Plenary Lecturer II

RFID Network Optimization Using Swarm Intelligence Algorithms

Milan Tuba

John Naisbitt University
Faculty of Computer Science
Belgrade, SERBIA
E-mail: tuba@ieee.org

Radio frequency identification (RFID) technology has been recently widely adopted in many fields such as logistics, production, supply chain management, asset tracking etc. RFID systems consist of tags and readers which communicate with each other by radio waves through antennas. Tags are cheap and passive, attached to the items that are subject of tracking, while readers are more expansive and powered. Tags respond by backscattering portion of the received reader's signal. Sufficient number of readers should be deployed with the goal of establishing a coverage of the tags in the respective domain. Multiobjective RFID network planning problem (MORNP) is a hard optimization problem which deals with a set of objectives (tag coverage, load balance, economic efficiency, readers' interferences, etc.) by adjusting the control variables (readers' coordinates, the number of readers, antenna parameters, etc.) of the system. Population based stochastic metaheuristics have been successfully used to tackle this problem. Swarm intelligence is one branch of such nature inspired metaheuristics that has been applied to the MORNP optimization. In most implementations a weighted coefficients approach was used to transform MORNP optimization into a single-objective case. However, hierarchical approach can be more promising since objective functions are usually ordered in such a way that, for example, it does not make sense to reduce power if the coverage would be jeopardized. Additionally, the number of deployed readers as an optimization parameter has to be treated separately. Stochastic optimization algorithms in the process of exploitation (intensification) mutate optimization parameters with the goal of staying close to the good known solutions. However, changing the number of readers (which is an integer parameter) destroys previous search information, effectively introducing exploration (diversification). This lecture will show few successful swarm intelligence applications to the multiobjective RFID network planning problem.

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Brief Biography of the Speaker: Milan Tuba is the Dean of Graduate School of Computer Science and Provost for mathematical, natural and technical sciences at John Naisbitt University. He received B. S. in Mathematics, M. S. in Mathematics, M. S. in Computer Science, M. Ph. in Computer Science, Ph. D. in Computer Science from University of Belgrade and New York University. From 1983 to 1994 he was in the U.S.A. first as a graduate student and teaching and research assistant at Vanderbilt University in Nashville and Courant Institute of Mathematical Sciences, New York University and later as Assistant Professor of Electrical Engineering at Cooper Union School of Engineering, New York. During that time he was the founder and director of Microprocessor Lab and VLSI Lab, leader of scientific projects and theses supervisor. From 1994 he was Assistant Professor of Computer Science and Director of Computer Center at University of Belgrade, from 2001 Associate Professor, Faculty of Mathematics, University of Belgrade, and from 2004 also a Professor of Computer Science and Dean of the College of Computer Science, Megatrend University Belgrade. He was teaching more than 20 graduate and undergraduate courses, from VLSI Design and Computer Architecture to Computer Networks, Operating Systems, Image Processing, Calculus and Queuing Theory. His research interest includes mathematical, queuing theory and heuristic optimizations applied to computer networks, image processing and combinatorial problems. Professor Tuba is the author or coauthor of more than 150 scientific papers and coeditor or member of the editorial board or scientific committee of number of scientific journals and conferences. Member of the ACM, IEEE, AMS, SIAM, IFNA.