

Implementation of Blockchain in Financial Sector to Improve Scalability

¹Mr.K. Mahesh Kumar , ²Mr. N. Kranthi Kumar

¹² Assistant Professor ,

¹Department of AI & DS, ²Department of Computer Science Engineering (AI&ML)

¹ Guru Nanak institutions, ²St. Martin's Engineering College, Secunderabad, Telangana, India,

*Corresponding Author

E-mail:koppunur@gmail.com

Abstract— The Blockchain is an encrypted database that stores information statistics, or in different words, it is a virtual ledger of any transactions, contracts - that needs to be independently recorded. One of the key capabilities of Blockchain is that this virtual ledger is out there throughout several masses and heaps of computer and isn't always sure to be stored in a single place. Blockchain chain has already commenced disrupting the financial offerings area, and it's far this technology which underpins the virtual currency- bitcoin transaction. The aim of the paper is to conduct research on the effect of blockchain technology on the financial sector. There is no doubt that the world is curious to see how this promising technology will influence or shape the future of banking. Blockchain enhances safety in data storage and transmutation, avails a decentralized and transparent network infrastructure and significantly reduces the costs in operations. These remarkable attributes make blockchain a very promising and in-demand solution even in an industry as restricted as the banking sector.

Keywords—Applications of blockchain, benefits from blockchain, features of blockchain, security of blockchain.

I. INTRODUCTION

A blockchain is a distributed digital ledger where transactions can be recorded and checked electronically over a network of computers in the absence of a central ledger. Cryptography is used to protect the data from deception or hackers[1]. Blockchain is being called “the new internet”, and is expected to transform businesses across various sectors, most importantly the financial sector.

It was invented by “Satoshi Nakamoto” in 2008. A blockchain helps to record all the transactions made so that no alterations can be made later on so as to maintain the security of the data. Today, entities maintain records in their own traditional ledgers for transactions between them. This sometimes leads to transfer or exchange of a considerable amount of data between entities, resulting in an increase in time and cost for them. It also makes the process of any asset transfers inefficient, costly and vulnerable. The duplicated shared ledger concept in blockchain technology can help remove these weaknesses[2]. The use of smart contracts, an application of blockchain technology, can enhance efficiency through event-triggered mechanisms. Most credit and budgetary organizations can't do their work without various go-between, while their interest makes the administrations of these establishments substantially more costly. The execution of blockchain will empower pointless arbiters to be relinquished and give clients and banks less expensive administrations. The fundamental zones in which banks and other budgetary organizations will probably actualize blockchain innovation: Payment, Client Identification framework, Loans, and Credits protection[4].

II. LITERATURE REVIEW

Blockchain is still in its relative infancy, but it is increasingly becoming a solution that will result in an essential advantage in the context of the switch of belongings within business networks.

A. Invention and importance of blockchain

Satoshi Nakamoto sketches out a new method for peer-to-peer digital cash gadget, the use of a cryptocurrency known as bitcoin. It became an appreciable improvement. Cryptocurrencies (virtual currencies) aren't constructed or aren't in fee of the government. They have got their own set of policies to follow. This type of association has come to be the very new blockchain era, which was the bottom for the growing numbers of authorizing expended blockchain[1]. Blockchain era permits exchange cash without intermediaries. Thus, humans ship cash immediately and correctly and with none trouble at ten same times. It's miles one of the maximum promising and revolutionizing inventions. Attested to be as large to the internet or energy. Sadly, very few have heard of the era but significant social media coverage is assisting. It is one of the maximum promising and positive new era for the coming era. It's an allotted ledger generation that roots bitcoin[3]. Presenting a new manner to record, preserve the records and transfer the records. Even greater incredible is the transparent, and secure statistics, this is auditable and proof against blackout.

B. Blockchain an underlying technology of bitcoin

Many humans count on that blockchain and bitcoin are identical. Blockchain is the underlying generation of bitcoin. They're intently associated, however, they're no longer the same factor. In 2008, bitcoin turned into introduced as a form of unregulated virtual currency created through Satoshi Nakamoto. Blockchain was the ledger answer used to safely record facilitating using this new forex when you consider that there has been no bank or government involved to reveal or police the transactions. The confusion between blockchain and bitcoin regularly arises because those two concepts have been introduced at the identical time. The blockchain era as for instance the only used for bitcoin allows for the recording of transactions on an allotted ledger across a community of users. The open-source era allows for the garage of records from the transactions into blocks. Each block consists of a time-stamped report of the transactions with each block related to the previous one, for that reason developing a series[10]. The records saved at the blockchain is absolutely obvious and everlasting without the potential to

trade or take away previous transaction facts from the dispensed ledger. This characteristic and answer can be used to resolve many inefficiencies in unique packages and industries.

III. BACKGROUND AND RELATED WORK

A. Working of blockchain

Blockchain not only changes how we transfer value but could dramatically shift our systems of trade identity and governance and one of the aspects that's most interesting is, how it can make these systems more transparent.

There this record book shows every transaction that has ever happened in chronological order and we each hold an exact copy of it because of the way the pages are bound together trying to go back and change past trades would be practically impossible and because we each hold a copy of it we would know if something went wrong, this shared record book is essentially a blockchain[6].

A blockchain is a distributed, immutable ledger or record of transactions. Distributed means that it's shared and stored in multiple locations removing a single point of failure and providing perceptibility across massive participants. Immutable means that it's nearly impossible to go back and change the past records once they have been agreed by and attach using cryptography.

Even as a logo-new transaction or an edit to a current transaction is available into a blockchain, usually a majority of the nodes inside a blockchain implementation should execute algorithms to assess and verify the information of the man or woman blockchain block this is proposed[8]. If a majority of the nodes come to consent that the facts and signature are valid, the brand-new block is common and is introduced to the chain of transactions. If a majority does not approve to the addition or modification of the ledger, then it isn't always delivered to the chain. The distributed consent version is what lets in blockchain to run as an allotted ledger without the need for a few important, unifying authority announcing which transactions are legitimate and which ones aren't legitimate[2].

With blockchain innovation, each page in a record of exchanges structures a square. That square affects the following square through cryptographic hashing. At the end of the day, when a square is finished, it makes an extraordinary secure code, which integrates with the following page or square, making a chain of squares, or blockchain[7]. It takes trust in the information before a square can be added to the chain, a couple of things need to occur. Initial, a cryptographic riddle must be comprehended, in this manner making the block. The Personal computer that illuminates the riddle shares the answer for the majority of different Personal computer on the system, this is called confirmation of-work. The system will at that point confirm this evidence of-work and, if right, the square will be added to the chain. The blend of these perplexing math confounds, and confirmation of numerous Personal computers guarantees that we can confide in every single square on the chain. Since the system does the trust working for us, we presently have the chance to collaborate legitimately with information in genuine time[2].

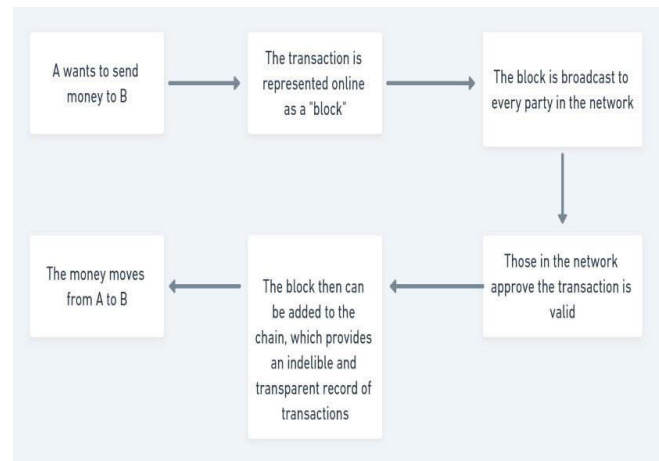


Fig.1. Working of Blockchain

The blockchain technology is categorized in two parts:

1. **Public Blockchain-**A public blockchain network or permission less blockchain network is completely open-ended and anyone inclined to participate in this kind of network can take part without anyone's permission[9]. This is the important and only difference between public and private blockchain network. Anyone can take part in the permission less network, perform the consent protocol and keep the shared open public ledger.

2. **Private Blockchain-** A non-public blockchain community calls for an invitation to participate in the community. The invitation must be established both via network starter or by using the regulations/conditions placed by the community starter. Permission blockchain community places a limit to the access of participant and allows most effective the kind of participant that is required in the network.

B. Blockchain is NOT Crypto-Currency

Blockchain is the platform which brings cryptocurrencies into play. The blockchain is the era, this serves because of the distributed ledger that paperwork the network. This technology creates the way for transacting and allows moving of price and records.

Crypto-currencies are the tokens used within those networks to ship fee and pay for these transactions. We can see them as a tool on blockchain technology, in a few instances serving as an aid or application feature. Other instances they may be used to digitize the cost of an asset.

Blockchains serve as the idea generation, wherein cryptocurrencies are a part of the ecosystem[10]. They pass hand in hand, and crypto is regularly important to transact on a blockchain. But without the blockchain, we might not have a means for those transactions to be recorded and transferred.

TABLE I: DIFFERENCE BETWEEN BLOCKCHAIN AND CRYPTO-CURRENCY

S.No.	Blockchain	Crypto-Currency
1.	Blockchain does not require crypto-currency	A crypto-currency is an application of crypto-technology, allowing the transfer of cash or value via transactions recorded on a blockchain.
2.	The program can be constructed to handle a varying set of rules and configuration.	There are various existing crypto-currencies, most famous is bitcoin.

3.	Related technology, such as smart contracts, can seriously improve process efficiency, transparency, reliability and reduce risk.	Specific to crypto-currencies a key benefit includes preventing extra spending [1].
----	---	---

IV. APPLICATIONS OF BLOCKCHAIN TECHNOLOGY IN FINANCIAL SECTOR

Blockchain is certainly one of the most mentioned technology inside the financial region these days. The shift from a centralized technical infrastructure to distributed, atmosphere-enabling systems are building the rules for new business models in bills, virtual banking, and financial transaction technology. Monetary services enterprise is presently the chief in experimenting with the generation. Blockchain holds the ability for all the individuals in a commercial enterprise community to percentage a gadget of records so as to offer consensus, provenances, immutability, and finality across the switch of belongings in the business network[11]. In spite of the efforts to reduce the complexities and boom the interconnectedness of participants transaction information, the commercial enterprise network is still typically replacing statistics or messages between them to conclude transactions. Blockchain technology has the capability to deal with positive limitations of the cutting-edge approaches by means of modeling, streamlining and simplifying the conventional design of the monetary enterprise infrastructure with a shared material of common place information[10].

The gain brought through blockchain technology may be extensively categorized into fee-saving, efficiency, and transparency.

(i) Cost Saving:

a. Fraud Prevention: As Blockchain technology is constructed on the concept of sharing statistics throughout events and consensus throughout transactions; it saves on reconciliation price between banks and forestalls losses due to documentary frauds.

b. Saves costs on forex volatility: Blockchain generation is used in go border bills can assist the consumers and banks to take gain of the foreign exchange marketplace to get the first-class deal transparently from the marketplace players[8].

c. Save costs over delayed settlements: In case of a distributed fee community, Blockchain technology guarantees the transaction agreement facts is also strategies simultaneously along with the feed message.

(ii) Efficiency:

a. Resilience through redundancy: Being a dispensed structure by using layout, Blockchain technology permits the network to be operated by way of all permission nodes within the atmosphere. All the essential contributors of the price surroundings- banks, monetary institutions shall efficiently become the participating nodes inside the Blockchain generation network[12].

b. Reduced time for processing: In the Blockchain era, the transaction is discovered to all the approving nodes, right away[13]. As a result, Blockchain generation can assist in enhancing the rate of processing transactions by way of discount in choice making a time across the agencies ensuing in decreased prices of processing and stronger transparency of choices to all the participating nodes.

c. Faster settlements: Blockchain also can assist to deal with recognize Your customer and identity management challenges as a variety of the records to show identification is already in virtual shape and Blockchain technology should immediately verification.

(iii) Transparency:

a. Immutable Transactions: Maintaining an immutable report of transaction occasions in a chronological order being a major pillar of its structure, Blockchain era guarantees a great deal desired attributes to banking and financial transactions which includes immutability and finality[14].

V. PROBLEM

LIMITATIONS OF BLOCKCHAIN IN FINANCIAL SECTOR

The banks today are faced with issues such as rising costs of operations, increasing sensitivity to fraud attacks on centralized servers and challenges in ensuring transparency. All this are primarily because most of the banking transactions from opening customer accounts to making global payments- may require intensive manual processing and documentation, involve costly intermediaries and is time consuming as these transactions need to be validated by various participants at various point in time causing the delay thereby resulting in an almost lack of fraud-proof real-time solution[15].

Banks are constantly investigating better approaches to perform exchanges faster for better client administration while guaranteeing cost productivity in their tasks and guaranteeing straightforwardness to clients and controllers. For this, blockchain conceivably gives an answer for banks as it inalienably wipes out middle people, keeps up a changeless log of exchanges and furthermore encourages ongoing execution of exchanges.

This could potentially reduce the time after time for a banking transaction, reducing costs of manual work, and leading to enhanced customer service and satisfaction[16]. Before we come to recognize or recognize all of the top-notch golden possibilities blockchain eras give us for the banking and economic offerings industry, there are some hurdles and headaches we want to overcome.

VI. PROPOSED SYSTEM

Blockchain is an era that strengthens an awesome manner to have huge-undertaking implications so that it will now not genuinely transform financial offerings, but many other commercial enterprise and industries. Billions of humans and groups are served and trillions of bucks are moved around the previous worldwide financial device every and every day. Nevertheless closely reliant and dependent on paper, despite the fact that dressed up with a

virtual appearance, there are various problems with this era. Motive brought price and delays as well as make it much less complicated for crime and fraud to cripple it. In spite of the monetary employer's resistance to trade, blockchain and its anticipated benefits make it worthwhile. Blockchain, not like traditional structures, is dynamic enough to come to be a pacesetter in implementation in a chargeable market situation. In a blockchain, the best advantage it guarantees is that every celebration has a report that is maintained in a ledger to be had to everyone. It is a ledger extensively surpassed between special users thereby developing a shared database that is replicated to those users and who can get right of entry to it simplest when they have the get admission to the right for it.

A. Things blockchain can do for the financial sector

a). On-chain settlement

Blockchain is a pioneering technology based on a distributed ledger. It has a capability to lower the fraud rates in the international bank system and it is also capable of providing On-chain settlement. Blockchain can be used in the financial sector specifically in banking sector providing a platform for banks to reduces fraud as well as On-chain settlement to the users that also helps in reducing the processing time. DLT is capable of providing a platform on Ethereum blockchain. The user will don't have to rely on the centralized system for the confirmation of the transaction.

b.) Low transfer fees

The user will have a transparent cost model for sending a certain amount of money for overseas transactions. The traditional system has a number of intermediates which results in the high transfer fees. The banks have to rely on the centralized system for verifying the transactions. The process is complicated and takes a lot of time to verify the transactions. The platform proposed will have a transparent cost model for sending the money cross border that will provide ease to the user and they have to pay only the negligible cost for sending money.

c). 24*7 Availability

The platform is accessible anytime from anywhere from the world. The nodes in the distributed network will verify the transaction and if more than 75% verifies the transactions, the process will be completed and the user on the side will receive the funds. The nodes will have certain amount of price to verify and block creation.

d). Transparency

The bank system presently changes the conversion rate without informing the users which results in high transaction cost. The platform proposed will have a transparent conversion rate that will be visible to the user for sending the money overseas with ease. This will also allow the user to seek in his ledger and see the transaction history and conversion rate.

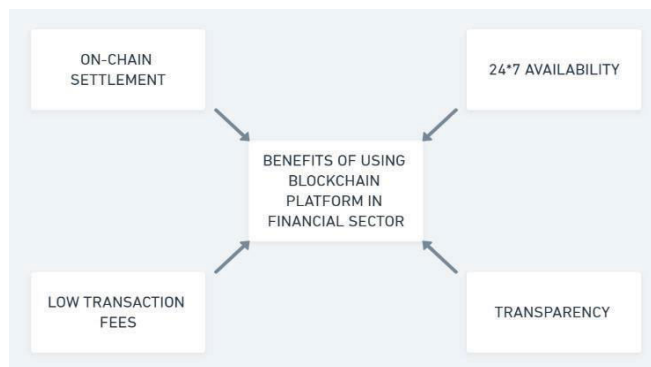


Fig. 2. Benefits of Using Blockchain

B. Proposed working of platform

Every bank registered on this blockchain platform will have to update the ledger by uploading customer data in encrypted form which allow security to the user's data. By registering to this platform every bank will have the same ledger for the customer data and transaction history. DLT will provide a full transparency model to the user to send money overseas along with 24*7 availability. This will also reduce the time for the transaction to process as every node present in the network will verify the transaction and store the transaction history in the blockchain database. This distributed ledger will also vanish the double spending problem present in the centralizes system. This platform also provides on-chain settlement with the negligible cost for a transaction.

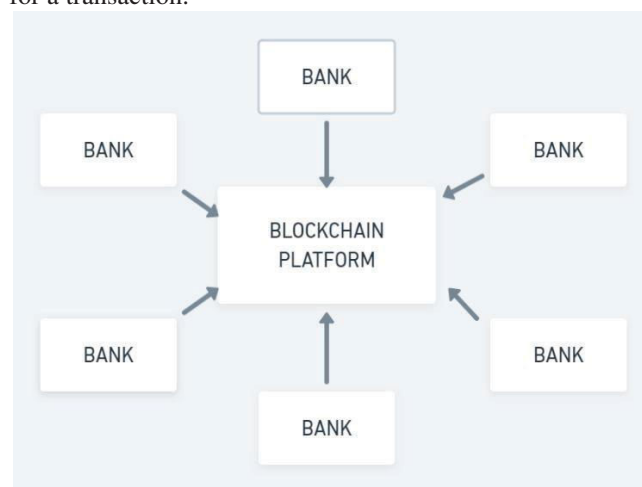


Fig. 3. Banks on the Blockchain Platform

If a user wants to send money to the other user, the platform will provide some features over the centralized system. The banks registered within the blockchain platform will interact with each other in the ledger. The user can only send money to the banks registered on the platform that will carry all the information of other users in the distributed ledger.

The user sending the money via this platform will have transparency for the transaction made with the negligible fees. The user on the receiver side will get the funds after more than 75% nodes verifies the transaction. However, the availability of the platform is easily accessible and they don't have to visit banks for sending money overseas. The

transaction made has to undergo a consensus mechanism that will be carried out by nodes in the network.

The platform will have a certain advantage over the centralized system as the transactions made will be immutable which reduce the rate of frauds conversions.

C. Benefit of the proposed platform

The benefit of this platform is that it will have only a single database for the user information which reduce the process of KYC of the user for every bank. The timeline of the transaction will be reducing as there will be an automation process of transferring money which will benefit the user sending money in any corner of the world.

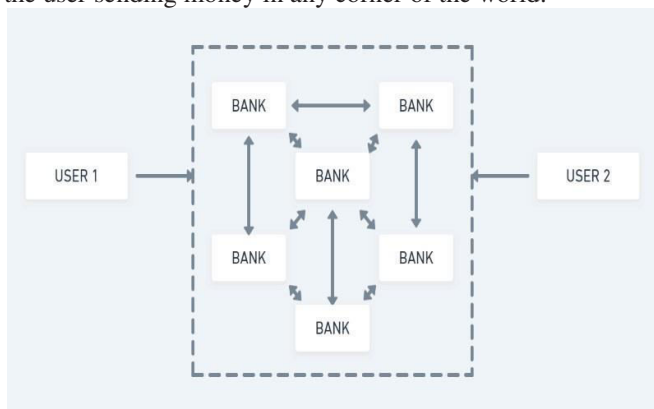


Fig. 4. Transaction made through proposed platform

TABLE II. EASY PAYMENT THROUGH BLOCKCHAIN

S.No.	Current Pain Points	How Blockchain Can Help
1.	Laboring Documentation	Automated Documentation
2.	Time-consuming process	Real time settlement of transaction
3.	Lack of mechanism to track throughout the process	Real time-tracking of transaction
4.	Potential of fraud	Fraud proof

VII. CONCLUSION & FUTURE SCOPE

Although the potential of blockchain is widely claimed to be at par with early commercial interest, banking firms need to understand the key features of the technology and how it can solve the current business issues as on one hand, internet enabled the exchange of data while on other, the blockchain can involve the exchange of value. Banks need to identify opportunities, determine feasibility and impact and test proof of concepts. However, the questions around emulations will have to be resolved through focused discussions with competent regulatory authorities and incorporation of their though-process.

Further we will research how we can provide off-chain settlement for the banks which are not listed on the platform, one of the alternate to do it is to access its database with the permission, due to which further transaction can be taken place (between listed and non-listed banks) so that both can have equal ledger maintained.

REFERENCES

- [1] Tejal Saha, Shalilak Jani, "Applications of Blockchain Technology in banking and finance", Parul CUniversity, Vadodara, India, February 2018 DOI: 10.13140/RG.2.2.35237.96489
- [2] DUSKO KNEZEVIC, "Impact of blockchain technology platform in changing the financial sector and other industries., University Union Belgrade, Serbia, Montenegrin Journal Of Economics, Vol. 14, No. 1(2018), p.p(109-120).
- [3] Lin William Cong Zhiguo He Working Paper 24399 <http://www.nber.org/papers/w24399> NATIONAL BUREAU OF ECONOMIC RESEARCH 1050 Massachusetts Avenue Cambridge, MA 02138 March 2018, Revised April 2018
- [4] Soonduck_Yoo, (2017) "Blockchain based financial case analysis and its implications", Asia Pacific Journal of Innovation and Entrepreneurship, Vol. 11 Issue: 3, pp.312-321 <https://doi.org/10.1108/APJIE-12-2017-036>
- [5] C. Miguel and L. Barbara, "Practical byzantine fault tolerance," in Proceedings of the Third Symposium on Operating Systems Design and Implementation, vol. 99, New Orleans, USA, 1999, pp. 173–186.
- [6] Underwood, S. (2016), Blockchain beyond Bitcoin, Commun. ACM, Vol. 59, No. 11, pp. 15–17. <https://doi.org/10.1145/2994581>
- [7] Digital currencies", IEEE Commun. Surv. Tutorials, Vol. 18, No. 3, pp. 2084–2123. <https://doi.org/10.1109/COMST.2016.2535718>.
- [8] Greenspan, G. (2015), "MultiChain Private Blockchain", White Paper Founder and CEO, Coin Sci-ences Ltd, <https://www.multichain.com>
- [9] M. Vukolić, "The quest for scalable blockchain fabric: Proof-of-work vs. bft replication," in International Workshop on Open Problems in Network Security, Zurich, Switzerland, 2015, pp. 112–125.
- [10] D. Kraft, "Difficulty control for blockchain-based consensus systems," Peer-to-Peer Networking and Applications, vol. 9, no. 2, pp. 397–413,2016.
- [11] I. Eyal, A. E. Gencer, E. G. Sirer, and R. Van Renesse, "Bitcoinng: A scalable blockchain protocol," in Proceedings of 13th USENIX Symposium on Networked Systems Design and Implementation (NSDI 16), Santa Clara, CA, USA, 2016, pp. 45–59.
- [12] I. Eyal, A. E. Gencer, E. G. Sirer, and R. Van Renesse, "Bitcoin-ng: A scalable blockchain protocol," in Proceedings of 13th USENIX Symposium on Networked Systems Design and Implementation (NSDI16), Santa Clara, CA, USA, 2016, pp. 45–59.
- [13] J. Bonneau, A. Narayanan, A. Miller, J. Clark, J. A. Kroll, and E. W. Felten, "Mixcoin: Anonymity for bitcoin with accountable mixes," in Proceedings of International Conference on Financial Cryptography and Data Security, Berlin, Heidelberg, 2014, pp. 486–504.
- [14] T. Ruffing, P. Moreno-Sanchez, and A. Kate, "Coinshuffle: Practical decentralized coin mixing for bitcoin," in Proceedings of European Symposium on Research in Computer Security, Cham, 2014, pp. 345–364.
- [15] I. Miers, C. Garman, M. Green, and A. D. Rubin, "Zerocoin: Anonymous
- [16] A. Fiat and A. Shamir, "How to prove yourself: Practical solutions to identification and signature problems," in CRYPTO '86, vol. 263 of LNCS, 1986, pp. 186–194.
- [17] A. Biryukov, D. Khovratovich, and I. Pustogarov, "Deanonymisation of clients in bitcoin p2p network," in Proceedings of the 2014 ACM SIGSAC Conference on Computer and Communications Security, New York, NY, USA, 2014, pp. 15–29.
- [18] S. Barber, X. Boyen, E. Shi, and E. Uzun, "Bitter to better – how to make bitcoin a better currency," in Financial Cryptography 2012, vol. 7397 of LNCS, 2012, pp. 399–414. digital currencies", IEEE Commun. Surv. Tutorials, Vol. 18, No. 3, pp. 2084–2123. <https://doi.org/10.1109/COMST.2016.2535718>
- [18] CryptoCurrency Market Capitalizations, Coinmarketcap.com, Available: <https://coinmarketcap.com>