Metaheuristics for Production Scheduling

Description: This book describes the potentialities of metaheuristics for solving production scheduling problems and the relationship between these two fields. For the past several years, there has been an increasing interest in using metaheuristic methods to solve scheduling problems. The main reasons for this are that such problems are generally hard to solve to optimality, as well as the fact that metaheuristics provide very good solutions in a reasonable time. The first part of the book presents eight applications of metaheuristics for solving various mono-objective scheduling problems. The second part is itself split into two, the first section being devoted to five multi-objective problems to which metaheuristics are adapted, while the second tackles various transportation problems related to the organization of production systems. Many real-world applications are presented by the authors, making this an invaluable resource for researchers and students in engineering, economics, mathematics and computer science.

Contents

7. Models and Methods in Graph Coloration for Various Production Problems, Nicolas Zufferey.
9. Metaheuristics for Biobjective Flow Shop Scheduling, Matthieu Basseur and Arnaud Liefooghe.
15. Combination of a Metaheuristic and a Simulation Model for the Scheduling of Resource-constrained Transport Activities, Virginie André, Nathalie Grangeon and Sylvie Norre.
16. Vehicle Routing Problems with Scheduling Constraints, Rahma Lahyani, Frédéric Semet and Benoît Trouillet.
17. Metaheuristics for Job Shop Scheduling with Transportation, Qiao Zhang, Hervé Manier, Marie-Ange Manier.

About the Authors

Bassem Jarboui is Professor at the University of Sfax, Tunisia.
Patrick Siarry is Professor at the Laboratoire Images, Signaux et Systèmes Intelligents (LISSI), University of Paris-Est Créteil, France.
Jacques Teghem is Professor at the University of Mons, Belgium.
Chapter 1. An Estimation of Distribution Algorithm for Solving Flow Shop Scheduling Problems with Sequence-dependent Family Setup Times
Mansour EDDALY, Bassem JARBOUI, Radhouan BOUABDA, Patrick SIARRY and Abdelwaheb REBAÏ

1.1. Introduction
1.2. Mathematical formulation
1.3. Estimation of distribution algorithms
1.3.1. Estimation of distribution algorithms proposed in the literature
1.4. The proposed estimation of distribution algorithm
1.4.1. Encoding scheme and initial population
1.4.2. Selection
1.4.3. Probability estimation
1.5. Iterated local search algorithm
1.6. Experimental results
1.7. Conclusion
1.8. Bibliography

Chapter 2. Genetic Algorithms for Solving Flexible Job Shop Scheduling Problems
Imed KACEM

2.1. Introduction
2.2. Flexible job shop scheduling problems
2.3. Genetic algorithms for some related sub-problems
2.4. Genetic algorithms for the flexible job shop problem
2.4.1. Codings
2.4.2. Mutation operators
2.4.3. Crossover operators
2.5. Comparison of codings
2.6. Conclusion
2.7. Bibliography

Chapter 3. A Hybrid GRASP-Differential Evolution Algorithm for Solving Flow Shop Scheduling Problems with No-Wait Constraints
Hanen AKROUT, Bassem JARBOUI, Patrick SIARRY and Abdelwaheb REBAÏ

3.1. Introduction
3.2. Overview of the literature
3.2.1. Single-solution metaheuristics
Chapter 5. Landscape in a combinatorial optimization problem

5.2.1. Landscape in a combinatorial optimization problem 99
5.2.2. Neutrality and landscape  102
5.3. Study of neutrality in the flow shop problem 106
5.3.1. Neutral degree  106
5.3.2. Structure of the neutral landscape 108
5.4. Local search exploiting neutrality to solve the flow shop problem 112
5.4.1. Neutrality-based iterated local search  113
5.4.2. NILS on the flow shop problem 116
5.5. Conclusion  122
5.6. Bibliography  123

Chapter 6. Evolutionary Metaheuristic Based on Genetic Algorithm: Application to Hybrid Flow Shop Problem with Availability Constraints 127

Nadia CHAABEN, Racem MELLOULI and Faouzi MASMOUDI

6.1. Introduction  127
6.2. Overview of the literature  128
6.3. Overview of the problem and notations used 131
6.4. Mathematical formulations  133
6.4.1. First formulation (MILP1) 133
6.4.2. Second formulation (MILP2) 135
6.4.3. Third formulation (MILP3)  137
6.5. A genetic algorithm: model and methodology 139
6.5.1. Coding used for our algorithm 139
6.5.2. Generating the initial population 140
6.5.3. Selection operator  142
6.5.4. Crossover operator  142
6.5.5. Mutation operator  144
6.5.6. Insertion operator 144
6.5.7. Evaluation function: fitness  144
6.5.8. Stop criterion  145
6.6. Verification and validation of the genetic algorithm 145
6.6.1. Description of benchmarks 145
6.6.2. Tests and results  146
15.5. Conclusion 430
15.6. Bibliography 431

Chapter 16. Vehicle Routing Problems with Scheduling Constraints 433
Rahma LAHYANI, Frédéric SEMET and Benoît TROUILLET

16.1. Introduction 433
16.2. Definition, complexity and classification 435
16.2.1. Definition and complexity 435
16.2.2. Classification 436
16.3. Time-constrained vehicle routing problems 438
16.3.1. Vehicle routing problems with time windows 438
16.3.2. Period vehicle routing problems 441
16.3.3. Vehicle routing problem with cross-docking 443
16.4. Vehicle routing problems with resource availability constraints 448
16.4.1. Multi-trip vehicle routing problem 448
16.4.2. Vehicle routing problem with crew scheduling 450
16.5. Conclusion 452
16.6. Bibliography 453

Chapter 17. Metaheuristics for Job Shop Scheduling with Transportation 465
Qiao ZHANG, Hervé MANIER, Marie-Ange MANIER

17.1. General flexible job shop scheduling problems 466
17.2. State of the art on job shop scheduling with transportation resources 468
17.3. GTSB procedure 474
17.3.1. A hybrid metaheuristic algorithm for the GFJSSP 474
17.3.2. Tests and results 480
17.3.3. Conclusion for GTSB 489
17.4. Conclusion 491
17.5. Bibliography 491

List of Authors 495
Index 499

Ordering:
Order Online - http://www.researchandmarkets.com/reports/2500204/
Order by Fax - using the form below
Order by Post - print the order form below and send to

Research and Markets,
Guinness Centre,
Taylors Lane,
Dublin 8,
Ireland.
Fax Order Form
To place an order via fax simply print this form, fill in the information below and fax the completed form to 646-607-1907 (from USA) or +353-1-481-1716 (from Rest of World). If you have any questions please visit http://www.researchandmarkets.com/contact/

Order Information
Please verify that the product information is correct.

- **Product Name:** Metaheuristics for Production Scheduling
- **Web Address:** [http://www.researchandmarkets.com/reports/2500204/](http://www.researchandmarkets.com/reports/2500204/)
- **Office Code:** SCAY6PFW

Product Format
Please select the product format and quantity you require:

**Quantity**
- Hard Copy (Hard Back): [ ] USD 198 + USD 28 Shipping/Handling

* Shipping/Handling is only charged once per order.

Contact Information
Please enter all the information below in BLOCK CAPITALS

<table>
<thead>
<tr>
<th>Title</th>
<th>Mr</th>
<th>Mrs</th>
<th>Dr</th>
<th>Miss</th>
<th>Ms</th>
<th>Prof</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Name:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Last Name:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Email Address: *</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Job Title:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organisation:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Address:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>City:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Postal / Zip Code:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Country:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phone Number:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fax Number:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Please refrain from using free email accounts when ordering (e.g. Yahoo, Hotmail, AOL)
Payment Information

Please indicate the payment method you would like to use by selecting the appropriate box.

☐ Pay by credit card: You will receive an email with a link to a secure webpage to enter your credit card details.

☐ Pay by check: Please post the check, accompanied by this form, to:
Research and Markets,
Guinness Center,
Taylors Lane,
Dublin 8,
Ireland.

☐ Pay by wire transfer: Please transfer funds to:
Account number 833 130 83
Sort code 98-53-30
Swift code ULSBIE2D
IBAN number IE78ULSB98533083313083
Bank Address Ulster Bank,
27-35 Main Street,
Blackrock,
Co. Dublin,
Ireland.

If you have a Marketing Code please enter it below:

Marketing Code: ________________________________

Please note that by ordering from Research and Markets you are agreeing to our Terms and Conditions at http://www.researchandmarkets.com/info/terms.asp