MULTIMEDIA COMMUNICATIONS TECHNICAL COMMITTEE
IEEE COMMUNICATIONS SOCIETY
http://mmc.committees.comsoc.org/

MMTC Communications – Review

Vol. 12, No. 6, December 2021

IEEE COMMUNICATIONS SOCIETY

TABLE OF CONTENTS

Message from the Review Board Directors

Welcome to the December 2021 issue of the IEEE ComSoc MMTC Communications – Review.

This issue comprises four reviews that cover multiple facets of multimedia communication research including Internet of Remote Things application, intelligent reflecting surfaces aided wireless communication systems, image quality assessment, and opportunistic autonomous vehicle platoon. These reviews are briefly introduced below.

The first paper, published in IEEE Internet of Things Journal and edited by Dr. Qin Wang, proposes a solution for adopting low earth orbit-satellites-assisted UAVs to provide flexible ubiquitous accessibility with its advantages of high-mobility and flexibility for data collecting in Internet of remote things (ToRT) applications.

The second paper, edited by Dr. Ye Liu, was published in IEEE Transactions on Communications. This paper systematically investigates and analyzes the number of reflecting elements for guaranteed spectral efficiency and energy efficiency in intelligent reflecting surfaces aided wireless communication system.

The third paper, edited by Dr. Tiesong Zhao, was published in IEEE Transactions on Multimedia. The paper proposes a full reference mean and deviation of deep and local similarity image quality assessment method.

The fourth paper, to be published in IEEE Transactions on Vehicular Technology, and edited by Dr. Qichao Xu. The paper proposes an effective reputation-based leader election scheme to simulate vehicles participating in the opportunistic autonomous vehicle platoon leader election.

All the authors, reviewers, editors, and others who contribute to the release of this issue deserve appreciation with thanks.

IEEE ComSoc MMTC Communications – Review Directors

Zhisheng Yan
George Mason University, USA
Email: zyan4@gmu.edu

Yao Liu
Binghamton University, USA
Email: yaoliu@binghamton.edu

Wenming Cao
Shenzhen University, China
Email: wmcao@szu.edu.cn

Phoenix Fang
California Polytechnic State University, USA
Email: dofang@calpoly.edu

LEO-Satellite-Assisted UAV: Joint Trajectory and Data Collection

A short review for "LEO-Satellite-Assisted UAV: Joint Trajectory and Data Collection for Internet of Remote Things in 6G Aerial Access Networks"

Edited by Qin Wang

Ziye Jia, Min Sheng, Jiandong Li, Dusit Niyato, and Zhu Han, "LEO-Satellite-Assisted UAV: Joint Trajectory and Data Collection for Internet of Remote Things in 6G Aerial Access Networks," IEEE Internet of Things Journal, vol. 8, no.12, June 2021.

One important application in 6G is the aerial access network and terrestrial-space integration, which significantly benefits the Internet of Remote Things (IoRT) [1-2]. For environmental monitoring data in the remote areas, such as deserts, oceans, and many depopulated zones, provides important information of the world. However, there are few base stations to collect the data in such areas. Fortunately, the aerial access network and terrestrial-space integration can facilitate the IoRT data collection and transmission. Satellites in the space, unmanned aerial vehicles (UAVs) in the air, the ground station and data processing center, as well as the demands from Earth compose the aerial access and integrated terrestrial-space networks.

Several kinds of satellites can provide global service. The low Earth orbit (LEO) satellites are more popular since their lower development costs and large-scale LEO satellite network can guarantee lower transmission delay. However, direct connection with satellites may be difficult due to the long distance between IoRT sensors and satellites, as well as the limited transmission power of small IoRT sensors. As a result of which, UAVs could help provide flexible ubiquitous accessibility with its advantages of high-mobility and flexibility.

There are two types of IoRT data (delay-tolerant data and delay-sensitive data). This paper proposes a LEO satellite network-assisted UAV trajectory for the IoRT data collection. Furthermore, it presents a model combining two transmission modes for the IoRT data back to Earth, including the UAV carry-store mode for the delay-tolerant data and the satellite network relay mode for the delay-sensitive data transmission. Considering the limited payloads of UAVs and multiple energy consumption, a UAV energy cost minimization problem is formulated while satisfying all the IoRT data demands and multiple constraints. By combining the Dantzig–Wolfe decomposition and column generation as an efficient method to deal with the large-scale integer linear programming (ILP) problem, it reformulates the original problem into a restricted master problem and a set of pricing problems.

In this paper, a LEO satellite network-assisted UAV trajectory and transmission for collecting IoRT data is considered. The scenario it introduces is composed of LEO satellite networks in the space and UAVs in the air and IoRT sensors on the ground. A UAV takes off from the departure station, flying and passing the IoRT sensors to collect data, and then lands on the destination station. The delay-tolerant IoRT data collected by the UAV is stored and carried by the UAV to the destination station, and then transmitted by the high-speed optical cable to the data processing center. The interference is negligible since the sparse distribution of the IoRT sensors and each IoRT sensor can only connect with one UAV. Since the data transmission consumes UAV's energy and the speed of satellites is much larger than the speed of UAVs, only the connection switching between UAVs and satellites is considered due to the periodical movement of satellites. The energy cost of the UAV trajectory mostly consists of three parts: acceleration, constant speed intermediate phase, and deceleration phase.

Due to the problem of minimizing the total energy consumption that exists in the form of ILP, which is NP-hard to solve, it proposes a column generation-based algorithm to obtain the solution more efficiently. Moreover, to improve the solution complexity in a large-scale system, it presents a heuristic algorithm to efficiently solve the pricing problems without affecting the optimal solution of the restricted master problem. The algorithm complexity is also analyzed. The column generation-based algorithm takes advantage of column iteration and the Yen's algorithm, which is used to generate the shortest trajectory paths for each UAV and randomly select one path from the set as the new column [3], and use virtual IoRT network topology, IoRT data Information, IoRT sensor transmission power, number of UAV, UAV storage capacity, and UAV transmission power to get the integer solution of the integral trajectory path set.

Numerical results demonstrate that compared with the exponential complexity of the optimal solution, the column generation algorithm has a lower time complexity, especially when the number of IoRT nodes is large. The total energy consumption results show that the column generation algorithm achieves the near-optimal solution. Hence, the proposed column generation algorithms demonstrate a near-optimal solution with lower time complexity, which is applicable to the practical large-scale system. Compared with the satellite relay mode, both the carry-store mode and the mixed-mode consume less energy. The separate mode not only needs more UAVs, which increases the capital expenditure and operation expenditure for UAVs, but the separate trajectory results in more energy cost, in accordance with the results.

In summary, the heuristic algorithm could minimize the total energy cost of UAVs while guaranteeing all the IoRT data is collected, which has no effect on the quality of final solutions and which can enable low time complexity.

References:

[1] W. Saad, M. Bennis, and M. Chen, “A vision of 6G wireless systems:Applications, trends, technologies, and open research problems,” IEEE Netw., vol. 34, no. 3, pp. 134–142, May/Jun. 2020.

[2] Z. Zhang et al., “6G wireless networks: Vision, requirements, architecture, and key technologies,” IEEE Veh. Technol. Mag., vol. 14, no. 3, pp. 28–41, Sep. 2019.

[3] J. Y. Yen, “Finding the K shortest loopless paths in a network,” Manag.Sci., vol. 17, no. 11, pp. 712–716, Jul. 1971.

Qin Wang, Ph.D, is an Associate Professor at Nanjing University of Posts and Telecommunications (NUPT), China. She received B.S. and Ph.D degrees from NUPT, in 2011 and 2016. Prior to joining NUPT, she was with the New York Institute of Technology (NYIT) between Feb. 2017 and Aug. 2020. From July 2018 to June 2020, she was a Postdoctoral Research Fellow at NUPT. From 2015 to 2016, she was a visiting scholar at San Diego State University, USA. Her research interests include multimedia communications, multimedia pricing, resource allocation in 6G, and Internet of Things. She has published papers in prestigious journals such as IEEE Transactions on Vehicular Technology and IEEE Communications Magazine, in prestigious conferences such as IEEE INFOCOM SDP Workshop.

Minimizing Reflecting Elements for Intelligent Reflecting Surfaces-Aided Communication

A short review for "How Many Reflecting Elements are Needed for Energy- and Spectral-Efficient Intelligent Reflecting Surface-Assisted Communication"

Edited by Ye Liu

D. Li, "How Many Reflecting Elements are Needed for Energy- and Spectral-Efficient Intelligent Reflecting Surface-Assisted Communication," in IEEE Transactions on Communications, 2021 (Early Access).

Intelligent reflecting surfaces (IRS), also called reconfigurable intelligent surfaces (RIS) [1], is an emerging technology that can make wireless transmission smart through actively controlling signal propagation by adjusting the phase shift, frequency, and amplitude of a wireless signal in a programmable manner. The IRS can improve the existing 5G wireless communication system in terms of coverage supplement, interference suppression, and multi-stream transmission. Moreover, many promising applications can be enhanced, such as aerial mobile miro-stations, far-field wireless power transfer [2], joint communication and sensing [3], and simultaneous wireless information and power transfer [4].

Most of the existing works on IRS focus on either spectral efficiency or energy efficiency maximization. Unfortunately, it is not always possible to maximize spectral efficiency and energy efficiency simultaneously. In addition, few works have been investigated reflecting element optimization problems, namely, using the minimum number of reflecting elements to achieve guaranteed spectral efficiency and energy efficiency. On the other hand, many previous studies have paid significant attention to joint beamforming and phase shift design for IRS-aided wireless communication systems. However, it remains a question of how many reflecting elements are combined with optimized beamforming and phase shift approaches.

To bridge the above gaps, this paper [5] systematically investigates and analyzes the number of reflecting elements for guaranteed spectral efficiency and energy efficiency in IRS-aided wireless communication systems. Different from the existing studies on IRS, which focus on energy efficiency maximization, spectral efficiency maximization, or the tradeoff between them, the goal of this paper is to decide the minimum number of reflecting elements needed subject to constraints on the spectral efficiency and energy efficiency, which opens a new door in the research area of IRS-aided wireless communication systems [6] toward 6G. The contributions of this paper are threefold, which are summarized as follows.

First, a system model is introduced, where the source has many antennas, the IRS has many reflecting elements, and the destination has one antenna. The direct link between the source and destination node is absent as there is an obstacle in the path. Then, the received signal is expressed with the channel coefficients, communication distances, pat loss factor, reflector coefficient and phases, and other parameters such as the diagonal phase shift matrix. The instantaneous capacity is also obtained, which is related to the additive white Gaussian noise, beamforming vector, and transmission power. Based on the above functions, the energy efficiency is finally decided. After that, the problem formulation is given.

Second, spectral efficiency and energy efficiency performance in IRS-aided wireless communication systems do not admit closed-form expressions because of the intractability issue in joint optimization of beamforming and phase shift. What's more, the spectral efficiency and energy efficiency constraints aggravate the difficulty of determining the optimal number of reflecting elements. To address this issue, this work resorts to the performance bounds to reformulate the original ones and decompose this problem into sub ones. Two suboptimal solutions are proposed accordingly. They are coherent phase shift-oriented schemes and random phase shift-oriented schemes, respectively.

In the coherent phase shift-oriented scheme, the objective function is divided into two sub-problems, which are not studied in previous works. The corresponding lemma and proof are presented in detail and helpful for future research. In the random phase shift-oriented scheme, the problem is decomposed into two sub-functions, and the capacity lower bound analysis to relax the sub-functions is conducted. The lemma and proof are also discussed in detail. After that, performance analysis and comparison of the two schemes are made comprehensively.

Third, numerical evaluation is conducted to compare the performance of the proposed coherent phase shift-oriented scheme and random phase shift-oriented scheme. Specifically, the numerical results show the impact of the number of transmit antennas, IRS placement, and noise power on the number of reflecting elements. Moreover, the impact of reflecting elements on spectral efficiency and energy efficiency in IRS-aided wireless communication systems is also demonstrated, as well as the upper bounds.

In summary, this paper investigates a new research problem and solves it with a new approach. This paper opens a new door for the research of IRS-aided wireless communication systems.

References:

[1] C. Pan et al., "Reconfigurable Intelligent Surfaces for 6G Systems: Principles, Applications, and Research Directions," in IEEE Communications Magazine, vol. 59, no. 6, pp. 14-20, June 2021.

[2] Y. Liu, D. Li, B. Du, L. Shu, and G. Han, "Rethinking Sustainable Sensing in Agricultural Internet of Things: From Power Supply Perspective," in IEEE Wireless Communications, 2022.

[3] X. Chen, Z. Feng, Z. Wei, P. Zhang, and X. Yuan, "Code-Division OFDM Joint Communication and Sensing System for 6G Machine-Type Communication," in IEEE Internet of Things Journal, vol. 8, no. 15, pp. 12093-12105, 1 Aug.1, 2021.

[4] T. D. P. Perera, D. N. K. Jayakody, I. Pitas, and S. Garg, "Age of Information in SWIPT-Enabled Wireless Communication System for 5GB," in IEEE Wireless Communications, vol. 27, no. 5, pp. 162-167, October 2020.

[5] D. Li, "How Many Reflecting Elements are Needed for Energy-and Spectral-Efficient Intelligent Reflecting Surface-Assisted Communication," in IEEE Transactions on Communications, 2021.

[6] X. Yu, D. Li, Y. Xu and Y. -C. Liang, "Convolutional Autoencoder-Based Phase Shift Feedback Compression for Intelligent Reflecting Surface-Assisted Wireless Systems," in IEEE Communications Letters, 2021.

Ye Liu, received the M.S. and Ph.D. degrees in electronic science and engineering from Southeast University, Nanjing, Nanjing, China, in 2013 and 2018, respectively. He was a visiting scholar with Montana State University, Bozeman, MT, the USA from October 2014 to October 2015. He was a visiting Ph.D. Student from February 2017 to January 2018 with the Networked Embedded Systems Group, RISE Swedish Institute of Computer Science. He is currently a Researcher with Nanjing Agricultural University, Nanjing, China. He has authored or co-authored papers in several prestigious journals and conferences, such as the IEEE WCM, IEEE IEM, IEEE ComMag, IEEE Network, IEEE IoTJ, IEEE TII, ACM TECS, INFOCOM, ICNP, and EWSN. His current research interests include wireless sensor networks, energy harvesting systems, and smart agriculture. Dr. Liu was awarded 1st place in the EWSN Dependability Competition in 2019, and the Macao Young Scholar in 2021.

Mean and Deviation of Deep and Local Similarity for Image Quality Assessment

A short review for "MaD-DLS: Mean and Deviation of Deep and Local Similarity for Image Quality Assessment"

Edited by Tiesong Zhao

Kyohoon Sim, Jiachen Yang, Wen Lu, Xinbo Gao, "MaD-DLS: Mean and Deviation of Deep and Local Similarity for Image Quality Assessment," IEEE Transactions on Multimedia, Early Access Article, 2021.

Image Quality Assessment (IQA) aims at evaluating the quality of images in visual communication systems, such as acquisition, compression, transmission, and display. It is a classical and challenging task in image processing and vision [1]. To this aim, subjective quality assessment is considered as the most reliable method, given that Human Visual System (HVS) is always the ultimate receiver of visual signals. However, the subjective assessment is laborious, expensive, and hard to be integrated into practical applications.

Many objective IQA studies have been developed to model HVS, such as Structural SIMilarity (SSIM) [2], Feature SIMilarity (FSIM) [3]. However, it is argued that most of existing methods focus only hand-crafted, low-level features that differ from the neurobiological methods in which HVS operates. To address this issue, this paper proposes a Full Reference (FR) Mean and Deviation of Deep and Local Similarity (MaD-DLS) IQA method.

Visual cortex has countless feature detectors, hence numerous feature maps are generated consecutively when HVS looks at a scene. To capture complete information of HVS, this paper extracts Deep Feature (DF) maps of distorted and original images from the convolutional layers of VGG-F [4] pretrained on ImageNet [5]. Moreover, when signals from the feature detector neurons are transmitted in visual cortex, other neurons will compare the similarity between the stimulus signals and stored signals [6]. To imitate this characteristic, this paper calculates the edge maps of DF on the distorted and original maps, respectively. It compares these edge maps to obtain a similarity map called Deep and Local Similarity (DLS) map.

To obtain the final quality score, the DLS map should fused by local weights. This paper designs a Mean and Deviation (MaD) pooling strategy that incorporates the advantages of the mean and standard deviation pooling methods. The MaD pooling reflects attention and discomfort due to the distortion distribution of HVS simultaneously. In practice, a layer score is computed on all DLS maps of the convolutional layer. The overall quality score of the MaD-DLS index is obtained by averaging the quality scores of each layer.

Experimental results on four benchmark IQA databases demonstrate the following findings.

(1) In terms of prediction accuracy and prediction monotonicity, the performance of MaD-DLS on each database outperforms several state-of-the-arts;
(2) The overall prediction monotonicity of MaD-DLS against four databases is also superior to the compared state-of-the-arts;
(3) The performance of MaD-DLS is mainly benefited from its extracted DF maps and MaD pooling.

In general, this paper proposes an FR MaD-DLS IQA method based on a neurobiological model on visual perception. The MaD-DLS consists of two critical components, DLS maps and MaD pooling. The DLS maps, which are computed on the edge maps related to the original and distorted images, simulate the neurobiological activity when HVS perceives images. The MaD pooling combines weighted mean pooling and standard deviation pooling, models both the impact of HVS's attention and the impact of distortion distribution within an image. Impressive prediction accuracy and prediction monotonicity are achieved on four benchmark IQA databases.

References:

[1] G. Zhai and X. Min, "Perceptual image quality assessment: a survey," Science China: Information Science, vol. 63, no. 11, pp. 211301, 2020.

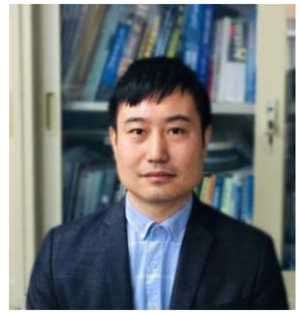
[2] Z. Wang, A. C. Bovik, H. R. Sheikh, and E. P. Simoncelli, "Image quality assessment: From error visibility to structural similarity," IEEE transactions on image processing, vol. 13, no. 4, pp. 600-612, 2004.

[3] L. Zhang, L. Zhang, X. Mou, and D. Zhang, "Fsim: A feature similarity index for image quality assessment," IEEE transactions on Image Processing, vol. 20, no. 8, pp. 2378-2386, 2011.

[4] K. Chatfield, K. Simonyan, A. Vedaldi, and A. Zisserman, "Return of the devil in the details: Delving deep into convolutional nets," arXiv preprint arXiv:1405.3531, 2014.

[5] J. Deng, W. Dong, R. Socher, L.-J. Li, K. Li, and L. Fei-Fei, "Imagenet: A large-scale hierarchical image database," in 2009 IEEE conference on computer vision and pattern recognition. IEEE, pp. 248-255, 2009.

[6] C. Stangor, J. Walinga et al., "Introduction to psychology-1st canadian edition," 2018.



Tiesong Zhao, Ph.D, is a Minjiang Distinguished Professor in Fuzhou University, Fujian, China. He received the B. S. and PhD degree from the University of Science and Technology of China and City University of Hong Kong, in 2006 and 2011, respectively. His research interests include multimedia signal processing, coding, quality assessment and transmission. Based on his contributions in video coding and transmission, he received the Fujian Science and Technology Award for Young Scholars in 2017. He has also been serving as an Associate Editor of IET Electronics Letters since 2019.

A Reputation-based Leader Election Incentive Scheme for Opportunistic Autonomous Vehicle Platoon

A short review for "A Reputation-based Leader Election Scheme for Opportunistic Autonomous Vehicle Platoon"

Edited by Qichao Xu

Z. Ying, M. Ma, Z. Zhao, X. Liu and J. Ma, "A Reputation-based Leader Election Scheme for Opportunistic Autonomous Vehicle Platoon," in IEEE Transactions on Vehicular Technology,2021.

With the rapid development of Vehicle-to-Vehicle (V2V) theory in Intelligent Transportation System (ITS), vehicle platooning has become a new research hotspot. Meanwhile, autonomous vehicles (AVs) have been envisioned to enhance transportation efficiency, reduce accidents, improve safety, offer great mobility service options, and alleviate environmental damage. To increase the safety of AVs, Autonomous Vehicle Platoon (AVP) became the spotlight in the ITS [1]. In an AVP, platoon members (PMs) include platoon leader (PL) and platoon follows (PFs), where PFs go after the PL in a particular order. Since the wind can be effectively reduced by the PL, AVP can save fuel consumption and reduce the risk of accidents. There are mainly two types of AVPs, namely Real-time AVP (RAVP) and Opportunistic AVP (OAVP) [2]. In OAVP, the vehicles go forward without a preestablished platoon. Thus, the establishment of OAVP needs PMs to elect a PL, otherwise, the OAVP is unable to establish.

However, the election of PL in OAVP is challenging with each vehicle is selfish and rational. Firstly, the construction of OVAP should be introduced, which includes the specific methods of communication and the details of the platoon process. Secondly, how to elect an honest PL, which will lead the OAVP in a safe way. Finally, PL, as the first vehicle, endures more windage than the PFs in the OAVP, which leads to more fuel consumption. Therefore, an incentive mechanism should be introduced to balance the benefits of PL and PFs.

To solve to above problems, an effective Reputation-based Leader Election (RLE) scheme is proposed to stimulate vehicles participating in the OAVP PL election in this paper. To be more specific, RLE obtains two sub-systems. The first is the election of the PL. A reputation management system based on blockchain technology for the PL election is proposed to evaluate the trustworthiness of vehicles. A multi-weight subjective logical model [3] is constructed to evaluate the previous behaviors and calculate the reputation values of vehicles. Then, a consortium blockchain is used to store all vehicles' reputation value and historical driving data of the vehicle. Vehicle with high reputation value has greater probability to become the PL. The second sub-system is to consider giving a reasonable reward to the PL. That is to say, PFs need to share part of their fuel savings with PL. This paper proposed an incentive mechanism to make fuel savings be shared between PL and PFs. Moreover, Smart contract in blockchain is used to supervise the payments transfer from PFs to PL, which enforce PFs to pay the part they should take.

Therefore, in this article, a reputation-based election system for electing the leader of an OAVP is proposed. In order to ensure the secure storage of reputation values and achieve accurate calculation, a multi-weight subjective logic model based on the basis of consortium blockchain is introduced. In order to solve the situation vehicles unwilling to be the PL, an incentive mechanism is needed to stimulate more vehicles to participate in the election of PL.

In the construction of the entire RLE system architecture, two sub-systems, the leader election and the incentive mechanism are contained. In the leader election process, roadside unit (RSU) is introduced to serve traffic information to AVs, and a certificate authority is introduced to releases public/ private key pairs for each AV. Pre-selected RSUs manipulate the consortium reputation blockchain (RB) to manage reputation values of registered vehicles [4]. There are seven functions in the achievement of RLE, include vehicle registration, request to form a platoon, platoon leader election, driving in OAVP, reward the leader, evaluate quality of travel and upload reputation evaluation to reputation blockchain. In the platoon leader election function, RSU firstly sets a reputation threshold of joining the platoon, which means vehicles with low credibility are not allowed to join the platoon. Then RSU downloads reputation values from the RB and select the vehicle with highest reputation from the vehicles applying for the leader as the final PL. In the driving in OAVP function, RSUs communicate with vehicles through the Long-Term Evolution Vehicle-to-Everything, and PMs communicate with each other through Dedicated Short-Range Communication. PL needs to monitor the road conditions, collect and process these pieces of information, and issue driving commands to PFs, while PFs only need to follow commands. In the reward function, PL could get a reasonable reward after the travel, which is undertaken by all PFs, and PFs also benefit from energy savings. The smart contract helps to supervise the payment transfer from PFs to PL.

In order to solve the situation that vehicles are unwilling to be the PL, in the first sub-system, a multi-weight subjective logic reputation calculation is devised to stimulate more vehicles to participate in the election of PL. The multi-weight subjective logic includes two opinions, direct reputation and real-time opinions for subjective logic. Three weight items, platoon experience, payment performance and timeliness are considered in direct reputation [5]. In the real-time opinion, the author mainly considers the influence of the behavior of the vehicle on the reputation, in which the behavior includes positive behavior and negative behavior. Vehicle with higher reputation have more chance to become the PL, and thus gets a high reward. To efficiently build the platoon, the second sub-system of an incentive mechanism is devised. The fuel economy of PMs in the platoon is sent to RSU to calculate the average fractional fuel savings rate and a fractional fuel saving rate. Then, with the help of smart contract, credit for each vehicle in the platoon is distributed over one or more communication channels as a result of the equitable distribution. In addition, a leadership bonus is introduced to pay the PL, the value of bonus depends on the actual situation.

Extensive simulations have evaluated the performance of the proposed scheme. The simulation results show that the proposed RLE scheme perform well in the detection rate of malicious vehicles. Furthermore, the PL's profit is well improved under the proposed incentive mechanism.

In summary, this paper designs an effective RLE for choosing the platoon leader of an OAVP, so that the platoon can be quickly formed. Then, a multi-weight subjective logic model based on the consortium blockchain is constructed to ensure the secure storage of reputation values and achieve accurate calculation. Moreover, to encourage more qualified vehicles to participate in the election of PL, an incentive mechanism in the platoon is devised.

References:

[1]. Z. Ying, M. Ma, and L. Yi, "Bavpm: Practical autonomous vehicle platoon management supported by blockchain technique," in 2019 4th International Conference on Intelligent Transportation Engineering (ICITE). IEEE, 2019, pp. 256–260.

[2]. A. K. Bhoopalam, N. Agatz, and R. Zuidwijk, "Planning of truck platoons: A literature review and directions for future research," Transportation Research Part B: Methodological, vol. 107, pp. 212–228, 2018.

[3]. J. Kang, Z. Xiong, D. Niyato, D. Ye, D. I. Kim, and J. Zhao, "Toward secure blockchain-enabled internet of vehicles: Optimizing consensus management using reputation and contract theory," IEEE Transactions on Vehicular Technology, vol. 68, no. 3, pp. 2906–2920, 2019.

[4]. H. Kim, J. Park, M. Bennis, and S.-L. Kim, "Blockchained on-device federated learning," IEEE Communications Letters, 2019.
[5]. N. Oren, T. J. Norman, and A. Preece, "Subjective logic and arguing with evidence," Artificial Intelligence, vol. 171, no. 10-15, pp. 838–854, 2007.

Qichao Xu, Ph.D, is an Assistant Professor in the School of Mechatronic Engineering and Automation, Shanghai University. He received the Ph.D. degree from Shanghai University, Shanghai, China, in 2019.
His research interests include Internet of Things, autonomous driving vehicles, and trust management. He has published more than 50 papers in prestigious journals such as IEEE TIFS, IEEE TMM, IEEE TITIS, IEEE TII, IEEE TVT, IEEE TBD and IEEE IoTs, in prestigious conferences such as IEEE ICC, IEEE INFOCOM.

MMTC Communications – Review Editorial Board

Multimedia Communications Technical Committee Officers

Chair: Jun Wu, Fudan University, China
Steering Committee Chair: Joel J. P. C. Rodrigues, Federal University of Piauí (UFPI), Brazil
Vice Chair – America: Shaoen Wu, Illinois State University, USA
Vice Chair – Asia: Liang Zhou, Nanjing University of Post and Telecommunications, China
Vice Chair – Europe: Abderrahim Benslimane, University of Avignon, France
Letters & Member Communications: Qing Yang, University of North Texas, USA
Secretary: Han Hu, Beijing Institute of Technology, China
Standard Liaison: Guosen Yue, Huawei, USA

MMTC examines systems, applications, services and techniques in which two or more media are used in the same session. These media include, but are not restricted to, voice, video, image, music, data, and executable code. The scope of the committee includes conversational, presentational, and transactional applications and the underlying networking systems to support them.