

Highlighted Activities of ICTCC 2016

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Abstract

The Second International Conference on Nature of Computation and Communication (ICTCC 2016) is jointly organized by EAI, Nguyen Tat Thanh University (NTTU), and Kien Giang University (KGU) and endorsed by the European Alliance for Innovation (EAI), a leading community-based organization devoted to the advancement of innovation in the field of ICT. The event consists of a main track on nature-inspired computation and communication, and two special tracks on “modeling contextual systems” and on “nature of computation and communication in image processing and visualization”, respectively. Especially, there are three keynote speeches, which will be presented at ICTCC 2016 by prominent invited speakers

Keywords: Nature-inspiration, Nature-inspired computation, Nature-inspired communication

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1. Introduction

The Second International Conference on Nature of Computation and Communication (ICTCC 2016) [1] jointly organized by EAI, Nguyen Tat Thanh University (NTTU), and Kien Giang University (KGU) is a place for highly original ideas about how nature-inspiration is going to shape networked computing systems of the future. Hence, it focuses on rigorous approaches and cutting-edge solutions which break new ground in dealing with the properties of nature-inspiration. Its purpose is to make a formal basis more accessible to researchers, scientists, professionals and students as well as developers and practitioners in ICT by providing them with state-of-the-art research results, applications, opportunities and future trends. For this second edition, we hope to repeat the success of previous year, when the conference received many papers and the participation of a large number of students, researchers, and professionals from all over the world.

Relevant topics include the following:

- Fundamentals of nature-inspiration
- Nature-inspired computation
- Nature-inspired communication

The event is endorsed by the European Alliance for Innovation (EAI), a leading community-based organization devoted to the advancement of innovation in the field of ICT. All accepted papers will be published by Springer and made available through SpringerLink Digital Library, one of the world’s largest scientific libraries. The proceedings are submitted for inclusion to the leading indexing services: DBLP, Google Scholar, Thomson Scientific ISI Proceedings, EI Elsevier Engineering Index, CrossRef, Scopus, as well as ICST’s own EU Digital Library (EUDL).

2. Special Tracks

Special tracks in ICTCC 2016 will provide a meeting for presenting novel ideas in a possibly more focused way than the conference itself. Its aim is to engage in active exchange, interaction, and comparison of approaches, methods, and ideas related to specific topics, both theoretical and applied, in the general area of nature-inspiration.

2.1. Track on modeling contextual systems

This track tries to be meeting point where researchers and practitioners in areas of modeling contextual

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systems (such as cyber-physical systems, multiagent systems, cellular automata and so on) can have the opportunity to present current research results, to share their research achievements and solutions, and to look for new idea of modeling contextual systems.

Relevant topics include the following:

- Modeling cyber-physical systems
- Modeling multiagent based system
- Modeling based on cellular automata
- Modeling based on morphology operators
- Modeling based on aggregation operators
- Modeling based on image processing operators
- Modeling based on natural language processing
- Modeling based on software engineering

2.2. Track on nature of computation and communication in image processing and visualization

The vision of this track is focused on nature-inspired computation and communication for image processing and visualization in both theoretical and empirical aspects.

Relevant topics include the following:

- Image Registration and Video Coding
- 3D and 4D Image Processing
- Object Detection, Recognition and Tracking
- Video Surveillance
- Motion Detection and Estimation
- Mobile Applications with Image Sensor
- Medical Applications
- Simulation, computer vision
- Signal, Image and Video Processing
- Image and Video Segmentation

3. Keynote Speeches

The keynote speeches establish the framework for the technical program of ICTCC 2016. This year we choose three prominent invited speakers, Prof. Leonard Barolli at Fukuoka Institute of Technology in Japan, Prof. Phan Cong Vinh from Nguyen Tat Thanh University in Vietnam and Researcher Pandian Vasant at Universiti Teknologi PETRONAS in Malaysia.

3.1. Application of Genetic Algorithms for MANETS and Wireless Mesh Networks

Prof. Leonard Barolli at Fukuoka Institute of Technology (FIT) in Japan will give a talk at ICTCC 2016 on a hot topic of genetic algorithm with the title of “Application of Genetic Algorithms for MANETS and Wireless Mesh Networks”

In this talk, he presents the application of Genetic Algorithms (GAs) for QoS Routing in Mobile Ad-hoc Networks (MANETS) and node placement in Wireless Mesh Networks (WMNs). In general, most of routing solutions in MANETS deal with the best effort data traffic. Connections with Quality of Service (QoS) requirements, such as voice channels with delay and bandwidth constraints, are not supported. The QoS routing has been receiving increasingly intensive attention, but searching for the shortest path with many metrics is an NP-complete problem. For this reason, approximated solutions and heuristic algorithms should be developed for multi-path constraints QoS routing. Also, the routing methods should be adaptive, flexible, and intelligent. Therefore, he uses Genetic Algorithms (GAs) and Multi-objective Optimization for QoS routing in MANETS. In WMNs, several optimization problems are appearing. Such problems are related to optimizing network connectivity, coverage and stability. The solution of these problems turns out to be crucial for optimized network performance. In the case of WMNs, such problems include computing placement of mesh router nodes so that network performance is optimized. However, as these optimization problems are known to be computationally hard to solve, GAs have been recently investigated as effective resolution methods. In this research, he implements two simulation systems: one for MANETS (called GAMAN) and another one for WMNs (called WMN-GA). Both simulation systems are based on GAs. He evaluates both approaches by computer simulations. In this study, he gives a comparison study between GA-based routing algorithms: GAMAN and GLBR. The performance evaluation via simulations shows that the GAMAN algorithm has better behavior than previous GAMAN-1 and GLBR algorithms and is a promising algorithm for QoS routing in MANETS.

He evaluates the performance of WMN-GA for different settings in order to judge the suitability of solving mesh router nodes problem. He considers a bi-objective optimization consisting in the maximization of the size of the giant component in the mesh routers network (for measuring network connectivity) and that of user coverage. He uses a benchmark of instances (varying from small to large size) generated using different distributions of mesh node clients. In order to evaluate the performance of the proposed genetic operators, he uses different distributions of client and mesh routers (Uniform, Normal, Exponential and

Weibull). He shows by simulations that both systems have a very good behavior and they successfully can be used for MANETs QoS routing and node placement problem in WMNs.

3.2. Algebraically Autonomic Computing

Prof. Phan Cong Vinh at Nguyen Tat Thanh University in Vietnam will give a talk at ICTCC 2016 on a hot topic of autonomic computing with the title of “Algebraically Autonomic Computing”

Autonomic computing (AC) is characterized by self-* such as self-configuration, self-healing, self-optimization, self-protection and more which run simultaneously in autonomic systems (ASs). Hence, self-* is a set of self- \mathcal{S} s. Each self- in self-* is called self-* action. A way to interpret self-* is to say that self-* actions are running on ASs. In this talk, algebraic objects called monoids are tasked with encoding the self-* action \mathcal{S} s perspective in all this, i.e. what the self-* action can do, and what happens when different self-* actions are done in succession.

3.3. Computational Intelligence (CI) and Its Application in Engineering and Computer Science

Researcher Pandian Vasant at Universiti Teknologi PETRONAS in Malaysia will give a talk at ICTCC 2016 on a hot topic of computational intelligence with the title of “Computational Intelligence (CI) and Its Application in Engineering and Computer Science”

Computational Intelligent techniques have been successfully applied to many aspects of Engineering and Computer Science. For example, as reported in the literature, Gravitational search algorithm (GSA), Genetic

algorithm (GA), Particle swarm optimization (PSO), Ant colony optimization (ACO), Bat Algorithm (BA), Fire Fly (FF), Evolutionary algorithm (EA) and several hybrid swarm evolutionary algorithms have been adopted to handle complex and uncertain real world optimization problems. On the other hand, advances in hybrid optimization techniques, an important section in Computational Intelligence and Soft Computing, also assist optimization algorithm experts to develop better methods. For instance, hybrid algorithm has been utilized for finding the relationship among decision variables for optimizers. In order to bridge the concepts and methodologies from the two ends, this talk focuses on the related topics of integrating and utilizing algorithms in computational intelligent techniques and their applications in Engineering and Computer Science. It provides the opportunity for practitioners handling their complicated real world issues by using Computational Intelligent optimization methodologies and for researchers to realize the significant contribution to the body of the knowledge to share findings and look into future directions. This talk aims at providing holistic state-of-the-art Computational Intelligent optimization techniques in Engineering and Computer Science, developing the cutting hedge optimization techniques by using modern and classical approaches, as well as exchanging of related ideas and discussing the future directions.

References

- [1] ICTCC 2016: [HTTP://ICTCC.ORG/2016/SHOW/HOME](http://ictcc.org/2016/show/home)