CP Papers on Scheduling

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1 Introduction

2 Paper List

Table 1 lists relevant papers on CP and Scheduling from the CP and CPAIOR conferences. It gives the author names and title of the paper, the reference to the published paper, the year and conference or journal where the paper was published. It also lists the CP systems that were used in the paper, and states if data and/or code of the paper is available online. A link to the stored location is given where it is known.

Table 1: List of Papers

Authors	Title	Cite	Year	Conf Journal	Pages	CP System	Data Avail	Code Avail	Based On	Classification	Constraints
C. Juvin, E. Hebrard, L. Houssin, P. Lopez	An Efficient Constraint Programming Approach to Preemptive Job Shop Scheduling	[18]	2023	CP	16	CP Opt Mistral	(y)			preemptive Job Shop	endBeforeStart span noOverlap
G. Povéda, N. Álvarez, C. Artigues	Partially Preemptive Multi Skill/Mode Resource-Constrained Project Scheduling with Generalized Precedence Relations and Calendars	[30]	2023	CP	21		y	y		PP-MS-MMRCPSP/max-cal	
Y. Aalian, G. Pesant, M. Gamache	Optimization of Short-Term Underground Mine Planning Using Constraint Programming	[1]	2023	CP	16	CP Opt	n	n			
R. Kameugne, S. Fetgo, T. Noulamo, C. Djamégni	Horizontally Elastic Edge Finder Rule for Cumulative Constraint Based on Slack and Density	[20]	2023	CP	17					RCPSPs	
N. Efthymiou, N. Yorke-Smith	Predicting the Optimal Period for Cyclic Hoist Scheduling Problems	[8]	2023	CPAIOR							
S. Squillaci, C. Pralet, S. Roussel	Scheduling Complex Observation Requests for a Constellation of Satellites: Large Neighborhood Search Approaches	[31]	2023	CPAIOR							
D. Kim, Y. Choi, K. Moon, M. Lee, K. Lee, M. Pinedo	Iterated Greedy Constraint Programming for Scheduling Steelmaking Continuous Casting	[21]	2023	CPAIOR							
C. Juvin, L. Houssin, P. Lopez	Constraint Programming for the Robust Two-Machine Flow-Shop Scheduling Problem with Budgeted Uncertainty	[19]	2023	CPAIOR							
F.Tardivo, A. Dovier, A. Formisano, L. Michel, E.Pontelli	Constraint Propagation on GPU: A Case Study for the Cumulative Constraint	[33]	2023	CPAIOR							

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R. Boudreault, V. Simard, D. Lafond, C. Quimper	A Constraint Programming Approach to Ship Refit Project Scheduling	[6]	2022	CP	16	MiniZinc Chuffed		y	-	RCPSP	cumulative
L. Popovic, A. Côté, M. Gaha, F. Nguewouo, Q. Cappart	Scheduling the Equipment Maintenance of an Electric Power Transmission Network Using Constraint Programming	[29]	2022	CP	15	CP Opt	n	n	-	TMS	alwaysIn noOverlap
F. Winter, S. Meiswinkel, N. Musliu, D. Walkiewicz	Modeling and Solving Parallel Machine Scheduling with Contamination Constraints in the Agricultural Industry	[35]	2022	CP	18	Cplex Gurobi CP Opt Sim Anneal	y	y	-	PMSP	alternative noOverlap
E. Armstrong, M. Garraffa, B. O'Sullivan, H. Simonis	A Two-Phase Hybrid Approach for the Hybrid Flexible Flowshop with Transportation Times	[4]	2022	CPAIOR	13	CP Opt	(y)	-	[3]	$HFFm\|tt\|C_{\max}$	endBeforeStart alternative cumulative noOverlap
M. Geitz, C. Grozea, W. Steigerwald, R. Stöhr, A. Wolf	Solving the Extended Job Shop Scheduling Problem with AGVs - Classical and Quantum Approaches	[12]	2022	CPAIOR							
Y. Ouellet, C. Quimper	A MinCumulative Resource Constraint	[28]	2022	CPAIOR							
E. Armstrong, M. Garraffa, B. O'Sullivan, H. Simonis	The Hybrid Flexible Flowshop with Transportation Times	[3]	2021	CP	18	MiniZinc Chuffed CP Opt SICStus	y	y	-	$HFFm\|tt\|C_{\max}$	cumulative diffn table
V. Antuori, E. Hebrard, M. Huguet, S. Essodaigui, A. Nguyen	Combining Monte Carlo Tree Search and Depth First Search Methods for a Car Manufacturing Workshop Scheduling Problem	[2]	2021	CP	16	MCTS	y	y	[]		
B. Kovács, P. Tassel, W. Kohlenbrein, P. Schrott-Kostwein, M. Gebser	Utilizing Constraint Optimization for Industrial Machine Workload Balancing	[23]	2021	CP	17	Gurobi Cplex CP Opt OR-Tools	y	y	-		cumulative
M. Lackner, C. Mrkvicka, N. Musliu, D. Walkiewicz, F. Winter	Minimizing Cumulative Batch Processing Time for an Industrial Oven Scheduling Problem	[24]	2021	CP	18	CP Opt Chuffed OR-Tools Gurobi OPL	y	y		OSP	
A. Hill, J. Ticktin. T. Vossen	A Computational Study of Constraint Programming Approaches for Resource-Constrained Project Scheduling with Autonomous Learning Effects	[17]	2021	CPAIOR							
C. Klanke, D. Bleidorn, V. Yfantis, S.Engell	Combining Constraint Programming and Temporal Decomposition Approaches - Scheduling of an Industrial Formulation Plant	[22]	2021	CPAIOR							
C. Hanen, A. Kordon, T. Pedersen	Two Deadline Reduction Algorithms for Scheduling Dependent Tasks on Parallel Processors	[16]	2021	CPAIOR							
M. Åstrand, M. Johansson, H.Feyzmahdavian	Short-Term Scheduling of Production Fleets in Underground Mines Using CP-Based LNS	[5]	2021	CPAIOR							
T. Geibinger, L. Kletzander, M. Krainz, F. Mischek, N. Musliu, F. Winter	Physician Scheduling During a Pandemic	[11]	2021	CPAIOR							
M. Nattaf, A. Malapert	Filtering Rules for Flow Time Minimization in a Parallel Machine Scheduling Problem	[27]	2020	CP	16	Cplex CP Opt	-	-	[]	PTC	alternative noOverlap
L. Groleaz, S. Ndiaye, C. Solnon	Solving the Group Cumulative Scheduling Problem with CPO and ACO	[15]	2020	CP	17	CP Opt ACO	-	-	[14]	GCSP	group cumulative
A. Mercier-Aubin, J. Gaudreault, C. Quimper	Leveraging Constraint Scheduling: A Case Study to the Textile Industry	[25]	2020	CPAIOR	13	MiniZinc Chuffed	a	a	-		circuit cumulative

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Authors	Title	Cite	Year	Conf Journal	Pages	CP System	Data Avail	Code Avail	Based On	Classification	Constraints
T. Tang, C. Beck	CP and Hybrid Models for Two-Stage Batching and Scheduling	[32]	2020	CPAIOR	16	Cplex CP Opt	n	n	-	2BPHFSP	span alwaysIn
J. Wessén, M. Carlsson, C. Schulte	Scheduling of Dual-Arm Multi-tool Assembly Robots and Workspace Layout Optimization	[34]	2020	CPAIOR	10	Gecode	n	n	-		circuit alldifferent
G. Col, E. Teppan	Industrial Size Job Shop Scheduling Tackled by Present Day CP Solvers	[7]	2019	CP	17	CP Opt OR-Tools	y	y	-	JSSP	noOverlap
S. Frimodig, C. Schulte	Models for Radiation Therapy Patient Scheduling	[9]	2019	CP	17	Mini-Zinc Gecode Cplex	n	n	-		cumulative regular bin-packing
C. Galleguillos, Z. Kiziltan, A. Sîrbu, Ö. Babaoglu	Constraint Programming-Based Job Dispatching for Modern HPC Applications	[10]	2019	CP		OR-Tools		y		on-line dispatch	
S. Murín, H. Rudová	Scheduling of Mobile Robots Using Constraint Programming	[26]	2019	CP	16	CP Opt Cplex OPL	y	y		JSPT	endBeforeStart alternative noOverlap
D. Grimes, G. Ifrim, B. O'Sullivan, H. Simonis	Analyzing the impact of electricity price forecasting on energy cost-aware scheduling	[13]	2014	J.SUSCOM			-	-	-		

Table 2: Problem Classification Types

Code	Name
JSSP	Job-Shop Scheduling Problem
JSPT	Job-Shop Scheduling Problem with Transportation
PP-MS-MMRCPSP/max-cal	partially preemptive- multi-skill/mode resource-constrained project scheduling problem with generalized precedence relations and resource calendars
RCPSP	Resource Constrained Project Scheduling Problem
TMS	Transmission Network Maintenance Planning
PMSP	Parallel Machine Scheduling Problem
HFF	Hybrid Flexible Flow-shop
$HFFm\|tt\|C_{\max}$	Hybrid Flexible Flowshop with Transportation Times
OSP	Oven Scheduling Problem
PTC	Scheduling Problem with Time Constraints
GCSP	Group Cumulative Scheduling Problem
2BPHFSP	Two-Stage Bin Packing and Hybrid Flow Shop Scheduling Problem

3 Concept Matching

In order to find out properties of the articles, we try to find concepts in the pdf versions of the articles. We use the *pdfgrep* command to search for the number of occurrences of certain regular expressions in the files. This often clearly identifies the constraints used in the model, and the solvers that are discussed.

Ref.	alternative constraint	cumulative	disjunctive	diffn	table constraint	regular expression	circuit	nooverlap	endbeforestart	alwaysin	span constraint	bin.?packing	cplex	gurobi	gecode	choco	mistral	or.?tools	OPL	cpo	chuffed	sicstus	eclipse	mini.?zinc
AalianPG23 [1]	0	15	0	0	0	0	0	2	2	5	0	0	1	0	0	0	0	0	0	3	0	0	0	0
AntuoriHHEN21 [2]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	3	0	0	0	0	0	0	0	0
ArmstrongGOS21 [3]	1	2	0	9	2	0	1	0	0	0	0	2	4	0	1	0	0	0	0	8	11	15	0	11
ArmstrongGOS22 [4]	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0
Astrand0F21 [5]	0	0	5	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0
BoudreaultSLQ22 [6]	0	16	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	11	0	0	8
ColT19 [7]	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	23	0	36	0	0	0	10
EfthymiouY23 [8]	0	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0
FrimodigS19 [9]	0	2	0	0	0	3	0	0	0	0	0	3	1	0	2	0	0	0	0	0	0	0	0	1
GalleguillosKSB19 [10]	1	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0
GeibingerKKMMW21 [11]	0	0	0	0	0	0	0	0	0	0	0	0	12	12	4	0	0	4	0	0	0	0	0	1
GeitzGSSW22 [12]	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
GroleazNS20 [15]	0	32	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	1	0	94	0	0	0	0
HanenKP21 [16]	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HillTV21 [17]	1	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
JuvinHHL23 [18]	0	1	20	0	0	0	0	28	1	0	0	0	0	0	0	0	16	0	0	29	0	0	0	0
JuvinHL23 [19]	0	0	0	0	0	0	0	1	1	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0
KameugneFND23 [20]	0	31	1	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0
KimCMLLP23 [21]	0	0	0	0	0	0	0	3	0	0	0	0	0	1	0	0	0	2	0	0	0	0	0	0
KlankeBYE21 [22]	0	4	1	0	0	0	7	5	0	0	0	0	1	1	0	0	0	2	0	0	0	0	0	0
KovacsTKSG21 [23]	0	6	0	0	0	0	0	0	0	0	0	0	3	21	0	0	0	14	0	0	0	0	0	0
LacknerMMWW21 [24]	0	9	0	0	0	0	0	1	1	0	0	0	4	34	0	0	0	19	9	9	20	0	0	7
Mercier-AubinGQ20 [25]	0	8	2	0	0	0	32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7
MurinR19 [26]	3	0	0	0	0	0	0	5	2	0	0	0	7	0	0	0	0	0	3	0	0	0	0	0
NattafM20 [27]	0	3	0	0	0	0	0	2	0	0	0	0	4	0	0	0	0	0	0	7	0	0	0	0
OuelletQ22 [28]	0	42	1	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	1

Ref.	alternative constraint	cumulative	disjunctive	diffn	table constraint	regular expression	circuit	nooverlap	endbeforestart	alwaysin	span constraint	bin.?packing	cplex	gurobi	gecode	choco	mistral	or.?tools	OPL	cpo	chuffed	sicstus	eclipse	mini.?zinc
PopovicCGNC22 [29]	0	2	0	0	0	0	0	6	0	6	0	0	1	0	0	0	0	0	0	0	0	1	0	0
PovedaAA23 [30]	0	8	2	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	2	8	0	0	5
SquillaciPR23 [31]	0	0	0	0	0	0	0	1	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
TangB20 [32]	0	0	0	0	0	0	0	0	2	4	1	15	1	0	0	0	0	0	0	2	0	0	0	0
TardivoDFMP23 [33]	0	46	2	0	0	0	0	0	0	0	0	0	0	0	19	0	0	0	0	0	0	0	0	13
WessenCS20 [34]	0	0	0	0	0	0	4	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
WinterMMW22 [35]	1	0	0	0	0	0	0	2	0	0	0	0	10	12	0	0	0	0	0	6	0	0	0	0

4 Examples from Books and Courses

5 Benchmark Sets

5.1 CSPLib

Table 4: CSPLib scheduling problems

Nr	Name	Description	CP System	Data	Code	Solutions	Classification	Const
59	Energy Cost Aware Scheduling	-	50 TXT	-	-			
61	RCPSP	Resource-Constrained Scheduling Problem	PyCSP3	PSPLIB	y	PSPLIB	RCPSP	
73	Test Scheduling Problem		ECLiPSe OPL	840 Prolog	y			
77	Stochastic Assignment and Scheduling Problem		MiniZinc	9 DZN	y			

6 Other Examples

References

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