JOURNAL OF INFORMATION PROCESSING SYSTEMS JIPS

Future Trends of Blockchain and Crypto Currency: Challenges, Opportunities, and Solutions

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Abstract
The blockchain and crypto currency has become one of the most essential components of a communication network in the recent years. Through communication networking, we browse the internet, make VoIP phone calls, have video conferences and check e-mails via computers. A lot of researches are being conducting to address the blockchain and crypto currency challenges in communication networking and provide corresponding solutions. In this paper, a diverse kind of novel research works in terms of mechanisms, techniques, architectures, and frameworks have been proposed to provide possible solutions against the existing challenges in the communication networking. Such novel research works involve thermal load capacity techniques, intelligent sensing mechanism, secure cloud computing system communication algorithm for wearable healthcare systems, sentiment analysis, optimized resources.

Keywords
Blockchain and Crypto Currency, Cloud Computing, Sentiment Analysis, Internet of Things

1. Introduction

In the past decade, tremendous progress of blockchain and crypto currency in the communication networks has facilitated a seamless link between various network systems and electronic devices. Computationally low powered devices run processing intensive applications that rely on the cloud layer to support them. Innovations in communication technologies help its citizens to communicate with smart city networks providing valuable analysis on the operational efficiency of various smart city applications.

There is an increase in demand for services, and with it, there are challenges in blockchain and crypto currency such as privacy and security of data stored in the cloud layer, data leakage in the transmission of data, the cold start problem when seeking information from networks, and low battery problems of devices affecting continuous wireless connectivity with smart city networks.

This paper presents various models and methodologies which address different issues in communication networks such as dynamic thermal rating to solve the problem of unequal energy transmissions, fast-rough mode decision algorithm to reduce the computational complexity of HVEC

video coding standard, a data leakage pattern detection system using convolutional neural network algorithm and a cloud data security and privacy model using RSA algorithm and role-based access control. Especially, the research related to blockchain and crypto currency are introduced, which were found with significant contributions in main interested topics of Blockchain and Crypto Currency.

This paper is organized in three sections. Section 2 (Blockchain and Crypto Currency Research) introduces 19 high quality papers. In particular, these included papers mainly focused on various perspectives: thermal load capacity techniques, intelligent sensing mechanism, secure cloud computing system communication algorithm for wearable healthcare systems, sentiment analysis, optimized resources, and so on.

2. Blockchain and Crypto Currency Research

In this section, a diverse kind of solutions, such as approaches, processes, and frameworks to mitigate the existing challenges in the communication networking are introduced as regular magazine style papers. Such solutions involve various future track topic including thermal load capacity, intelligent sensing security, HEVC, sentiment analysis, machine learning, smart system, and so on. In the subsequent paragraphs, this paper describes each topic in a summarized way in terms of existing challenges and their solutions.

Song et al. [1] proposed a dynamic thermal rating technique to address the growing problem of unequal energy transmission in China. The primary disadvantage of transmission lines currently is the lack of transmission capacity which is limited by the maximum permissible operating temperature of the conductor. The proposed method improves the utilization of transmission capacity, and analysis results show that the thermal load potential of the transmission lines is efficiently extracted by dynamic thermal rating. The paper presents a theoretical foundation for increasing the absorptive capability of the power grid. The dynamic thermal rating demonstrates a theoretical foundation for improving the absorptive capacity of the power grid by allowing excavation of thermal load potential of transmission lines.

Meng et al. [2] developed a monitoring system for people with health problems using a belt that monitors the physical activity of a person using electrocardiogram sensors. The belt is integrated with on-body circuits and sensors to measure a user's vital signals. The belt sends its data through a circuit module via digital yarns to a mobile application using Bluetooth and helps in encouraging the user to increase their physical activity. The interactive application on the mobile device combined with persuasive functions inspires the user to be more active. A user is provided with real-time analysis of their activity and feedback on their status via the mobile application. Heart and activity data are analyzed using two signal processing algorithms. The proposed system's evaluation is done by conducting a user study.

HVEC, an efficient video coding standard which is highly efficient compared to other coding standards, has high computational complexity due to 35 different kinds of intra-prediction modes. Yao et al. [3] proposed a fast-rough mode decision mode algorithm (RMD), which reduces the complexity of HVEC coding standard by implementing the smoothness of up-reference pixels and the left-reference pixels. The candidate modes in HVEC are decreased from the existing 35 to 19 by comparing the up-reference and left-reference pixels. Computational complexity is reduced by implementing the three-step search method in the remaining 19 candidate modes and reduces them to 12–15 modes. Experimental results indicate RMD reduces 39.7% of the encoding time with negligible loss of BDPSNR (Bjontegaard delta

peak signal-to-noise ratio). The BDPR is increased by 1.35%.

Tedmori and Awajan [4] presented a survey of various existing methods applied for sentimental analysis on social media. The analysis based on subjective sentences helps to gauge a user's interest in a specific product, item, or brand. Subjective information is extracted from text present on social media and various methods are applied upon it, such as natural language processing, computational linguistics, and text analysis. The paper discusses the primary tasks and applications of sentiment analysis and provides an in-depth study of various sentiment analysis algorithms. Several algorithms, methodologies, and techniques present in the research literature are categorized and summarized to facilitate future research in the field of sentiment analysis.

Seo and Kim [5] proposed a data leakage pattern detection system using convolutional neural network (CNN) algorithm by defining the behavior of data leakage. Related patterns between security logs are first analyzed using association relationship analysis and then using a malicious behavior graph, data leakage is detected using CNN algorithm. The system can identify the attacker along with their malicious behavior from the results derived from the CCN algorithm. Evaluation results demonstrate the proposed system can successfully identify previously undefined malicious data leakage patterns. The proposed system detects data leakage with more flexibility compared to existing data leakage detection systems.

Cloud computing is used for data storage and running various information technology-based services. However, there is a growing concern for data privacy and security stored in the cloud layer. Mahmood et al. [6] proposed a model to secure data stored in the cloud by implementing an enhanced RSA encryption algorithm and a role-based access control model. The role-based access control model uses access control markup language to provide data access and security. Data encryption and decryption time and cost are reduced by applying the proposed cryptography concept for data storage and managing data access via the access control model. Experimental results show that the access model achieves encryption and decryption at the least time and lowest cost and improves the security of data stored in the cloud.

A study of Lee and Lee [7] proposed a method to reduce the false positive probability and membership query speed in Bloom filter. Additional special bloom filters are implemented to reduce false positives caused by the original bloom filter by handling them within the first memory. Evaluation results demonstrate reduced routing table lookup time by 28% compared with the original bloom filter. Implementing the hash table like approach where only values are stored, the membership query speed is faster when compared with the original Bloom filter. Results show a 58% reduced routing lookup time when compared with a hash table.

Event-B design pattern help in the quick development of a formal model of a system, but existing Event B-pattern design patterns lack formal behavior semantics. Peng et al. [8] proposed a method to transform the Event-B synchronous control flow design pattern into the labeled transition system (LTS) behavior model. They mapped the design pattern instantiation process of Event-B with the instantiation process of LTS model and verified the linear temporal logic (LTL) behavior properties of the LTS model. The LTS model of a complex multi-level control system is obtained using this process. Evaluation results demonstrate the proposed model simplifies the analysis and simulation of system behavior and makes the verification of behavior properties more convenient. It is more suitable to model, examine and verify the LTL behavior of the Event-B model.

Various available wearable sensor devices are deployed in the human body such as in the legs, arms, and the stomach for medical healthcare reasons. These devices have low battery power and replacing them is difficult due to the device being present inside the human body. Lee et al. [9] proposed a transmission power control algorithm (TPC) to improve the lifetime of the sensor device batteries by

reducing their energy consumption. The algorithm operates on a closed-loop tool which consists of two parts, sink devices, and sensor. TPC addresses both sink and sensor part of the devices to reduce power consumption over existing models such as linear, hybrid and ATPC, which only consider the sink part of the devices. TPC method assesses the current channel state based on the values of different body sensors. If the existing channel is not determined to be optimal, the sensor's batteries are conserved by devices managing their transmission power level without any communication.

Ni et al. [10] proposed an adaptive cooperative sensing strategy based on an estimated signal-to-noise ratio (SNR) for single user spectrums, which are susceptible to shadow effects, hidden terminals, and multipath effects. An adaptive double threshold energy detector is used when the SNR is higher than the selection threshold, otherwise, the cyclostationary feature is used. The detection accuracy improves when there is low SNR with low complexity. The transmission bandwidth is preserved by making the local sensing node transmit the observed results via the control channel to the fusion center and use the voting rule to make the decision. Simulation results demonstrate shortening of the average sensing time, improvement in the system detection probability, and a low increase in the costs of the sensing system.

Recommendation systems such as collaborative filtering assist in searching for information on the internet. However, exiting collaborative filtering methods face difficulties such as the cold start problem. Xinchang et al. [11] proposed a movie recommendation system using social network analysis and collaborative filtering. A relationship matrix between users is formed using their age, gender, and occupation. The matrix is applied to a cluster user using community detection based on edge betweenness centrality. Results show the proposed system suggests movies to users preferred by one group to another group. The total number of movies suggested is 20 and the best number of movies recommended is 5. The proposed method is effective using the Mean Absolute error and shows the best performance compared to k-NN and density-based clustering methods.

A study of Kan and Wang [12] proposed a Cyber-Physical System (CPS) architecture, which includes both physical and application layers for remote monitoring and warning system of dangerous chemicals. The CPS system addresses real-time perception, dynamic control, and information service of major hazardous substances. The terminal node using field collectors performs the data acquisition of sensors and video in the physical layer. The cloud layer completes the hazard classification and prediction of dangerous sources. Simulation results show that the CPS system is safe, effective, and it solves the problem of hazardous chemicals enterprise safety management.

Song et al. [13] presented a study to determine a user's life pattern using eye-tracking, SNS, and heterogeneous data and proposed an intuitive and precise user modeling. The study derives classification preference by analyzing eye tracking data and conducts eye-tracking experiments using various smart devices. The similarity between users is drawn using the Pearson correlation coefficient. The study results demonstrate that smart devices influence users. User modeling, eye tracking, and their preferences contribute to the research on the recommendation system, which accurately shows user tendencies. The model is 98.5% accurate using smart TV's and 96.5% accurate when using smartphones. Precise user similarity can be accomplished using biometric data and life pattern through clustering.

Li et al. [14] addressed the issues in the green supply chain management such as sustainable development, economic globalization, a holistic index framework. The authors proposed an index framework to solve the adaptive weight problem. The comparison of the TOPSIS (technique for order performance by similarity to ideal solution) shows that the adaptive weight D-S theory model in this paper is feasible and effective.

Joshi et al. [15] proposed 16-point FET DIF radix-2 algorithm, analyzed direct simulation methods for

ADC and DAC blocks. Authors also analyzed conversion of the signal from analog to digital signal. All things were simulated using Verilog or ModelSim simulator and verified with MATLAB.

Gu et al. [16] provided MTS-CBPSO method for introducing chaotic mapping and binary particle swarm optimization algorithm. This method applied for financial distress prediction of Chinese listed companies. It also applied for classification optimization target. Authors also compared with the traditional MTS and the common classification methods such as SVM, C4.5, k-NN and provided better result of prediction accuracy and dimensionality reduction.

Kwon et al. [17] applied long short-term memory (LSTM) model to classify cryptocurrency price time series. Authors used grid search-based k-fold cross validation technique applied to find the most suitable LSTM model parameters. Finally, authors compared f1-score values of LSTM model outperforms the gradient boosting model, machine learning model and provided good prediction performance for cryptocurrency price time series. Authors showed performance improvement 7% using LSTM Model over GB Model.

Jeong and Choi [18] presented a badge awarding system for performance assessment in education using blockchain technology. Authors also implemented the recruitment management platform using Open Badges and show badges online to a recruiter and this system is compatible with Open Badges of IMS Global Learning Consortium. It is used to earn, issue and award badges across various platforms. All badge awarding events in this system were recorded into a Blockchain, anyone can check the validity of the badge through the blockchain anytime.

3. Conclusion

This issue involved 19 novel and enhanced peer-reviewed papers from different countries in the world. This paper presents diverse kinds of paradigms to subjects, which tackle diverse kinds of research areas such as AI, thermal load capacity, intelligent sensing security, HEVC, sentiment analysis optimized resources, blockchain, digital image watermarking, human tracking technique, steganography software engineering, malware distribution networks, fingerprint matching, wireless sensor networks, semantic web, and so on.

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