

EC Competition 2019 Analysis on Results

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Why analysis?



Purpose of EC competition

■To understand real-world problems by solving them

- •What algorithms are effective in practice?
- •How should we formulate real-world problems?

Knowing is worthier than winning What is the key aspect that decided the victory? Let's see the submitted data from each team



Single-objective



Team	Median f(x)	Rank (Median)	Best f(x)	Rank (Best)
S01	0.078854218	7	0.062543495	7
S02	0.056596708	5	0.055134148	3
S03	0.056049541	3	0.055301076	4
S04	0.057617756	6	0.055813531	6
S05	0.056069596	4	0.055536909	5
S07	0.055819271	2	0.054334158	1
S08	0.055256613	1	0.055056593	2

Similar values but different variables



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All solutions are different local optima Fujirsu





Multi-objective



Team	Median HV	#Nd.Pts.	Rank (Median)	Best HV	Rank (Best)
M02	2.963295	617	5	3.302039	5
M03	4.927480	1503	4	5.085406	4
M04	5.137813	1994	3	5.252494	1
M05	5.138977	1092	2	5.190210	3
M07	5.162676	1399	1	5.241505	2

M02: N=617





M03: N=1503





M04: N=1994



1000000 1600000 40 50 60 70 80 0.0e+00.0 Objective 1 8 2.08407 1600000 Objective 2 100000 1.54408 Objective 3 5.0e+07 8 2 8 Objective 4 8 Ş. 8 -1.5 -1.0 -0.5 Objective 5 -20 -2.0 -1.5 -1.0 -0.5 0.0 -2.0e+07 -1.0e+07 0.0e+00 5.0e+07 1.5e+08

M05: N=1092



M05 1000000 1600000 50 60 70 80 40 0.0e+000 Objective 1 208 1600000 Objective 2 1000000 1.54408 Objective 3 50 Ge 8 8 8 Objective 4 8 各 8 50 -15 -10 Objective 5 -20 -2.0 -1.5 -1.0 -0.5 0.0 -2.0e+07 -1.0e+07 0.0e+00 5.0e+07 1.5e+08

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M07: N=1399



M07 1000000 1600000 40 50 60 70 80 0.0e+00.0 Б Objective 1 2.08407 1600000 Objective 2 100000 8 Objective 3 5.0e+07 8 2 8 Objective 4 8 各 8 -1.5 -1.0 -0.5 Objective 5 -20 -2.0 -1.5 -1.0 -0.5 0.0 -2.0e+07 -1.0e+07 0.0e+00 5.0e+07 1.5e+08

















M05

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Findings



The problem may have a single funnel
All non-dominated fronts have one cluster
Diversity enhancement is needed but niching is not
Diversity in decision space is also important
The winner maintained diversity in all coordinates
The other teams lost diversity in some coordinates
The problem may be simplicial



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