

# Table of Contents

A <i>MAX-MIN</i> Ant System for the University Course Timetabling Problem . . . . .	1
<i>Krzysztof Socha, Joshua Knowles, Michael Sampels</i>	
ACO Applied to Group Shop Scheduling: A Case Study on Intensification and Diversification . . . . .	14
<i>Christian Blum</i>	
Agent-Based Approach to Dynamic Task Allocation . . . . .	28
<i>Shervin Nouyan</i>	
An Ant Colony Optimization Algorithm for the 2D HP Protein Folding Problem . . . . .	40
<i>Alena Shmygelska, Rosalía Aguirre-Hernández, Holger H. Hoos</i>	
An Experimental Study of a Simple Ant Colony System for the Vehicle Routing Problem with Time Windows . . . . .	53
<i>Ismail Ellabib, Otman A. Basir, Paul Calamai</i>	
Ant Algorithms for Assembly Line Balancing . . . . .	65
<i>Joaquín Bautista, Jordi Pereira</i>	
Ant Colonies as Logistic Processes Optimizers . . . . .	76
<i>Carlos A. Silva, Thomas A. Runkler, João M. Sousa, Rainer Palm</i>	
Ant Systems for a Dynamic TSP (Ants Caught in a Traffic Jam) . . . . .	88
<i>Casper Joost Eyckelhof, Marko Snoek</i>	
Anti-pheromone as a Tool for Better Exploration of Search Space . . . . .	100
<i>James Montgomery, Marcus Randall</i>	
Applying Population Based ACO to Dynamic Optimization Problems . . . .	111
<i>Michael Guntsch, Martin Middendorf</i>	
Cross-Entropy Guided Ant-Like Agents Finding Cyclic Paths in Scarcely Meshed Networks . . . . .	123
<i>Otto Wittner, Bjarne E. Helvik</i>	
Insertion Based Ants for Vehicle Routing Problems with Backhauls and Time Windows . . . . .	135
<i>Marc Reimann, Karl Doerner, Richard F. Hartl</i>	
Modelling ACO: Composed Permutation Problems . . . . .	149
<i>Daniel Merkle, Martin Middendorf</i>	

Self-Organized Networks of Galleries in the Ant Messor Sancta ..... 163  
*Jérôme Buhl, Jean-Louis Deneubourg, Guy Theraulaz*

Solving the Homogeneous Probabilistic Traveling Salesman Problem  
 by the ACO Metaheuristic ..... 176  
*Leonora Bianchi, Luca Maria Gambardella, Marco Dorigo*

Toward the Formal Foundation of Ant Programming ..... 188  
*Mauro Birattari, Gianni Di Caro, Marco Dorigo*

Towards Building Terrain-Covering Ant Robots ..... 202  
*Jonas Svennebring, Sven Koenig*

**Short Papers**

A New Ant Colony Algorithm Using the Heterarchical Concept Aimed  
 at Optimization of Multim minima Continuous Functions ..... 216  
*Johann Dréo, Patrick Siarry*

An Ant-Based Framework for Very Strongly Constrained Problems ..... 222  
*Vittorio Maniezzo, Matteo Milandri*

Analysis of the Best-Worst Ant System and Its Variants on the QAP ..... 228  
*Oscar Cordón, Iñaki Fernández de Viana, Francisco Herrera*

Ants and Loops ..... 235  
*Geoffrey Canright*

Candidate Set Strategies for Ant Colony Optimisation ..... 243  
*Marcus Randall, James Montgomery*

Dynamic Wavelength Routing in WDM Networks via Ant Colony  
 Optimization ..... 250  
*Ryan M. Garlick, Richard S. Barr*

Homogeneous Ants for Web Document Similarity Modeling  
 and Categorization ..... 256  
*Kok Meng Hoe, Weng Kin Lai, Tracy S.Y. Tai*

Parallel Ant System for the Set Covering Problem ..... 262  
*Malek Rahoual, Riad Hadji, Vincent Bachelet*

Real-World Shop Floor Scheduling by Ant Colony Optimization ..... 268  
*Andre Vogel, Marco Fischer, Hendrik Jaehn, Tobias Teich*

Simulation of Nest Assessment Behavior by Ant Scouts ..... 274  
*Erol Şahin, Nigel R. Franks*

Using Genetic Algorithms to Optimize ACS-TSP ..... 282  
*Marcin L. Pilat, Tony White*

**Posters**

A Method for Solving Optimization Problems in Continuous Space Using Ant Colony Algorithm .....	288
<i>Chen Ling, Sheng Jie, Qin Ling, Chen Hongjian</i>	
A Nested Layered Threshold Model for Dynamic Task Allocation .....	290
<i>Tom De Wolf, Liesbeth Jaco, Tom Holvoet, Elke Steegmans</i>	
ACO Algorithm with Additional Reinforcement .....	292
<i>Stefka Fidanova</i>	
Ant Colony System for Image Segmentation Using Markov Random Field .....	294
<i>Salima Ouadfel, Mohamed Batouche, Catherine Garbay</i>	
Bidimensional Shapes Polygonalization by ACO .....	296
<i>Ugo Vallone</i>	
Coevolutionary Ant Algorithms Playing Games .....	298
<i>Jürgen Branke, Michael Decker, Daniel Merkle, Hartmut Schmeck</i>	
GAACO: A GA + ACO Hybrid for Faster and Better Search Capability ..	300
<i>Adnan Acan</i>	
GPS Positioning Networks Design: An Application of the Ant Colony System .....	302
<i>Hussain Aziz Saleh</i>	
<b>Author Index</b> .....	305

