounts of continuous data, which is a weakness of ANN algorithms. [6]

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