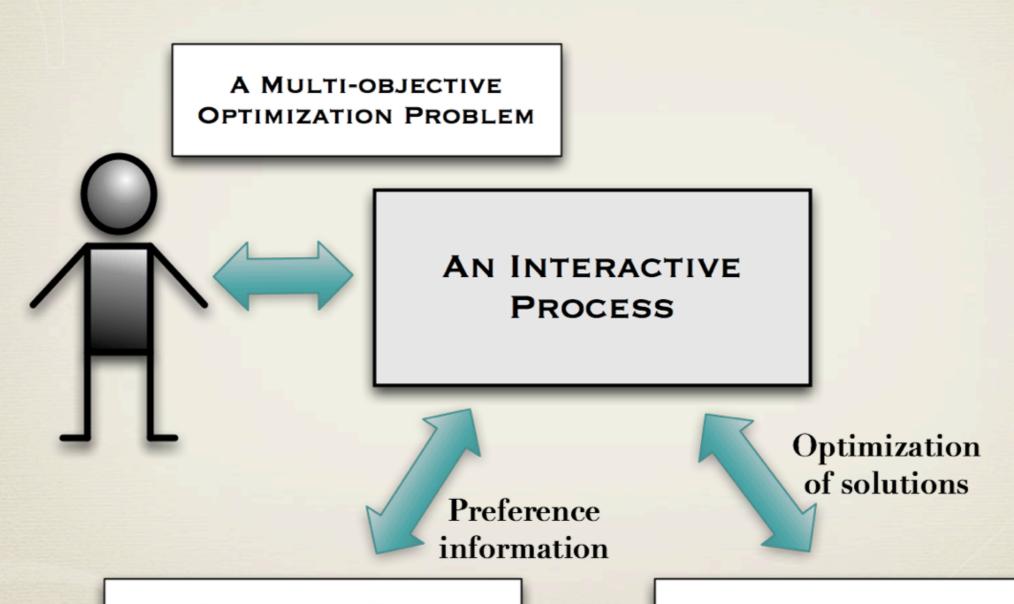
DARWIN

Interactive Evolutionary Algorithm for Robust
Multi-Objective Optimization

Agenda

- 1. The Subject
- 2. The Darwin Algorithm
- 3. The Application
- 4. Computational Results

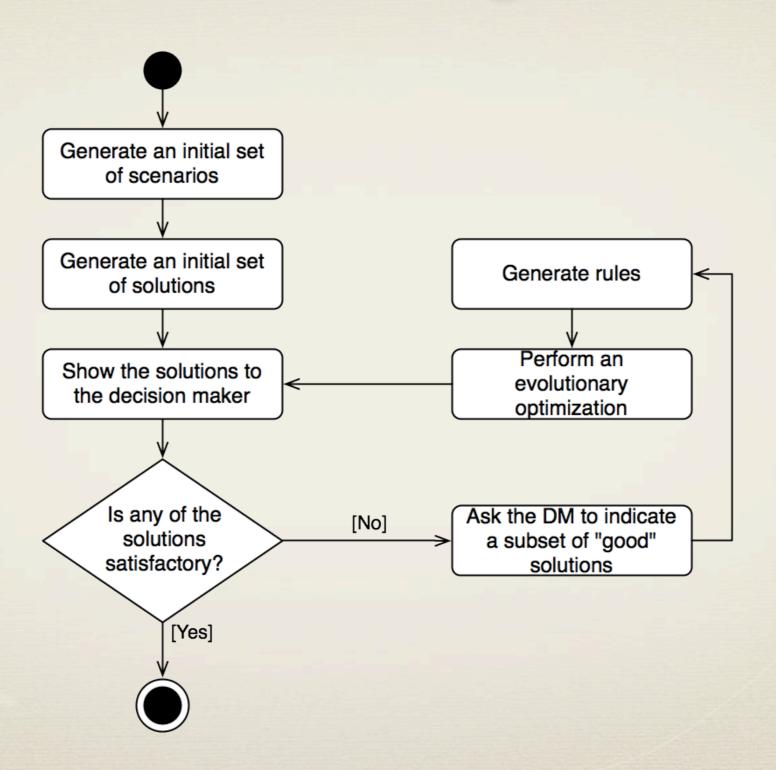
Interactive Evolutionary Algorithm for Robust Multi-Objective Optimization



A DOMINANCE-BASED ROUGH SET APPROACH (DECISION RULES)

AN EVOLUTIONARY
ALGORITHM

The Darwin Algorithm



The Application

- * Easy to use
- * A problem parser
- * History
- * Fine-tuning of parameters
- * CSV reports



The Application

History: Previous (1/1) Next												
_	Is g	ood?	profit_1.0	profit_25.0	profit_50.0	time_1.0	time_25.0	time_50.0				
	0		175.86	187.55	198.63	70.48	67.69	65.78				
	1		198.93	220.48	228.31	73.43	70.79	67.25				
	2		355.11	374.92	396.09	138.08	132.53	129.2				
	3	\checkmark	711.36	733.89	782.43	292.74	280.39	273.9				
	4	\checkmark	849.83	888.18	936.12	330.07	315.64	310.03				
	5		324.29	354.15	373.89	124.27	118.07	116.98				
	6		278.71	287.96	301.72	118.29	113.57	110.89				
	7		351.69	370.86	384.5	135.33	129.98	126.97				
	8		410.23	439.48	454.06	168.76	162.03	158.86				
	9		361.4	374.63	387.95	146.62	139.94	137.72				
	10		691.07	718.74	757.59	272.7	260.89	254.75				
	11		386.57	402.74	418.06	162.52	155.3	153.09				
	12		535.01	556.15	576.21	215.59	206.2	202.78				
	13		667.28	702.67	735.52	254.05	242.85	239.36				
	14		350	366.08	385.71	135.8	129.88	127.4				
	15		687.42	727.26	766.25	255.42	245.71	240.3				
	16	\checkmark	827.34	859.01	909.06	329.89	315.33	308.14				
	17		686.54	720.94	763.99	276.04	263.95	257.55				
	18		592.5	633.7	670.69	236.09	227.09	219.91				
	19	\checkmark	804.05	844.77	891.41	328.31	312.89	306.21				
	20		643.53	681.63	719.4	249.56	239.75	233.47				
	21	\checkmark	763.79	812.7	872.68	323.37	309.37	301.51				
	22		614.41	637.83	664.73	250.61	240	234.43				
	23		585.02	618.98	655.56	234.41	224.58	218.44				
	24		621.05	645.65	679.85	246.14	235.33	230.35				
	25		407.5	426.87	451.79	166.99	159.23	155.66				

The Application

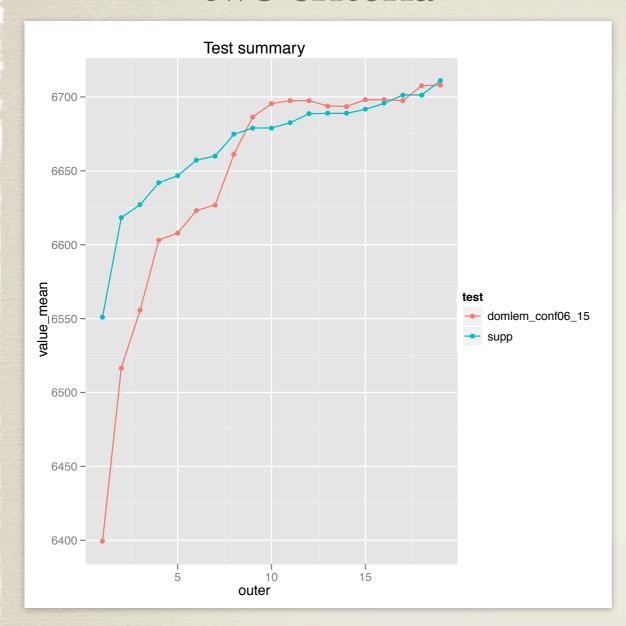
Solution details Mark as good	00	0												
0	History: Previous (1/1) Next													
1	Id 🔺	Is good?	profit_1.0 p	rofit_25.0	profit_50.0	time_1.0	time_25.0	time_50.0						
2		0 📃	175.86	187.55	198.63	70.48	67.69	65.78						
3		1 🗌	198.93	220.48	228.31	73.43	70.79	67.25						
4			355.11	374.92	396.09	138.08	132.53	129.2						
5			711.36	733.89	782.43	292.74	280.39	273.9						
6			849.83	888.18	936.12	330.07	315.64	310.03						
7 351.69 370.86 384.5 135.33 129.98 126.97 162.03 158.86 139.94 137.72 260.89 254.75 11			324.29	354.15	373.89	124.27	118.07	116.98						
8			278.71	287.96	301.72	118.29	113.57	110.89						
Solution 03 139.94 137.72 260.89 254.75 11		_	351.69	370.86	384.5	135.33	129.98	126.97						
Solution 03 260.89 254.75 151.309 15			4 🔴 🔘 (<u> </u>										
xa 6.455828902192162 155.3 153.09 206.2 202.78 xb 12.606745819340265 xc 11.480324766570938 129.88 127.4 15 687.42 727.26 766.25 255.42 245.71 240.3 16		= Colution 02												
12		10												
13		_	1	xa	6.455828	902192162								
14		_	5	xb	12.60674	5819340265								
15		=	•	xc	11.48032	4766570938								
16		_					2							
17														
18														
19 804.05 844.77 891.41 328.31 312.89 306.21 20 643.53 681.63 719.4 249.56 239.75 233.47 21 763.79 812.7 872.68 323.37 309.37 301.51 22 614.41 637.83 664.73 250.61 240 234.43 23 585.02 618.98 655.56 234.41 224.58 218.44 24 621.05 645.65 679.85 246.14 235.33 230.35 25 70.5 426.87 451.79 166.99 159.23 155.66		_												
20														
21 763.79 812.7 872.68 323.37 309.37 301.51 22 614.41 637.83 664.73 250.61 240 234.43 23 585.02 618.98 655.56 234.41 224.58 218.44 24 621.05 645.65 679.85 246.14 235.33 230.35 25 407.5 426.87 451.79 166.99 159.23 155.66 Solution details Mark as good														
22		_												
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25 407.5 426.87 451.79 166.99 159.23 155.66 • Solution details Mark as good		_												
Solution details Mark as good		_							*					
		-, -					133.23	155.00	<u> </u>					
			Sol	lution detail:	Mark	as good			//.					

Computational Results

- * K. Deb, L. Thiele, M. Laumanns, and E. Zitzler.

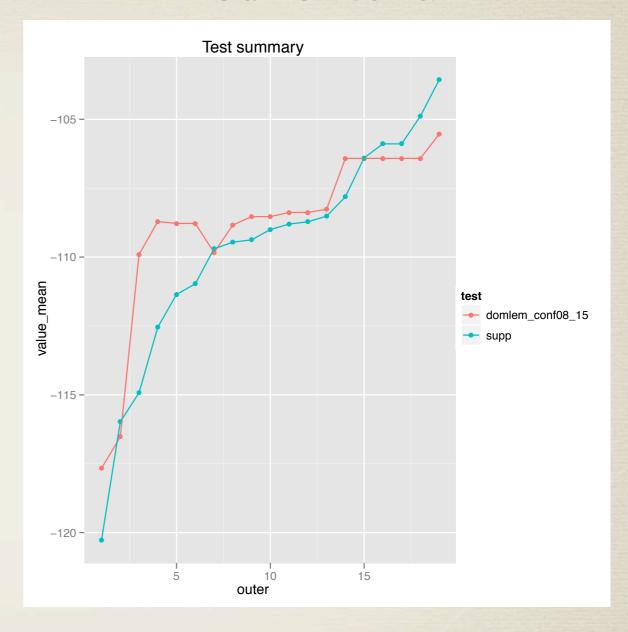
 Scalable multi-objective optimization test problems. 2002
- * Uncertainty added
- * Comparison with the supposed utility function

Mix problem two criteria



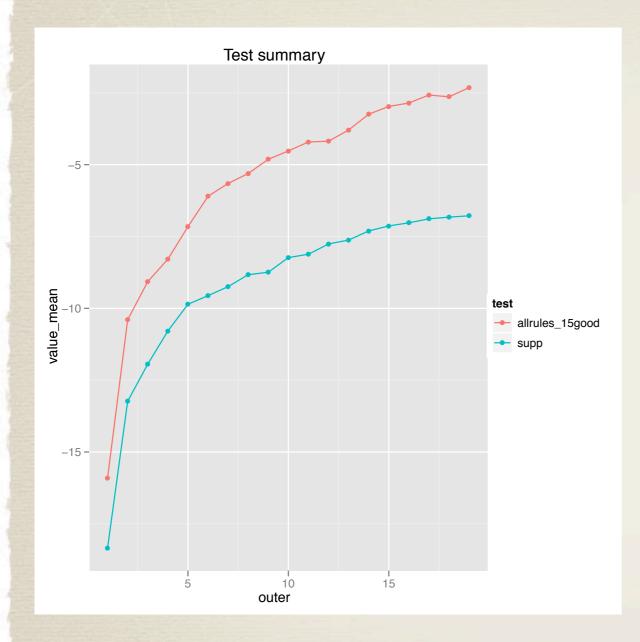
10th +0.25% 20th -0.04%

DTLZ₇ four criteria



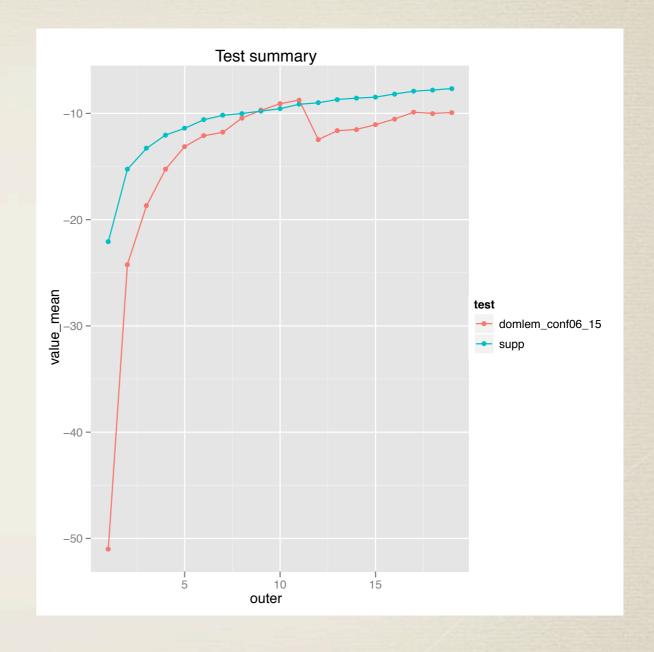
10th +0.77%
20th -1.91%

DTLZ_I four criteria



10th +44.96% 20th +65.86%

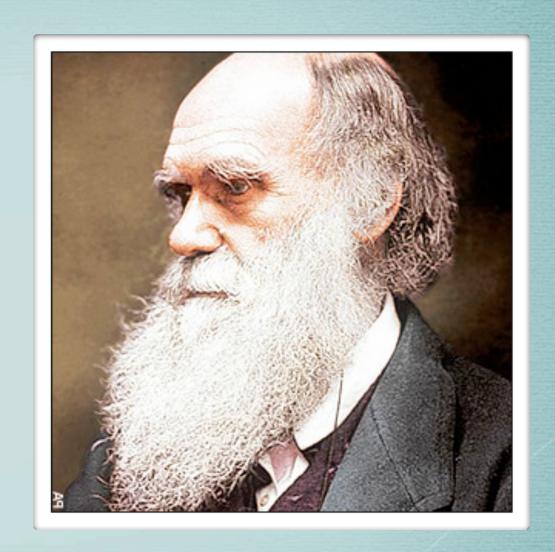
DTLZ_I ten criteria



10th +4.92% 20th -29.55%

Conclusions

- * DARWIN can solve MMO problems
- * Good performance
- * Requires fine-tuning



http://github.com/puszczyk/DarwinDS