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Editorial

The second issue of *CIT*'s Vol. 28 (Vol. 28, No. 2, June 2020), which is presently before you, is regretfully being published with a greater delay caused by the special circumstances of the prolonged coronavirus pandemic in which its preparation took place. Through the joint efforts of our editors' team, as well as the editorial staff and our trusty technical support, we have nevertheless managed to maintain the continuity of publishing, additionally focusing our efforts in the coming period on resolving the current backlog.

Furthermore, as part of a recent reinforcement of our editorial team, we have also enlarged the Associate Editors' team with two new colleagues. I am pleased to announce that Boris Milašinović and Tomislav Petković Jr. joined *CIT*'s publishing effort by taking over the editing of broader areas of software engineering, and of image processing, respectively.

As for the issue's content, this June 2020 issue of *CIT. Journal of Computing and Information Technology* brings five papers from the regular section, which focus on topics from the areas of computer networks, network security, software engineering, machine learning, and robotics.

In the first paper of the issue, Darko Skorin-Kapov and Jadranka Skorin-Kapov address the topic of allocating the cost of a network formed to provide some service between all pairs of network nodes, which is a situation occurring in transportation (*e.g.* network of roads or trains), as well as in telecommunication networks (*e.g.* P2P architectures). Their paper titled *Network Connectivity Game* considers the cost allocation problem formulated as a cooperative game. Within such a framework, they introduce two novel aspects of modeling in networks, namely that the tree network solving the communication problem has no specific source, and that players are pairs of nodes. The authors then provide an efficient algorithm to find some cost allocations in the core of the above game, along with discussing the Egalitarian Network Cost Allocation rule which finds additional core points and prevents a free ride for any player.

The paper *A Markov-Based Intrusion Tolerance Finite Automaton* by Fengquan Li deals with network security, and specifically with network intrusion issues. It focuses on network security maintenance provided by intrusion tolerance technology, enabling an invaded network server to repair itself while providing necessary services. The author optimizes an existing intrusion tolerance model – the Scalable Intrusion-Tolerant Architecture (SITAR) – by deriving an intrusion tolerance Non-Deterministic Finite Automaton (NDFA) for it, so as to model the stochastic and unpredictable intrusion behavior. Through consequently quantifying this automaton by Markov theory, stable probabilities of each state are then computed, eventually producing both theoretical guidance and basis for administrators to better safeguard network security. The proposed model extends the maintenance time at key state nodes, making it harder to invade the system, thus making the system model more secure.

Zhihua Zhang and Yongmin Mu consider the all-important stage of software testing within the software development process, which is the key to both ensuring software quality and improving software reliability. In their paper, titled *Fault Localization Based on Hybrid Genetic Simulated Annealing Algorithm*, they model fault localization as a combinatorial optimization problem, using the function call path as a starting point. While traditional software testing mainly bases on manual testing, automated testing provides a number of improvements in testing efficiency, reliability, and adequacy. In order to avoid the usual shortcomings of locating software defects when using genetic algorithms, namely their poor local search ability when solving search problems along with the explosive increase of the number of paths obtained at the code level, the authors introduce a fault localization method based on a hybrid genetic simulated annealing algorithm. This method uses the correlation degree between functions in the function call path as a penalty factor of the algorithm's fitness function for constructing the initial population and fitness function required by the algorithm. Experimental results show a good effect on both single fault and multi-fault localization.

Research of nonlinear systems stems from the fact that most of real-world physical systems are nonlinear in nature, here including industrial processes, control systems, economic data, biology and life sciences, medicine, and social systems. Identifying and measuring the mathematical model of such a system is denoted as nonlinear system identification (NSI). The authors of the next paper, *A Nonlinear System Identification Method Based on Adaptive Neural Network*, Junju Sun and Liyun Lin, center their research on NSI by applying neural networks. Since neural networks exhibit limitations regarding accuracy and training speed, they propose an improved method basing on adaptive neural networks. Within their approach, the authors construct a generic nonlinear system identifier, including both error feedback and correction of predictive control. Experimental results obtained on three nonlinear systems show that their radial basis function neural network (RBFNN) optimized by adaptive particle swarm optimization (PSO) achieves a constrained number of iterations as well as a smaller identification error and better performance than traditional RBFNNs.

In the last paper of this issue, Suhaila N. Mohammed and Alia K. Abdul Hassan offer a survey on emotion recognition from a multimodal perspective of Human-Robot Interaction (HRI) in the homonymous paper *A Survey on Emotion Recognition for Human Robot Interaction*. The authors focus on the concept of the emotional robot, capable of recognizing human's emotions, hence being able to support a more natural and in fact more humane interaction. In this respect, they focus the survey on two main issues: the main challenges to be solved when building emotional HRI systems, and the identification of the sensing modalities providing emotion detection. After a short review of known psychological emotion models, followed by a discussion of issues faced in emotion recognition for HRI, a more thorough consideration of emotion recognition channels is presented, classifying them into unimodal (facial expression, speech, body language, bio-signals, text) and multimodal ones, with the latter applying characteristic methods for combining unimodal channels, so-called fusion methods (data-level, feature-level, decision-level). Additionally, providing numerical data on emotion recognition efficiency, along with a comparison of HRI emotion recognition systems, the authors also offer a number of recommendations meant to guide the development of such systems.

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Editor-in-Chief