## **Information Science**

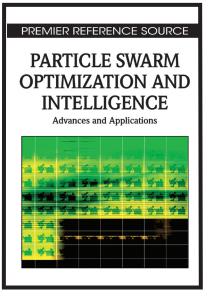
# REFERENCE

The premier reference source for computer science and information technology management

# New Release

## January 2010

### Particle Swarm Optimization and Intelligence: Advances and Applications



"This book provides a unified presentation of the most established PSO variants, from early precursors to concurrent state-of-the-art approaches."

- Konstantinos E. Parsopoulos, University of Ioannina, Greece & Michael N. Vrahatis, University of Patras, Greece

#### Subject:

Artificial Intelligence; Swarm Intelligence; Machine Learning; Particle Swarm Optimization

#### Market:

This essential publication will be invaluable to academic and research libraries as well as graduate and undergraduate students interested in particle swarm optimization and relative approaches. This book will also be a useful reference for researchers and scientists that employ heuristic algorithms for problem solving in science and engineering.



Excellent addition to your library! Recommend to your acquisitions librarian.

By: Konstantinos E. Parsopoulos, University of Ioannina, Greece & Michael N. Vrahatis, University of Patras, Greece

> 13-digit ISBN: 978-1-61520-666-7 378 pages; 2010 Copyright Price: US \$180.00 (hardcover\*) Perpetual Access: US \$270.00 Print + Perpetual Access: US \$360.00 Illustrations: figures, tables (8 1/2" x 11") Translation Rights: World

\*Paperback is not available.

Since its initial development, particle swarm optimization has gained wide recognition due to its ability to provide solutions efficiently, requiring only minimal implementation effort.

Particle Swarm Optimization and Intelligence: Advances

**and Applications** examines modern intelligent optimization algorithms proven as very efficient in applications from various scientific and technological fields. Providing distinguished and unique research, this innovative publication offers a compendium of leading field experiences as well as theoretical analyses and complementary techniques useful to academicians and practitioners.

### Particle Swarm Optimization and Intelligence: Advances and Applications

By: Konstantinos E. Parsopoulos, University of Ioannina, Greece & Michael N. Vrahatis, University of Patras, Greece

#### **Table of Contents**

Part I – Theory and Methods 56 Rounding techniques for integer optimization			
		5.6.	Rounding techniques for integer optimization
1.	Introduction	5.7.	Chapter synopsis
1. 1.1.	What is optimization?	5.8.	References
1.1. 1.2.	Types of optimization problems		
	Classification of optimization algorithms	Part II -	– Applications of Particle Swarm Optimization
1.3.	The development of evolutionary computation		
1.4.		6.	Applications in Machine Learning
1.5.	Fundamental evolutionary operations	6.1.	Introduction
1.6.	Swarm intelligence	6.2.	Training artificial neural networks with PSO
1.7.	The No-Free-Lunch theorem	6.3.	Fuzzy cognitive maps learning with PSO
1.8.	Chapter synopsis	6.4.	Chapter synopsis
1.9.	References	6.5.	References
2.	Particle Swarm Optimization	7.	Applications in Dynamical Systems
2.1.	Main inspiration source	7.1.	Introduction
2.2.	Early variants of PSO	7.2.	Detection of periodic orbits of nonlinear mappings using PSO
2.3.	Further refinement of PSO	7.3.	Detection of periodic orbits in 3-dimensional galactic potentials using
2.4.	Contemporary standard PSO	PSO	Detection of periodic orbits in 5 dimensional galactic perentials using
2.5.	Chapter synopsis	7.4.	Chapter synopsis
2.6.	References	7.4. 7.5.	References
		/.3.	Acjoi otacis
<i>3</i> .	Theoretical Derivations and Application Issues	8.	Applications in Operations Research
3.1.	Initialization techniques	8.1.	Introduction
3.2.	Theoretical investigations and parameter selection	8.2.	Scheduling problems
3.3.	Design of PSO algorithms using computational statistics	8.3.	Continuous review inventory optimization
3.4.	Termination conditions	8.4.	Game theory problems
3.5.	Chapter synopsis	•	Chapter synopsis
3.6.	References	8.5. 8.6.	References
5.01		0.0.	Rejerences
4.	Established and Recently Proposed Variants of Particle Swarm Optimi-	9.	Applications in Bioinformatics and Medical Informatics
zation		9.1.	Introduction
4.1.	Unified particle swarm optimization	9.1. 9.2.	Calibrating probabilistic neural networks
4.2.	Memetic particle swarm optimization	9.2. 9.3.	Tackling magnetoencephalography problems
4.2.1.	Fundamental concepts of memetic algorithms	9.3. 9.4.	Chapter synopsis
4.2.2.	Recently proposed memetic PSO schemes		References
4.3.	Vector evaluated particle swarm optimization	9.5.	Rejerences
4.4.	Composite particle swarm optimization: a meta-strategy approach	10	Ann lighting in Mains and Demania Environments
4.5.	Guaranteed convergence particle swarm optimization	10.	Applications in Noisy and Dynamic Environments
4.5. 4.6.	Cooperative particle swarm optimization	10.1.	Optimization in the presence of noise
4.0. 4.7.	Niching particle swarm optimization	10.2.	Optimization in continuously changing environments
4./. 4.8.	TRIBES	10.3.	Chapter synopsis
4.8. 4.9.	Quantum particle swarm optimization	10.4.	References
	Chapter synopsis		And the stand of the birther Country's 1 (1961) and 1
4.10.	References	11.	Applications in Multiobjective, Constrained and Minimax Problems
4.11.	Rejerences	11.1.	Application in multiobjective optimization
-	Portormance Enhancing Techniques	11.2.	Application in constrained optimization
5.	Performance-Enhancing Techniques Introduction	11.3.	Application in minimax optimization
5.1.		11.4.	Chapter synopsis
5.2.	The stretching technique for alleviating local minimizers	11.5.	References
5.3.	The deflection technique for detecting several minimizers		
5.4.	The repulsion technique	12.	Afterword
5.5.	The penalty function technique for constrained optimization problems		
	Aŗ		ÎX A
	Appendix B		

#### About the Authors:

**Konstantinos E. Parsopoulos** received his Diploma in Mathematics, with specialty in Computational Mathematics and Informatics, in 1998 from the Department of Mathematics, University of Patras, Greece, and his PhD degree in Intelligent Computational Optimization in 2005 from the Departments of Mathematics and Computer Engineering & Informatics, University of Patras, Greece. He served as a Lecturer with the Department of Mathematics, University of Patras, Greece, from May 2008 to September 2009. He is currently an Assistant Professor with the Department of Computer Science, University of Ioannina, Greece. His research is focused on Intelligent Computational Optimization algorithms with an emphasis on Swarm Intelligence and Evolutionary Computational paproaches. He has served as a member of the editorial board of 2 international scientific journals, as well as of the technical and program committee in 13 international conferences. Also, he has served as reviewer for 24 scientific journals, as well as for the Portuguese Foundation for Science and Technology (FCT). He has participated in national and international research projects, and he is a member of ACM and IEEE since 2005 and 1999, respectively.

Michael N. Vrahatis received his PhD in Computational Mathematics (1982) from the University of Patras, Greece. His work includes topological degree theory, systems of nonlinear equations, numerical and intelligent optimisation, data mining and unsupervised clustering, cryptography and cryptanalysis as well as computational and swarm intelligence. He is a Professor of Computational Mathematics in the University of Patras, since 2000 and serves as Director of the Computational Intelligence Laboratory of the same Department (since 2004). He is/was a member of the editorial board of eight international journals. His work consists of over 330 publications (122 papers in referred international scientific journals, and 209 papers in books, edited volumes and conference proceedings) that has been cited by researchers over 3500 times (co-authors citations excluded).

Excellent addition to your library! Recommend to your acquisitions librarian.

#### www.info-sci-ref.com