Chapter 3
Content-Based Transaction Access From Distributed Ledger of Blockchain Using Average Hash Technique

Randhir Kumar
https://orcid.org/0000-0001-9375-2970
National Institute of Technology, Raipur, India

Rakesh Tripathi
National Institute of Technology, Raipur, India

ABSTRACT

There are many critical applications working with blockchain-based technology including the financial sector, healthcare, and supply chain management. The fundamental application of blockchain is Bitcoin, which was primarily designed for the financial value transfer. Owing to the feature of decentralized storage structure, immutability, integrity, availability, and reliability of transactions, the blockchain has become the need of the current industry like VANET. However, presently, not much work has been done in order to mitigate the redundancy in the distributed ledger. Hence, the authors arrive at the intelligible conclusion to detect a similar transaction that can mitigate the redundancy of transaction in a distributed ledger. In this chapter, they are addressing two main challenges in blockchain technology: firstly, how to minimize the storage size of blockchain distributed ledger and, secondly, detecting the similar transaction in the distributed ledger to mitigate the redundancy. To detect similar transaction from the distributed ledger they have applied the average hash technique.

DOI: 10.4018/978-1-7998-3295-9.ch003

INTRODUCTION

The coming era of vehicles will be in needs to connected, and intelligent with the requirements like real-time applications, security, seamless connection, and privacy. The Blockchain provides the secure message dissemination and information sharing in vehicular network. The blockchain framework provides the privacy, integrity, availability, and security of information in vehicular network.

In recent decades, there has been a determined increase in the smart and autonomous vehicle. Today vehicular networks are being used for the accidental avoidance, parking management, traffic control, and critical message dissemination (Technologies, 2010). The recent article (Shrestha, 2018), state that most of the developed country like US, China, Germany are working on self driving vehicles.

The aim of the vehicular network (VANET) is to disseminate the critical information (such as accident report) in a secure and accurate manner in order to ensure the safe driving (Shrestha & Nam, 2017). However, this is still a challenging task to disseminate critical information to the all active nodes (peers) in the vehicular network. Most of the previous work on message dissemination and security in VANETs is working with centralized structure. The main issue with the centralized structure is the single-point-of-failure problem. To overcome this challenge in VANETs, distributed structure of vehicular networks has been proposed (Security, Security, & Security, n.d.). However, the issue with distributed structure system is distributed key management, message trust, privacy of data, consent dissemination, owing to the dynamic nature of the VANETs. The distributed trust in information sharing might not work because of consent mechanism, and at the same time the trust value might be inaccurate owing to insufficient information. These issue of distributed structure of VANETs demands for secure mechanism to share the accidental information or critical information.

The security mechanism is required to mitigate the critical information manipulation like deletion, change, and interface with insecure communication by the malicious VANETs node. The message which is generated by the known vehicle should be stored into the distributed storage (database) in order to provide safety in safe driving. The same information must be shared to all the VANET nodes (peers) in consistent state. This type of security attention can be achieved by using blockchain technology, which is currently gaining attention and great potential in diverse fields (Dorri, Steger, Kanhere, & Jurdak, 2017),(Jaoude & Saade, 2019).

The blockchain is emerging technology that provides decentralized and distributed storage platform which supports security and privacy for the cryptocurrency (Bitcoin) (Nakamoto, 2008). The blockchain can be utilized to maintain a history of traffic and accidental events, which can work as a ground truth for the vehicular networks in essence of information sharing. The main objective to apply the blockchain in a VANET is the robustness of storage structure, where each block is shared and stored among the peers. The peers continuously validate the integrity of the blocks in a network. The recorded information in the block of blockchain cannot be changed and forged easily owing to the feature of immutability

There are various study of blockchain has been proposed in geospatial systems such as logistics and energy micro grids (Mengelkamp, Notheisen, Beer, Dauer, & Weinhardt, 2018),(Min, Li, Liu, & Cui, 2016). In this book chapter, we propose blockchain based vehicular adhoc networks (BVANETs) which provide the peer-to-peer message delivery (content-based transaction access) by using IPFS and blockchain. The proposed model mitigates the redundancy of the information in the VANET by using average hash technique.