CIT. Journal of Computing and Information Technology, Vol. 27, No. 2, June 2019, i–ii
doi: 10.20532/cit.2019.1004900

Editorial

The present June 2019 (Vol. 27, No. 2) issue of *CIT. Journal of Computing and Information Technology* brings four papers from the broad areas of computer networks and network security, and a paper from the area of algorithmics.

The topic of the paper *Practical Model Checking of a Home Area Network System: Case Study* by Soufiane Zahid, Abdeslam En-Nouaary and Slimane Bah is a special component of the Smart Grid architecture – the ICT based intelligent power network monitoring, optimizing and controlling all functional units from electricity generation to end-customers – which is the Home Area Network (HAN). It turns out that HANs are quite important Smart Grid components in that they can help reduce customer energy consumption and cost, and maximize transparency and reliability of the energy supply chain, hence the interest in their formal modeling and validation. In their paper the authors validate a previously devised SDL (Specification and Description Language) model for a HAN, using model checking techniques. They introduce a novel method to translate the former to a Promela model, which is subsequently used as the input to the state-of-the-art model checker SPIN. The authors point out how to obtain optimal results as well as how to find a balance between HAN model complexity on the one hand, and space and time limitations of model checking which otherwise lead to combinatorial explosion on the other.

In his paper *Load Balancing Dynamic Source Routing Protocol Based on Multi-Path Routing* Zhongping Chen investigates performance issues of Wireless Mesh Networks (WMNs) with respect to optimal routing and network load balancing. The author considers the basic routing protocol for wireless mesh networks HWMP (Hybrid Wireless Mesh Protocol), which is a hybrid protocol that uses both on-demand driven routing, itself providing flexibility, and table-driven routing, providing speed. However, HWMP relies too much on root node processing, making this latter susceptible to overloading. Therefore, the author proposes a novel Low Comprehensive Cost Metric (LCCM) that uses a multi-path multi-gateway shunting mechanism to mitigate the issue, effectively achieving an improved network load balancing performance as well as a higher network throughput. Simulation results show that this new protocol can effectively avoid node congestion and has better performance than existing protocols.

Intrusion Detection Systems (IDS) protect an organization's network infrastructure by identifying illegitimate users, attacks, as well as vulnerabilities. While current IDSs show low accuracy in ensuring reliable detection, knowledge-based IDSs alleviate this problem by performing regular updates of knowledge about the attacks within a network. Within this context, Adebukola Saidat Onashoga, Adio Taofeek Akinwale, Opeyemi Amusa and Gboyega Austin Adebayo propose a collaborative knowledge repository architecture for intrusion detection. In their paper titled *CK-RAID: Collaborative Knowledge Repository for Intrusion Detection System*, they introduce an architecture providing a secure knowledge base and a robust inference engine, whose main components comprise an intrusion detection system, a knowledge server and external modular components. *CK-RAID* is based on a distributed network of computer nodes, each with its individual IDS, with a centralized knowledge repository system, and firewall as the first line of defense against attacks. The architecture aims to optimize both attack detection and update rate of known and newly emerging attacks in order to refresh the respective knowledge and inference rules by timely and regularly classifying new alerts as attacks. The authors report a better detection rate of their system with respect to known standard solutions.

Phishing is a kind of cyber-attack that targets naive online users by tricking them into revealing sensitive information. One of the many classes of anti-phishing methods proposed to date is based on machine learning and deep learning. In their paper titled *A Phishing Webpage Detection Method Based on Stacked Autoencoder*, Jian Feng, Lianyang Zou and Tianzhu Nan describe a novel approach to anti-phishing, which uses a deep learning method, *i.e.* Stacked Autoencoder (SAE), to detect phishing Web pages. This phishing Web page detection model is based on features that are extracted from URL, source codes of HTML and third-party services to represent the basic characters of phishing Web pages. The authors make use of an innovative way of correlation coefficients calculation, which results in higher efficiency and feasibility. The reported results of experiments on sets of phishing and benign Web pages show improved performance of the proposed detection model over standard algorithms, indicating its effective applicability.

An important problem in algorithm optimization is performance improvement through parallelization and subsequent algorithm execution on multicore processors. Tausif Diwan and Jitendra Tembhurne address such an approach for a class of dynamic programming, *i.e*. Non-Serial Polyadic Dynamic Programming (NPDP), which turns out to be its most complex class, having dependencies across non-consecutive phases. As in dynamic programming computation proceeds phase-wise, subproblems in a phase are independent, thus allowing for a high degree of parallelization. This however doesn't apply equally to NPDP, where subproblems of each phase are dependent on the ones of the previous phases, eventually leading to load imbalance with respect to the mapping of subproblems onto processor cores. In their paper titled *A Parallelization of Non-Serial Polyadic Dynamic Programming on GPU* the authors thus propose a novel adaptive method, named Generalized Mapping Method (GMM), for NPDP parallelization utilizing a multi-core processor (specifically a GPU) for efficient mapping of subproblems onto processing threads in each phase. According to the authors, this method achieves a significant speedup of a factor 30 over conventional state-of-the-art approach.

Vlado Glavinić
Editor-in-Chief