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ERRATUM

Erratum to: A hybrid discrete particle swarm optimization algorithm for solving fuzzy job shop scheduling problem

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The erratum for the paper IJAMT9306 (titled "A hybrid discrete particle swarm optimization algorithm for solving fuzzy job-shop scheduling problem"), which has been published online at 7/9/2012 (doi: 10.1007/s00170-012-4337-3).

Table 5 Numerical example Case5. (10-jobs-10-machines)

	Processing machines (fuzzy processing time)									
Job1	8(2,3,4)	6(3,5,6)	5(2,4,5)	2(4,5,6)	1(1,2,3)	3(3,5,6)	9(2,3,5)	4(1,2,3)	7(3,4,5)	10(2,3,4)
Job2	10(2,3,4)	7(2,3,5)	4(2,4,5)	6(1,2,3)	8(4,5,6)	3(2,4,6)	2(2,3,4)	1(1,3,4)	5(2,3,4)	9(3,4,5)
Job3	6(2,4,5)	9(1,2,3)	10(2,3,5)	8(1,2,4)	1(3,5,6)	7(1,3,4)	4(1,3,5)	2(1,2,4)	5(2,4,5)	3(1,3,5)
Job4	1(1,2,3)	5(3,4,5)	8(1,3,5)	9(2,4,6)	10(2,4,5)	6(1,2,4)	7(3,4,5)	2(1,3,5)	4(1,3,6)	3(1,3,4)
Job5	2(2,3,4)	7(1,3,4)	3(1,3,4)	5(1,2,3)	8(1,3,5)	9(2,3,4)	10(3,4,5)	6(1,3,4)	1(3,4,5)	4(1,3,4)
Job6	4(2,3,4)	2(2,3,4)	3(1,2,3)	5(2,4,5)	6(1,3,4)	8(1,3,4)	7(3,4,5)	9(1,2,3)	10(2,4,5)	1(1,3,4)
Job7	3(2,3,4)	5(1,4,5)	4(1,3,5)	1(3,4,5)	9(2,3,4)	7(3,4,5)	2(1,2,3)	10(3,5,6)	8(3,5,6)	6(1,2,3)
Job8	7(3,4,5)	1(1,2,3)	9(3,4,5)	6(2,4,5)	10(1,3,4)	2(2,3,4)	5(1,2,3)	3(2,4,5)	4(3,4,5)	8(2,3,5)
Job9	9(3,4,5)	4(1,3,4)	10(1,3,5)	2(2,3,4)	3(3,5,6)	6(2,4,5)	8(1,3,4)	1(3,4,5)	5(1,2,3)	7(3,4,5)
Job10	7(2,4,5)	5(1,2,3)	2(3,4,5)	4(2,3,4)	1(1,2,3)	8(3,4,5)	10(2,4,5)	6(3,4,5)	3(1,2,3)	9(1,2,4)

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Table 7 Numerical example Case7. (10-jobs-10-machines)

	Processing machines (fuzzy processing time)									
Job1	7(3,4,5)	9(10,12,13)	2(4,7,10)	5(5,8,9)	4(10,12,16)	1(10,11,13)	6(4,7,10)	3(4,5,8)	8(4,6,7)	10(9,12,13)
Job2	10(10,11,14)	3(9,12,14)	5(7,10,14)	4(7,11,12)	8(2,4,6)	1(8,10,14)	2(7,11,12)	7(8,11,14)	6(6,9,10)	9(10,14,15)
Job3	5(5,7,10)	7(2,3,5)	4(1,3,4)	3(7,10,12)	1(8,11,12)	8(2,4,5)	6(4,5,7)	2(7,8,10)	9(9,13,14)	10(8,12,15)
Job4	5(5,8,10)	6(4,5,8)	4(7,10,14)	7(3,5,7)	8(4,5,6)	2(8,10,12)	1(2,3,4)	9(2,3,5)	3(6,8,11)	10(6,8,11)
Job5	2(4,7,10)	7(5,6,7)	4(9,10,14)	1(2,3,4)	3(9,12,13)	5(5,6,9)	9(5,7,8)	6(1,2,4)	8(3,4,6)	10(2,4,6)
Job6	7(1,3,4)	3(3,4,5)	8(3,5,6)	2(5,7,8)	4(8,9,13)	9(9,12,14)	10(4,7,8)	1(1,2,4)	6(2,4,5)	5(6,9,12)
Job7	10(10,11,14)	8(2,3,4)	6(9,10,12)	3(9,10,11)	7(4,5,6)	2(3,5,7)	9(1,3,4)	4(2,4,5)	1(8,10,13)	5(7,10,11)
Job8	6(7,11,15)	2(9,13,15)	8(5,6,9)	4(8,9,13)	7(6,9,12)	3(6,8,10)	9(6,9,11)	5(1,2,4)	10(8,12,14)	1(6,9,12)
Job9	7(4,7,10)	2(3,5,6)	8(6,9,10)	6(3,5,6)	9(8,11,12)	4(5,7,10)	10(4,6,9)	1(1,2,4)	3(3,5,7)	5(10,12,15)
Job10	4(1,2,3)	1(8,12,13)	9(7,8,9)	10(6,9,12)	5(9,11,15)	2(7,11,15)	6(10,14,18)	3(1,3,5)	8(1,2,4)	7(2,3,5)

Table 9 The experimental result for Case5 in 10 run times

Run time	Fuzzy Makespan			Comparison index		
	s_1	s_2	s_3	$(s_1+2*s_2+s_3)/4$	s_2	s_3-s_1
1	31	47	63	47.00	47.00	32.00
2	30	47	63	46.75	47.00	33.00
3	30	47	63	46.75	47.00	33.00
4	28	47	62	46.00	47.00	34.00
5	29	47	63	46.50	47.00	34.00
6	29	47	63	46.50	47.00	34.00
7	27	47	62	45.75	47.00	35.00
8	27	47	62	45.75	47.00	35.00
9	27	47	62	45.75	47.00	35.00
10	24	47	66	46.00	47.00	42.00
avg	28.2	47	62.9	46.28	47.00	34.70
var	4.18	0.00	1.43	0.23	0.00	7.57

Table 11 The experimental result for Case7 in 10 run times

Run time	Fuzzy Makespan			Comparison index		
	s_1	s_2	s_3	$(s_1+2*s_2+s_3)/4$	s_2	s_3-s_1
1	99	129	152	127.25	129.00	53.00
2	97	128	154	126.75	128.00	57.00
3	93	121	155	122.50	121.00	62.00
4	96	127	160	127.50	127.00	64.00
5	92	119	160	122.50	119.00	68.00
6	92	119	160	122.50	119.00	68.00
7	95	125	164	127.25	125.00	69.00
8	95	125	164	127.25	125.00	69.00
9	94	128	163	128.25	128.00	69.00
10	92	126	165	127.25	126.00	73.00
avg	94.50	124.70	159.70	125.90	124.70	65.20
var	5.61	14.01	21.12	5.64	14.01	38.62

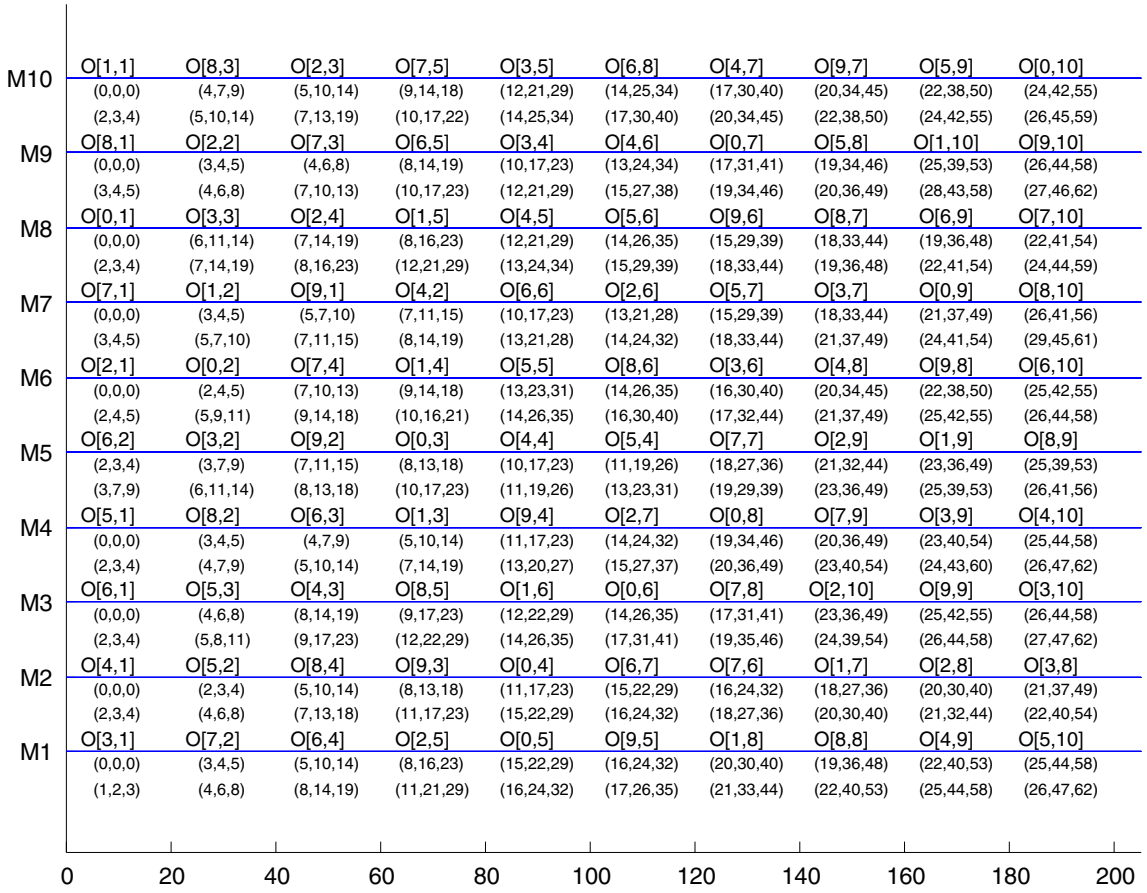

Fig. 4 Fuzzy Gantt chart of the best result for Case5 (fuzzy makespan=(27, 47, 62))

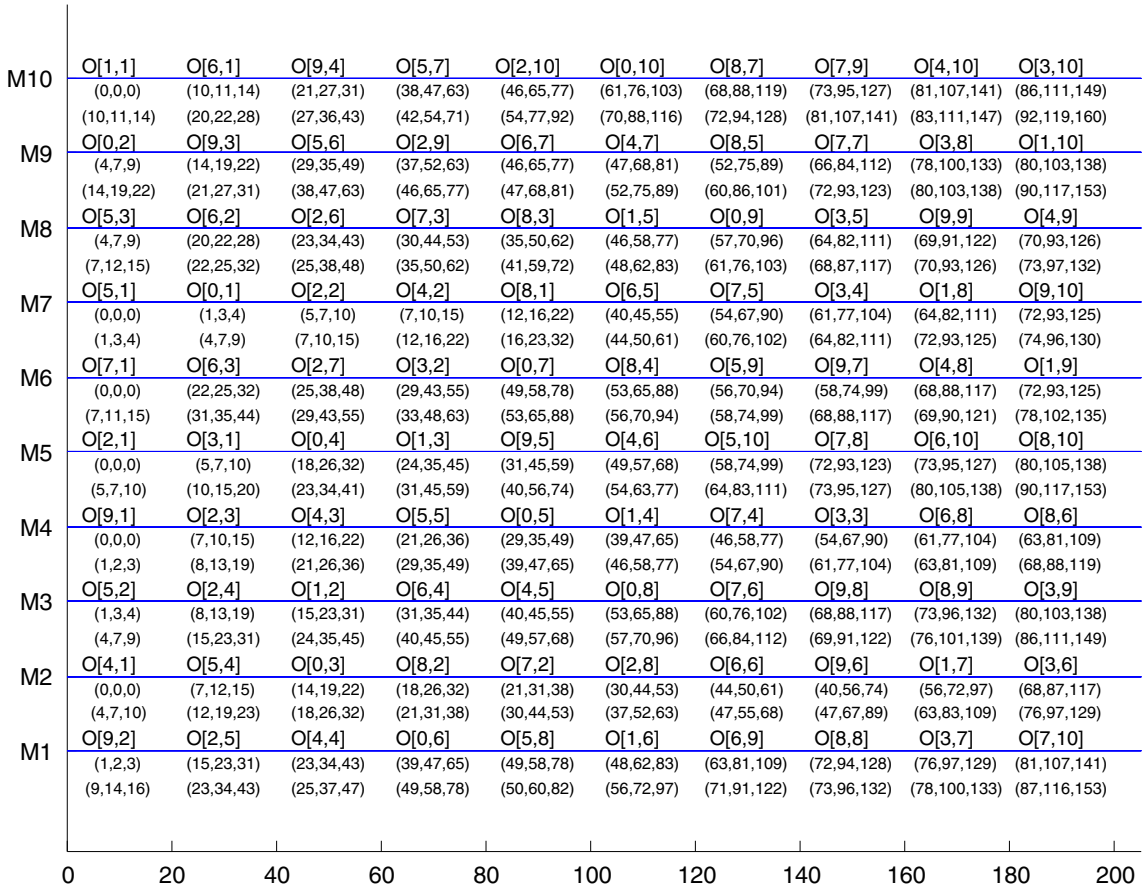

Fig. 5 Fuzzy Gantt chart of the best result for Case7 (fuzzy makespan=(92, 119, 160))

Table 13 The comparisons with other two algorithms

	Problem size	RKGA				SMGA				HDPSO			
		avg	f_1	opt	f_1	avg	f_1	opt	f_1	avg	f_1	opt	f_1
Case1	6×6	28.9, 36, 43.1	144.0	**29, 36, 43**	**144.0**	28.2, 36.1, 44.4	144.8	**29, 36, 43**	**144.0**	**29, 36, 43**	**144.0**	**29, 36, 43**	**144.0**
Case2	6×6	**56, 80, 103**	**319.0**	**56, 80, 103**	**319.0**	**56, 80, 103**	**319.0**	**56, 80, 103**	**319.0**	**56, 80, 103**	**319.0**	**56, 80, 103**	**319.0**
Case3	6×6	52.2, 71, 87.6	281.8	**51, 70, 86**	**277.0**	52.6, 71.5, 88.5	284.1	**51, 70, 86**	**277.0**	**51, 70, 86**	**277.0**	**51, 70, 86**	**277.0**
Case4	6×6	**50, 65, 84**	**264.0**	**50, 65, 84**	**264.0**	**50, 65, 84**	**264.0**	**50, 65, 84**	**264.0**	**50, 65, 84**	**264.0**	**50, 65, 84**	**264.0**
Case5	10×10	28.4, 48, 64.1	188.5	28, 47, 62	184.0	29.1, 48.3, 64.5	190.2	28, 47, 66	188.0	**28.2, 47, 62.9**	**185.1**	**27, 47, 62**	**183.0**
Case6	10×10	95.1,130.9,162.2	519.1	**96, 129, 60**	**414.0**	96.8, 134.9, 164.7	531.3	95, 133, 161	522.0	**95.8, 129.7, 160.5**	**515.7**	**96, 129, 60**	**414.0**
Case7	10×10	93, 126.2, 163.6	509.0	89, 123, 158	493.0	96.5, 129.7, 168.3	524.2	93, 129, 168	519.0	**94.5, 124.7, 159.7**	**503.6**	**92, 119, 160**	**490.0**
Case8	10×10	84.6, 115.9, 148.6	465.0	**85, 116, 143**	**460.0**	86.1, 118, 147.8	469.9	88, 115, 146	464.0	**86, 115.7, 143.2**	**460.6**	**85, 116, 143**	**460.0**

* f_1 means (s_1+2* s_2+ s_3)