ICCS 2017 Workshop on Agent-Based Simulations, Adaptive Algorithms and Solvers

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Abstract

This workshop seeks to integrate results from different domains of computer science, computational science, and mathematics. We welcome simulation papers, either hard simulations using finite element or finite difference methods, or soft simulations by means of evolutionary computations, and related methods. The workshop focuses on simulations performed by using (a) agent-oriented systems; or (b) adaptive algorithms. Simulations performed by other kind of systems are also welcome. An agent-oriented system seems are attractive tools useful for numerous domains of applications. Adaptive algorithms significantly decrease on the computational cost by investing computational resources when needed by the problem.

Keywords: Agent-based simulations, Adaptive algorithms, Solvers

1 In memory of the profesor Krzysztof Cetnarowicz

We honor the memory of Professor Krzysztof Cetnarowicz, a co-chairman of our workshop, who passed away on January 30, 2017. Professor Krzysztof Cetnarowicz graduated from AGH University of Science and Technology, Faculty of Mining and Metallurgy Electrotechnics in 1971. He obtained the Ph.D. at the Faculty of Electrotechnics, Automatics, and Electronics in 1977 and D.Sc. (habilitation) in 1999 at the Faculty of Electrotechnics, Automatics, Computer Science, and Electronics. He earned the Professor title in 2014 at the Faculty of Computer Science, Electronics, and Telecommunications. His whole academic career was strongly connected with the well-known Polish Technical Universities, namely the AGH University of Science and Technology. He also studied mathematics at the Jagiellonian University.

Professor Krzysztof Cetnarowicz was a well-known scholar in the field of decentralized and agent-based systems. He introduced several new ideas, mixing the mathematical precision with his imagination to explore new fields of computer sciences. One of his best-known ideas, was the idea of M-agent [1, 2], a deliberative kind of agent that perceives the events in the environment, builds its model of the environment, prepares appropriate strategies and acts according to those, affecting the environment. His last monograph published in 2012 was dedicated to this idea [3].

Applications of M-agents include simulations and optimization of transport networks, task allocations, industrial planning, service-oriented architectures, as well as route planning for mobile robots. Another idea of Professor Cetnarowicz was his idea of Evolutionary Multi-Agent System (EMAS) proposed in 1996. This computing paradigm coupling evolutionary and agent-based approaches was used by a community of his colleagues and students. The idea of EMAS consists of treating the evolutionary individual as an agent, an autonomous being, perceiving the environment, interacting with other agents (carrying the solutions) and working towards the solution. One of the remarkable mechanisms of EMAS is the distributed selection. It becomes more related to the biological one than the selection in the classical Evolutionary Algorithms. Namely, the agents possess a certain amount of allocated resource, called the energy. They exchange this energy during meetings, when the energy flows from the worse agents to the better ones. Now, when the energy of some agent exceeds a certain level, it may reproduce with another agent, creating an offspring as a combination of their solutions, and passing to the offspring enough energy to begin its life in the same conditions as the parents did.

The introduction of the EMAS methodology resulted in four Ph.D. thesis, two D.Sc. habilitations, dozens of publications and M.Sc. theses, as well as it generated dedicated software platforms implemented in languages like Java, Scala, Erlang or Python. Finally, a dedicated formal model was prepared based on the Markov Chains and the theory of Michael Vose. The EMAS may be perceived as one of the first memetic algorithms, following the works of Pablo Moscato, as it consists of individuals that exchange certain knowledge, and use it individually when pursuing their goals of searching for the optimum of the fitness function. Professor Krzysztof Cetnarowicz was a visiting professor at the Technical University of Belfort Montbeliard (France). He has been a member of the PCs of over 20 conferences, a reviewer of grants at the National Czech Agency of the Czech Republic, Polish National Science Centre grants, and a member of the diploma examination board at the University of Ostrava VSB (Czech Republic) and a member of the Scientific Board of Institute of Computer Science on Polish Academy of Science (IPI PAN). He published over one hundred scientific works, printed as conference proceedings, journal articles, monographs, and patents. He worked as a reviewer at many research projects, articles, Ph.D. and D.Sc. theses. In the recent years, he led Intelligent Information Systems Group working at the Department of Computer Science, AGH University of Science and Technology. He was always kind and helpful, very cordial and supportive to all of his colleagues and students.

References

[1] K. Cetnarowicz, M-agent architecture based method of development of multiagent systems, Proc. of the 8th Join EPS-APS International Conference on Physics Computing, Krakow (1996)

[2] K. Cetnarowicz, P. Gruer, V. Hilaire, A. Koukam, A formal specification of M-agent architecture, International Workshop of Central and Eastern Europe on Multi-Agent Systems, (2001) 62-72

[3] K. Cetnarowicz, Agent paradigm in computer science : concepts, bases and applications, Studies on Computational Intelligence, Springer, (2015) 1-130