

Report of Experiment ExpF. k-Symmetry: Scalability of Learning by Grammar Tuning and Language Tuning

Andreas Geyer-Schulz

May 7, 2025

Grammar tuning adapts the language. Language tuning adds new language elements. In this experiment we study the complexity of learning with increasing k with a grammar with symmetric pairs and an additional function.

Contents I

Description of Experiment

The purpose of this computational experiment is to study the development of time and generations with increasing k for the grammar T5.

The **problem environment** is the k -symmetry problem: Finding a boolean expression (with and, or, and not) which is TRUE for symmetric k -bit strings.

The **solution method** is grammar-based genetic programming (option `algorithm="sgp"` of `xegaRun`). The **solver** used is `xegaRun` from the R-package `xega`.

The experiment consists of 11 treatments, 1 grammar for 11 problem sizes $k \in 2, \dots, 12$.

The control variable in this experiment is

- the bit-length of the k-symmetry problem: 2 to 12. for grammar **T5**: With symmetric pairs and a new base function, the function $sPairs(x, y)$ which implements $OR(AND(x,y),AND(NOT(x),NOT(x,y)))$.

Common Parameters of Experiment ExpF

	Parameter Value
Experiment	EE
Optimize	Minimize!
Trials	10
Algorithm	sgp
Max.Depth.of.DTs	7
Grammar	AndOrNotTuned5.txt
Replay	0
Evaluation.Method	Deterministic
Execution.Model	MultiCore
Verbose	1
Semantics	byValue
Report.Eval.Errors	TRUE
Termination.Condition	AbsoluteError
Termination.Eps	-0.1
Gene.Map	Bin2Dec

Table: Common Parameters of Experiment ExpF (Part 1)

Common Parameters of Experiment ExpF

	Parameter Value
Init.Gene	InitGene
Codon.Precision	LCM
Population.Size	200
Max.Generations	500
Crossover.Rate	0.2
Mutation.Rate	0.4
IV.Crossover.Rate	Const
Crossover.Rate.2	0.4
IV.Mutation.Rate	Const
Mutation.Rate.2	0.8

Table: Common Parameters of Experiment ExpF (Part 2)

Parameters of Treatments of Experiment ExpF

	Treatment	Problem Environment	Worst Fitness	Codons
1	BoolT5sgp10k	10-Symmetry Problem	-1024	400
2	BoolT5sgp11k	11-Symmetry Problem	-2048	440
3	BoolT5sgp12k	12-Symmetry Problem	-4096	480
4	BoolT5sgp2k	2-Symmetry Problem	-4	80
5	BoolT5sgp3k	3-Symmetry Problem	-8	120
6	BoolT5sgp4k	4-Symmetry Problem	-16	160
7	BoolT5sgp5k	5-Symmetry Problem	-32	200
8	BoolT5sgp6k	6-Symmetry Problem	-64	240
9	BoolT5sgp7k	7-Symmetry Problem	-128	280
10	BoolT5sgp8k	8-Symmetry Problem	-256	320
11	BoolT5sgp9k	9-Symmetry Problem	-512	360

Table: Parameters of Treatments of Experiment ExpF

The Production Table of Experiment ExpF

	LHS	RHS
1	<fe>	<f0>
2	<fe>	<f1>(<fe>)
3	<fe>	<f2>(<fe>,<fe>)
4	<f0>	D1
5	<f0>	D2
6	<f0>	D3
7	<f0>	D4
8	<f0>	D5
9	<f0>	D6
10	<f0>	D7
11	<f0>	D8
12	<f0>	D9
13	<f0>	D10
14	<fe>	sPair<sympairs>
15	<sympairs>	(D1,D10)

Table: The Production Table of Experiment ExpF (Part 1)

The Production Table of Experiment ExpF

	LHS	RHS
16	<sympairs>	(NOT(D1),NOT(D10))
17	<sympairs>	(D2,D9)
18	<sympairs>	(NOT(D2),NOT(D9))
19	<sympairs>	(D3,D8)
20	<sympairs>	(NOT(D3),NOT(D8))
21	<sympairs>	(D4,D7)
22	<sympairs>	(NOT(D4),NOT(D7))
23	<sympairs>	(D5,D6)
24	<sympairs>	(NOT(D5),NOT(D6))
25	<f1>	NOT
26	<f2>	OR
27	<f2>	AND

Table: The Production Table of Experiment ExpF (Part 2)

Fitness. $k=2, \dots, 12$.

	Treatment	Trials	Variable	min	mean	sd	max
1	BoolT5sgp10k	10	Fitness	0.00	0.00	0.00	0.00
5	BoolT5sgp11k	10	Fitness	0.00	0.00	0.00	0.00
9	BoolT5sgp12k	10	Fitness	0.00	16.00	16.87	32.00
13	BoolT5sgp2k	10	Fitness	0.00	0.00	0.00	0.00
17	BoolT5sgp3k	10	Fitness	0.00	0.00	0.00	0.00
21	BoolT5sgp4k	10	Fitness	0.00	0.00	0.00	0.00
25	BoolT5sgp5k	10	Fitness	0.00	0.00	0.00	0.00
29	BoolT5sgp6k	10	Fitness	0.00	0.00	0.00	0.00
33	BoolT5sgp7k	10	Fitness	0.00	0.00	0.00	0.00
37	BoolT5sgp8k	10	Fitness	0.00	0.00	0.00	0.00
41	BoolT5sgp9k	10	Fitness	0.00	0.00	0.00	0.00

Table: Fitness. $k=2, \dots, 12$.

Seconds. $k=2, \dots, 12$.

	Treatment	Trials	Variable	min	mean	sd	max
2	BoolT5sgp10k	10	Seconds	13.13	126.76	104.94	367.04
6	BoolT5sgp11k	10	Seconds	52.10	214.71	204.00	732.73
10	BoolT5sgp12k	10	Seconds	587.79	2164.05	867.99	3009.62
14	BoolT5sgp2k	10	Seconds	0.16	0.19	0.02	0.24
18	BoolT5sgp3k	10	Seconds	0.18	0.20	0.01	0.21
22	BoolT5sgp4k	10	Seconds	0.18	0.24	0.08	0.46
26	BoolT5sgp5k	10	Seconds	0.23	0.35	0.14	0.68
30	BoolT5sgp6k	10	Seconds	0.57	2.00	2.00	7.42
34	BoolT5sgp7k	10	Seconds	0.52	1.91	0.86	2.98
38	BoolT5sgp8k	10	Seconds	6.10	19.12	7.29	29.78
42	BoolT5sgp9k	10	Seconds	4.45	15.40	10.97	44.27

Table: Seconds. $k=2, \dots, 12$.

Generations. $k=2, \dots 12$.

	Treatment	Trials	Variable	min	mean	sd	max
3	BoolT5sgp10k	10	Generations	13.00	90.30	62.90	218.00
7	BoolT5sgp11k	10	Generations	26.00	88.40	75.74	281.00
11	BoolT5sgp12k	10	Generations	114.00	395.90	153.11	500.00
15	BoolT5sgp2k	10	Generations	1.00	1.00	0.00	1.00
19	BoolT5sgp3k	10	Generations	1.00	1.00	0.00	1.00
23	BoolT5sgp4k	10	Generations	1.00	1.20	0.63	3.00
27	BoolT5sgp5k	10	Generations	1.00	1.50	0.97	4.00
31	BoolT5sgp6k	10	Generations	3.00	8.60	6.06	24.00
35	BoolT5sgp7k	10	Generations	1.00	6.40	3.13	11.00
39	BoolT5sgp8k	10	Generations	13.00	38.10	12.04	53.00
43	BoolT5sgp9k	10	Generations	7.00	23.90	15.91	65.00

Table: Generations. $k=2, \dots 12$.

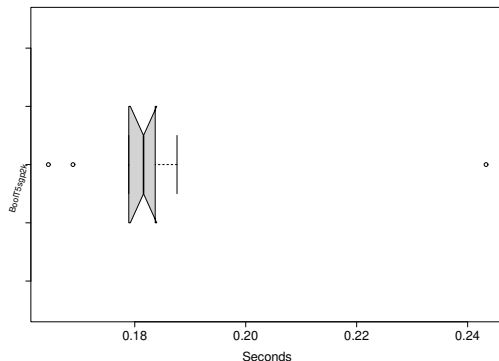
Do we always find the optimal program?

TODO

- For grammar T5: **Yes**. For grammar T4: **No**. (Not for the 6-symmetry problem with 500 generations.
- For the 6-symmetry problem, the grammar T4 has maximum of 6 errors.

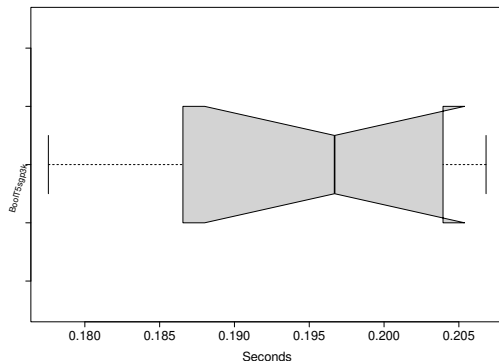
How long to find an optimal solution?

Distribution of Time (s) for Grammars. sgp2k symmetry.



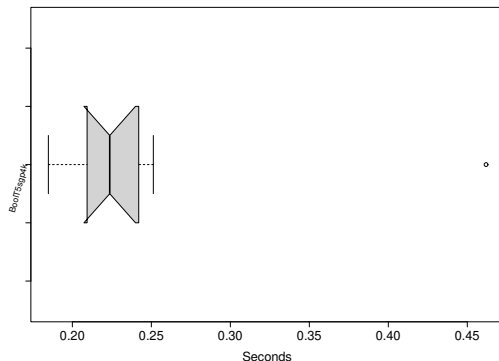
How long to find an optimal solution?

Distribution of Time (s) for Grammars. sgp3k symmetry.



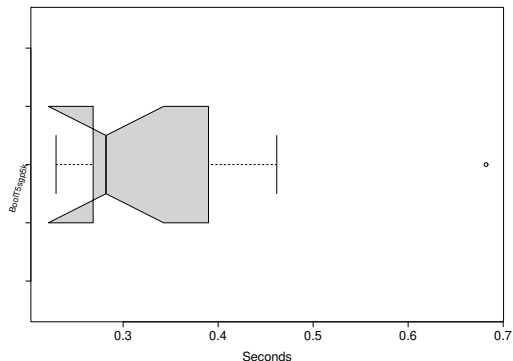
How long to find an optimal solution?

Distribution of Time (s) for Grammars. sgp4k symmetry.



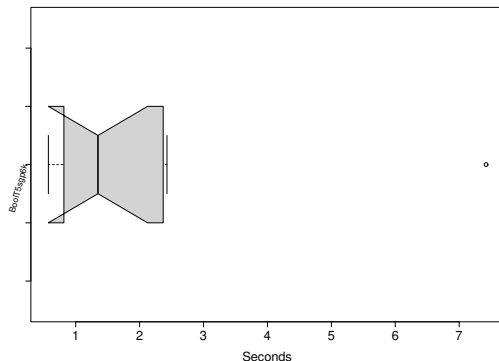
How long to find an optimal solution?

Distribution of Time (s) for Grammars. sgp5k symmetry.



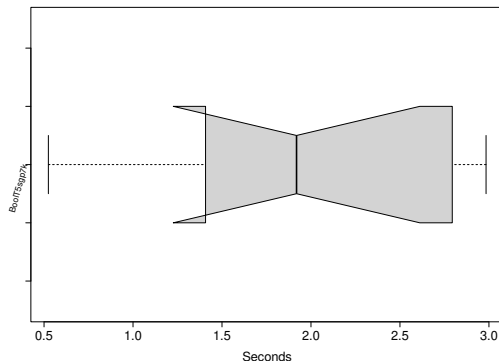
How long to find an optimal solution?

Distribution of Time (s) for Grammars. sgp6k symmetry.



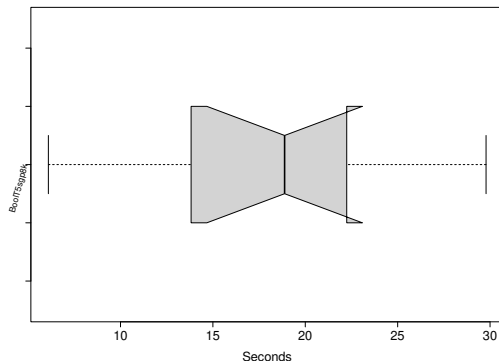
How long to find an optimal solution?

Distribution of Time (s) for Grammars. sgp7k symmetry.



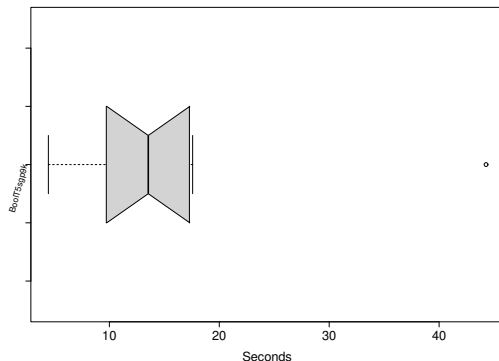
How long to find an optimal solution?

Distribution of Time (s) for Grammars. sgp8k symmetry.



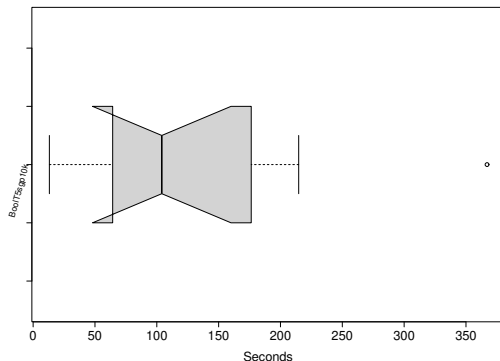
How long to find an optimal solution?

Distribution of Time (s) for Grammars. sgp9k symmetry.



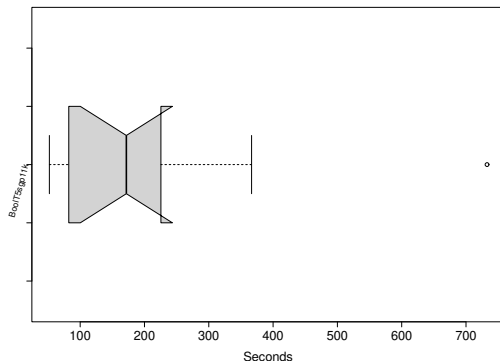
How long to find an optimal solution?

Distribution of Time (s) for Grammars. sgp10k symmetry.

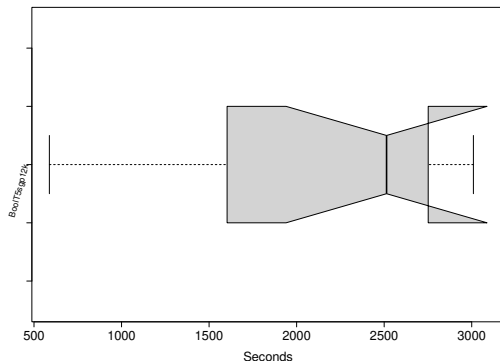


How long to find an optimal solution?

Distribution of Time (s) for Grammars. sgp11k symmetry.

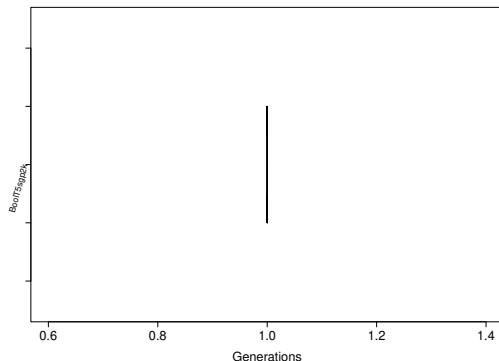


Distribution of Time (s) for Grammars. sgp12k symmetry.



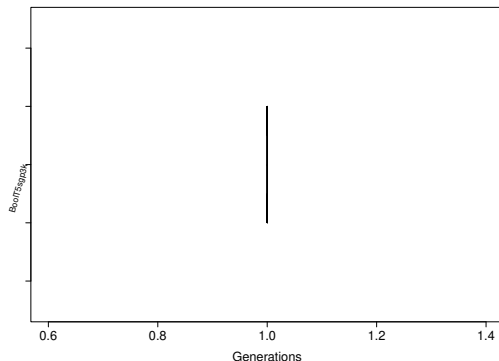
How long to find an optimal solution?

Distribution of Number of Generations for Grammars. sgp2k symmetry.

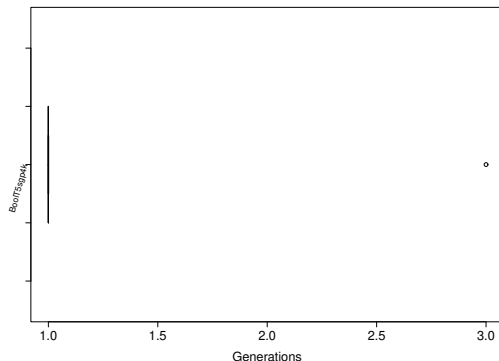


How long to find an optimal solution?

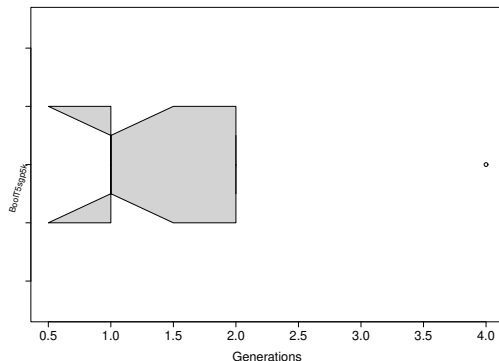
Distribution of Number of Generations for Grammars. sgp3k symmetry.



Distribution of Number of Generations for Grammars. sgp4k symmetry.

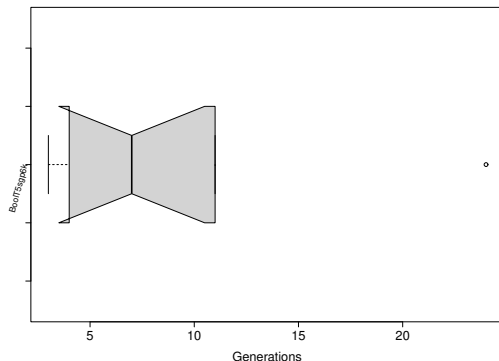


Distribution of Number of Generations for Grammars. sgp5k symmetry.



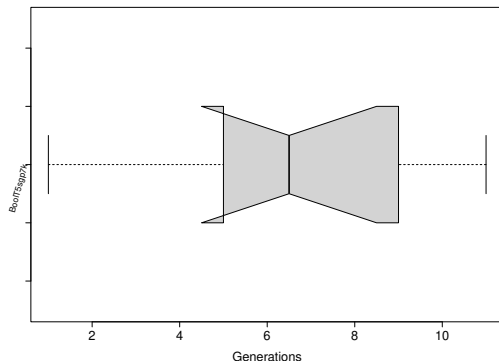
How long to find an optimal solution?

Distribution of Number of Generations for Grammars. sgp6k symmetry.



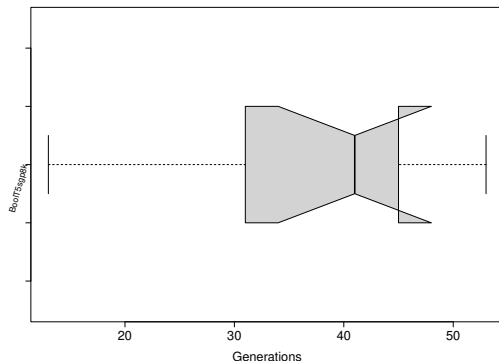
How long to find an optimal solution?

Distribution of Number of Generations for Grammars. sgp7k symmetry.



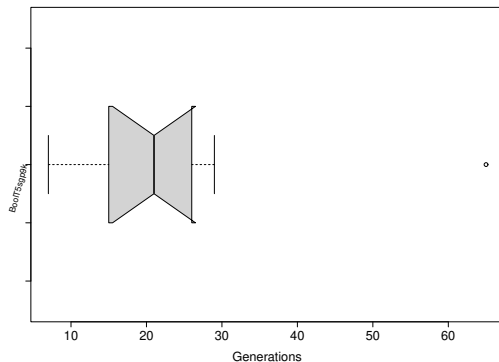
How long to find an optimal solution?

Distribution of Number of Generations for Grammars. sgp8k symmetry.



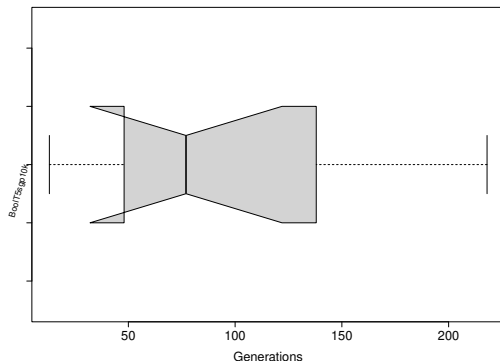
How long to find an optimal solution?

Distribution of Number of Generations for Grammars. sgp9k symmetry.



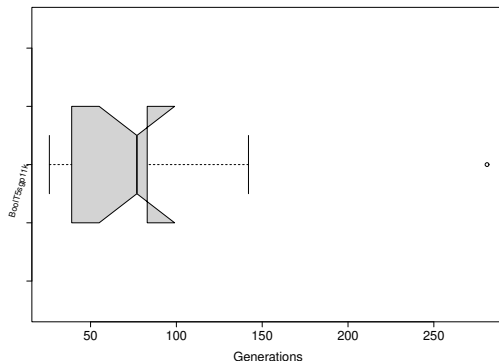
How long to find an optimal solution?

Distribution of Number of Generations for Grammars. sgp10k symmetry.



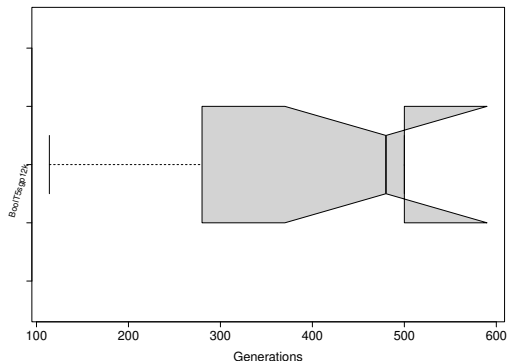
How long to find an optimal solution?

Distribution of Number of Generations for Grammars. sgp11k symmetry.



How long to find an optimal solution?

Distribution of Number of Generations for Grammars. sgp12k symmetry.

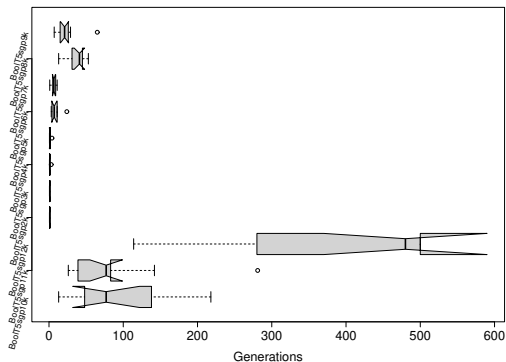


Which grammar performs best?

TODO

- **Grammar T5** performs **best** (by two orders of magnitude).
For the 6-symmetry problem:
Grammar T4: 460.68 mean(Generations) 100.68
std(Generations).
Grammar T5: 7.22 mean(Generations) 4.27 std(Generations).
 $\max(\text{Generations}_{T5}) = 23.00$.
 $\min(\text{Generations}_{T4}) = 95.00$.
Statistically significant? Not tested. Expect highly significant.

Distribution of Number of Generations for Grammar T5



Growth of Complexity?

TODO

- Complexity grows in steps of 2 of k . The 2- and 3-symmetry problem need the same boolean expression, but with different variables: For the 2-symmetry problem, D1 and D2. For the 3-symmetry problem, D1 and D3, D2 is ignored.
- Grammar T5 scales well with problem size growth.
Reason: The combination of **grammar** and **language** tuning. The generation of pairs of symbols (grammar tuning) and the new function sPair. It takes a symbol pair as its arguments eliminates the need to expand a non-terminal twice with the same symbol pair (language tuning).

Further Research.

Integrate grammar and language tuning into grammar-based genetic programming algorithms.

Mechanisms: Automatic function definitions from frontiers of derivation trees.

Grammar evolution from frontiers of derivation trees.

Summary of statistics of experiment ExpF.

	Treatment	Trials	Variable	min	mean	sd	max
4	BoolT5sgp10k	10	Evaluations	2600.00	18060.00	12579.37	43600.00
8	BoolT5sgp11k	10	Evaluations	5200.00	17680.00	15147.34	56200.00
12	BoolT5sgp12k	10	Evaluations	22800.00	79180.00	30621.77	100000.00
16	BoolT5sgp2k	10	Evaluations	200.00	200.00	0.00	200.00
20	BoolT5sgp3k	10	Evaluations	200.00	200.00	0.00	200.00
24	BoolT5sgp4k	10	Evaluations	200.00	240.00	126.49	600.00
28	BoolT5sgp5k	10	Evaluations	200.00	300.00	194.37	800.00
32	BoolT5sgp6k	10	Evaluations	600.00	1720.00	1211.79	4800.00
36	BoolT5sgp7k	10	Evaluations	200.00	1280.00	626.81	2200.00
40	BoolT5sgp8k	10	Evaluations	2600.00	7620.00	2408.23	10600.00
44	BoolT5sgp9k	10	Evaluations	1400.00	4780.00	3182.52	13000.00
1	BoolT5sgp10k	10	Fitness	0.00	0.00	0.00	0.00
5	BoolT5sgp11k	10	Fitness	0.00	0.00	0.00	0.00
9	BoolT5sgp12k	10	Fitness	0.00	16.00	16.87	32.00
13	BoolT5sgp2k	10	Fitness	0.00	0.00	0.00	0.00

Table: Summary of statistics of experiment ExpF. (Part 1)

Summary of statistics of experiment ExpF.

	Treatment	Trials	Variable	min	mean	sd	max
17	BoolT5sgp3k	10	Fitness	0.00	0.00	0.00	0.00
21	BoolT5sgp4k	10	Fitness	0.00	0.00	0.00	0.00
25	BoolT5sgp5k	10	Fitness	0.00	0.00	0.00	0.00
29	BoolT5sgp6k	10	Fitness	0.00	0.00	0.00	0.00
33	BoolT5sgp7k	10	Fitness	0.00	0.00	0.00	0.00
37	BoolT5sgp8k	10	Fitness	0.00	0.00	0.00	0.00
41	BoolT5sgp9k	10	Fitness	0.00	0.00	0.00	0.00
3	BoolT5sgp10k	10	Generations	13.00	90.30	62.90	218.00
7	BoolT5sgp11k	10	Generations	26.00	88.40	75.74	281.00
11	BoolT5sgp12k	10	Generations	114.00	395.90	153.11	500.00
15	BoolT5sgp2k	10	Generations	1.00	1.00	0.00	1.00
19	BoolT5sgp3k	10	Generations	1.00	1.00	0.00	1.00
23	BoolT5sgp4k	10	Generations	1.00	1.20	0.63	3.00
27	BoolT5sgp5k	10	Generations	1.00	1.50	0.97	4.00
31	BoolT5sgp6k	10	Generations	3.00	8.60	6.06	24.00

Table: Summary of statistics of experiment ExpF. (Part 2)

Summary of statistics of experiment ExpF.

	Treatment	Trials	Variable	min	mean	sd	max
35	BoolT5sgp7k	10	Generations	1.00	6.40	3.13	11.00
39	BoolT5sgp8k	10	Generations	13.00	38.10	12.04	53.00
43	BoolT5sgp9k	10	Generations	7.00	23.90	15.91	65.00
2	BoolT5sgp10k	10	Seconds	13.13	126.76	104.94	367.04
6	BoolT5sgp11k	10	Seconds	52.10	214.71	204.00	732.73
10	BoolT5sgp12k	10	Seconds	587.79	2164.05	867.99	3009.62
14	BoolT5sgp2k	10	Seconds	0.16	0.19	0.02	0.24
18	BoolT5sgp3k	10	Seconds	0.18	0.20	0.01	0.21
22	BoolT5sgp4k	10	Seconds	0.18	0.24	0.08	0.46
26	BoolT5sgp5k	10	Seconds	0.23	0.35	0.14	0.68
30	BoolT5sgp6k	10	Seconds	0.57	2.00	2.00	7.42
34	BoolT5sgp7k	10	Seconds	0.52	1.91	0.86	2.98
38	BoolT5sgp8k	10	Seconds	6.10	19.12	7.29	29.78
42	BoolT5sgp9k	10	Seconds	4.45	15.40	10.97	44.27

Table: Summary of statistics of experiment ExpF. (Part 3)

Parameters of treatment: BoolT5sgp10k

	Parameter Values
tRNG	L'Ecuyer-CMRG Inversion Rejection
tReplay	0
experimentName	EE
treatmentName	BoolT5sgp10k
trials	10
everyK	10
outpath	data
batchPath	.
tVerbose	1

Table: Parameters of treatment: BoolT5sgp10k

Parameters of treatment BoolT5sgp10k passed to xegaRun

	Parameter Values
penv	10-Symmetry Problem
grammar	/home/dj2333/dev/cran/kSymmetry/BNF/AndOrNotTuned5.txt
replay	0
algorithm	sgp
maxdepth	7
max	FALSE
worstFitness	-1024
popsiz	200
generations	500
crossrate	0.2
mutrate	0.4
ivmutrate	Const
mutrate2	0.8
ivcrossrate	Const
crossrate2	0.4

Table: Parameters of treatment BoolT5sgp10k passed to xegaRun (Part 1)

Parameters of treatment BoolT5sgp10k passed to xegaRun

	Parameter Values
scalefactor	Uniform
genemap	Bin2Dec
initgene	InitGene
selection	SUS
mateselection	SUS
replication	Kid2
crossover	Cross2Gene
mutation	MutateGene
accept	All
reportEvalErrors	TRUE
codons	400
codonPrecision	LCM
terminationEps	-0.1
terminationCondition	AbsoluteError
evalmethod	Deterministic

Table: Parameters of treatment BoolT5sgp10k passed to xegaRun (Part 2)

Parameters of treatment BoolT5sgp10k passed to xegaRun

	Parameter Values
executionModel	MultiCore
verbose	1
batch	FALSE
semantics	byValue
path	.

Table: Parameters of treatment BoolT5sgp10k passed to xegaRun (Part 3)

Treatment: BoolT5sgp10k

	Treatment	Trials	Variable	min	mean	sd	max
4	BoolT5sgp10k	10	Evaluations	2600.00	18060.00	12579.37	43600.00
1	BoolT5sgp10k	10	Fitness	0.00	0.00	0.00	0.00
3	BoolT5sgp10k	10	Generations	13.00	90.30	62.90	218.00
2	BoolT5sgp10k	10	Seconds	13.13	126.76	104.94	367.04

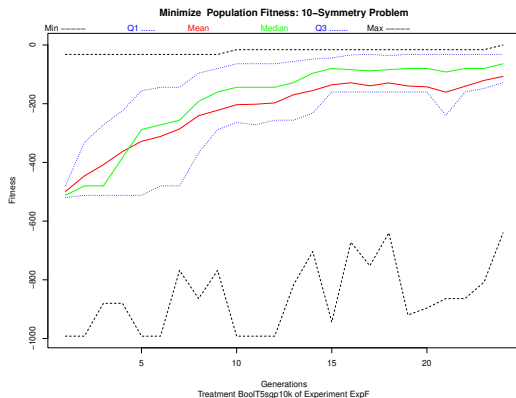
Table: Treatment: BoolT5sgp10k

The Solution Table of Treatment BoolT5sgp10k of Experiment ExpF. Fit: 0. Unique Shortest Solutions: 10.

	Solution
1	AND(sPair(D1, D10), AND(AND(AND(sPair(NOT(D4), NOT(D7)), sPair(NOT(D3), NOT(D8))), sPair(NOT(D5), NOT(D6))), sPair(NOT(D2), NOT(D9))))

Table: The Solution Table of Treatment BoolT5sgp10k of Experiment ExpF. Fit: 0. Unique Shortest Solutions: 10.

Plot of last xegaRun for Treatment BoolT5sgp10k of Experiment ExpF



Parameters of treatment: BoolT5sgp11k

	Parameter Values
tRNG	L'Ecuyer-CMRG Inversion Rejection
tReplay	0
experimentName	EE
treatmentName	BoolT5sgp11k
trials	10
everyK	10
outpath	data
batchPath	.
tVerbose	1

Table: Parameters of treatment: BoolT5sgp11k

Parameters of treatment BoolT5sgp11k passed to xegaRun

	Parameter Values
penv	11-Symmetry Problem
grammar	/home/dj2333/dev/cran/kSymmetry/BNF/AndOrNotTuned5.txt
replay	0
algorithm	sgp
maxdepth	7
max	FALSE
worstFitness	-2048
popsiz	200
generations	500
crossrate	0.2
mutrate	0.4
ivmutrate	Const
mutrate2	0.8
ivcrossrate	Const
crossrate2	0.4

Table: Parameters of treatment BoolT5sgp11k passed to xegaRun (Part 1)

Parameters of treatment BoolT5sgp11k passed to xegaRun

	Parameter Values
scalefactor	Uniform
genemap	Bin2Dec
initgene	InitGene
selection	SUS
mateselection	SUS
replication	Kid2
crossover	Cross2Gene
mutation	MutateGene
accept	All
reportEvalErrors	TRUE
codons	440
codonPrecision	LCM
terminationEps	-0.1
terminationCondition	AbsoluteError
evalmethod	Deterministic

Table: Parameters of treatment BoolT5sgp11k passed to xegaRun (Part 2)

Parameters of treatment BoolT5sgp11k passed to xegaRun

	Parameter Values
executionModel	MultiCore
verbose	1
batch	FALSE
semantics	byValue
path	.

Table: Parameters of treatment BoolT5sgp11k passed to xegaRun (Part 3)

Treatment: BoolT5sgp11k

	Treatment	Trials	Variable	min	mean	sd	max
8	BoolT5sgp11k	10	Evaluations	5200.00	17680.00	15147.34	56200.00
5	BoolT5sgp11k	10	Fitness	0.00	0.00	0.00	0.00
7	BoolT5sgp11k	10	Generations	26.00	88.40	75.74	281.00
6	BoolT5sgp11k	10	Seconds	52.10	214.71	204.00	732.73

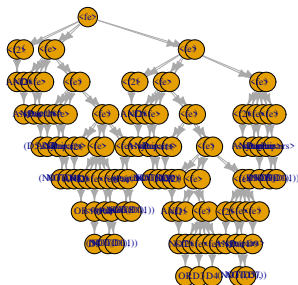
Table: Treatment: BoolT5sgp11k

The Solution Table of Treatment BoolT5sgp11k of Experiment ExpF. Fit: 0. Unique Shortest Solutions: 10.

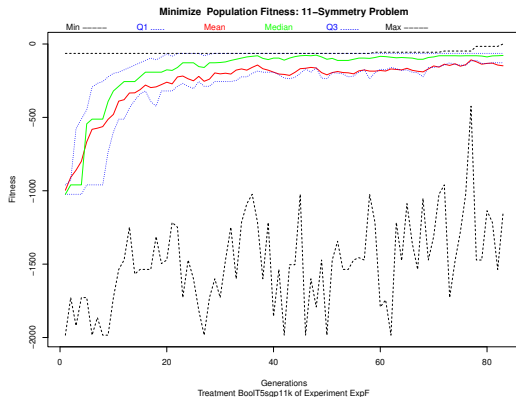
	Solution
1	$\text{NOT}(\text{NOT}(\text{AND}(\text{sPair}(\text{NOT}(\text{D1}), \text{NOT}(\text{D11})),$ $\text{AND}(\text{AND}(\text{AND}(\text{sPair}(\text{NOT}(\text{D3}), \text{NOT}(\text{D9})), \text{sPair}(\text{D5}, \text{D7})),$ $\text{AND}(\text{sPair}(\text{D1}, \text{D11}), \text{sPair}(\text{D2}, \text{D10}))), \text{sPair}(\text{D4}, \text{D8}))))))$

Table: The Solution Table of Treatment BoolT5sgp11k of Experiment ExpF. Fit: 0. Unique Shortest Solutions: 10.

The Derivation Tree of a Solution of Treatment BoolT5sgp11k of Experiment ExpF



Plot of last xegaRun for Treatment BoolT5sgp11k of Experiment ExpF



Parameters of treatment: BoolT5sgp12k

	Parameter Values
tRNG	L'Ecuyer-CMRG Inversion Rejection
tReplay	0
experimentName	EE
treatmentName	BoolT5sgp12k
trials	10
everyK	10
outpath	data
batchPath	.
tVerbose	1

Table: Parameters of treatment: BoolT5sgp12k

Parameters of treatment BoolT5sgp12k passed to xegaRun

	Parameter Values
penv	12-Symmetry Problem
grammar	/home/dj2333/dev/cran/kSymmetry/BNF/AndOrNotTuned5.txt
replay	0
algorithm	sgp
maxdepth	7
max	FALSE
worstFitness	-4096
popsiz	200
generations	500
crossrate	0.2
mutrate	0.4
ivmutrate	Const
mutrate2	0.8
ivcrossrate	Const
crossrate2	0.4

Table: Parameters of treatment BoolT5sgp12k passed to xegaRun (Part 1)

Parameters of treatment BoolT5sgp12k passed to xegaRun

	Parameter Values
scalefactor	Uniform
genemap	Bin2Dec
initgene	InitGene
selection	SUS
mateselection	SUS
replication	Kid2
crossover	Cross2Gene
mutation	MutateGene
accept	All
reportEvalErrors	TRUE
codons	480
codonPrecision	LCM
terminationEps	-0.1
terminationCondition	AbsoluteError
evalmethod	Deterministic

Table: Parameters of treatment BoolT5sgp12k passed to xegaRun (Part 2)

Parameters of treatment BoolT5sgp12k passed to xegaRun

	Parameter Values
executionModel	MultiCore
verbose	1
batch	FALSE
semantics	byValue
path	.

Table: Parameters of treatment BoolT5sgp12k passed to xegaRun (Part 3)

Treatment: BoolT5sgp12k

	Treatment	Trials	Variable	min	mean	sd	max
12	BoolT5sgp12k	10	Evaluations	22800.00	79180.00	30621.77	100000.00
9	BoolT5sgp12k	10	Fitness	0.00	16.00	16.87	32.00
11	BoolT5sgp12k	10	Generations	114.00	395.90	153.11	500.00
10	BoolT5sgp12k	10	Seconds	587.79	2164.05	867.99	3009.00

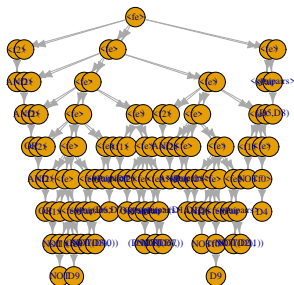
Table: Treatment: BoolT5sgp12k

The Solution Table of Treatment BoolT5sgp12k of Experiment ExpF. Fit: 0. Unique Shortest Solutions: 5.

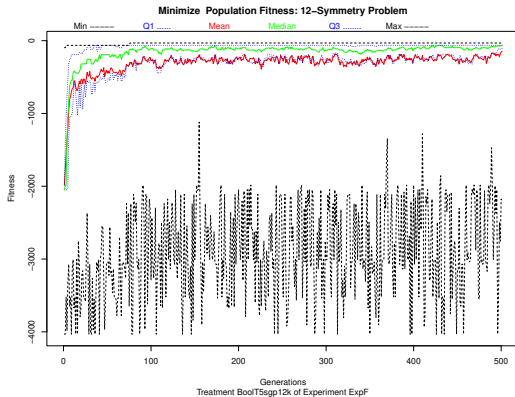
	Solution
1	AND(AND(AND(NOT(NOT(sPair(NOT(D3), NOT(D10)))), AND(sPair(D1, D12), sPair(NOT(D6), NOT(D7)))), sPair(NOT(D6), NOT(D7))), AND(AND(AND(sPair(NOT(D2), NOT(D11)), OR(sPair(D1, D12), NOT(D4))), AND(OR(NOT(D5), sPair(D2, D11)), sPair(NOT(D5), NOT(D8)))), sPair(D4, D9)))

Table: The Solution Table of Treatment BoolT5sgp12k of Experiment ExpF. Fit: 0. Unique Shortest Solutions: 5.

The Derivation Tree of a Solution of Treatment BoolT5sgp12k of Experiment ExpF



Plot of last xegaRun for Treatment BoolT5sgp12k of Experiment ExpF



Parameters of treatment: BoolT5sgp2k

	Parameter Values
tRNG	L'Ecuyer-CMRG Inversion Rejection
tReplay	0
experimentName	EE
treatmentName	BoolT5sgp2k
trials	10
everyK	10
outpath	data
batchPath	.
tVerbose	1

Table: Parameters of treatment: BoolT5sgp2k

Parameters of treatment BoolT5sgp2k passed to xegaRun

		Parameter Values
penv		2-Symmetry Problem
grammar	/home/dj2333/dev/cran/kSymmetry/BNF/AndOrNotTuned5.txt	
replay		0
algorithm		sgp
maxdepth		7
max		FALSE
worstFitness		-4
popsiz		200
generations		500
crossrate		0.2
mutrate		0.4
ivmutrate		Const
mutrate2		0.8
ivcrossrate		Const
crossrate2		0.4

Table: Parameters of treatment BoolT5sgp2k passed to xegaRun (Part 1)

Parameters of treatment BoolT5sgp2k passed to xegaRun

	Parameter Values
scalefactor	Uniform
genemap	Bin2Dec
initgene	InitGene
selection	SUS
mateselection	SUS
replication	Kid2
crossover	Cross2Gene
mutation	MutateGene
accept	All
reportEvalErrors	TRUE
codons	80
codonPrecision	LCM
terminationEps	-0.1
terminationCondition	AbsoluteError
evalmethod	Deterministic

Table: Parameters of treatment BoolT5sgp2k passed to xegaRun (Part 2)

Parameters of treatment BoolT5sgp2k passed to xegaRun

	Parameter Values
executionModel	MultiCore
verbose	1
batch	FALSE
semantics	byValue
path	.

Table: Parameters of treatment BoolT5sgp2k passed to xegaRun (Part 3)

Treatment: BoolT5sgp2k

	Treatment	Trials	Variable	min	mean	sd	max
16	BoolT5sgp2k	10	Evaluations	200.00	200.00	0.00	200.00
13	BoolT5sgp2k	10	Fitness	0.00	0.00	0.00	0.00
15	BoolT5sgp2k	10	Generations	1.00	1.00	0.00	1.00
14	BoolT5sgp2k	10	Seconds	0.16	0.19	0.02	0.24

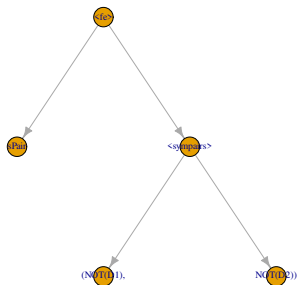
Table: Treatment: BoolT5sgp2k

The Solution Table of Treatment BoolT5sgp2k of Experiment ExpF. Fit: 0. Unique Shortest Solutions: 6.

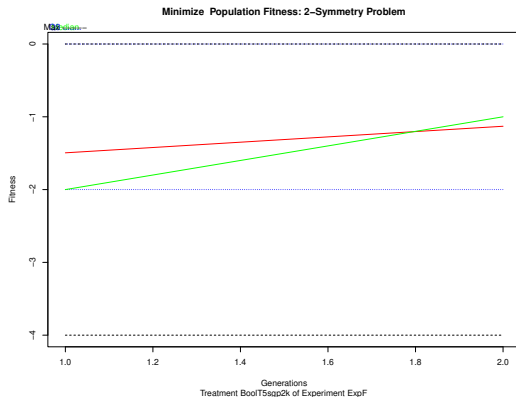
Solution	
1	sPair(D1, D2)

Table: The Solution Table of Treatment BoolT5sgp2k of Experiment ExpF. Fit: 0. Unique Shortest Solutions: 6.

The Derivation Tree of a Solution of Treatment BoolT5sgp2k of Experiment ExpF



Plot of last xegaRun for Treatment BoolT5sgp2k of Experiment ExpF



Parameters of treatment: BoolT5sgp3k

	Parameter Values
tRNG	L'Ecuyer-CMRG Inversion Rejection
tReplay	0
experimentName	EE
treatmentName	BoolT5sgp3k
trials	10
everyK	10
outpath	data
batchPath	.
tVerbose	1

Table: Parameters of treatment: BoolT5sgp3k

Parameters of treatment BoolT5sgp3k passed to xegaRun

		Parameter Values
penv		3-Symmetry Problem
grammar	/home/dj2333/dev/cran/kSymmetry/BNF/AndOrNotTuned5.txt	
replay		0
algorithm		sgp
maxdepth		7
max		FALSE
worstFitness		-8
popsiz		200
generations		500
crossrate		0.2
mutrate		0.4
ivmutrate		Const
mutrate2		0.8
ivcrossrate		Const
crossrate2		0.4

Table: Parameters of treatment BoolT5sgp3k passed to xegaRun (Part 1)

Parameters of treatment BoolT5sgp3k passed to xegaRun

	Parameter Values
scalefactor	Uniform
genemap	Bin2Dec
initgene	InitGene
selection	SUS
mateselection	SUS
replication	Kid2
crossover	Cross2Gene
mutation	MutateGene
accept	All
reportEvalErrors	TRUE
codons	120
codonPrecision	LCM
terminationEps	-0.1
terminationCondition	AbsoluteError
evalmethod	Deterministic

Table: Parameters of treatment BoolT5sgp3k passed to xegaRun (Part 2)

Parameters of treatment BoolT5sgp3k passed to xegaRun

	Parameter Values
executionModel	MultiCore
verbose	1
batch	FALSE
semantics	byValue
path	.

Table: Parameters of treatment BoolT5sgp3k passed to xegaRun (Part 3)

Treatment: BoolT5sgp3k

	Treatment	Trials	Variable	min	mean	sd	max
20	BoolT5sgp3k	10	Evaluations	200.00	200.00	0.00	200.00
17	BoolT5sgp3k	10	Fitness	0.00	0.00	0.00	0.00
19	BoolT5sgp3k	10	Generations	1.00	1.00	0.00	1.00
18	BoolT5sgp3k	10	Seconds	0.18	0.20	0.01	0.21

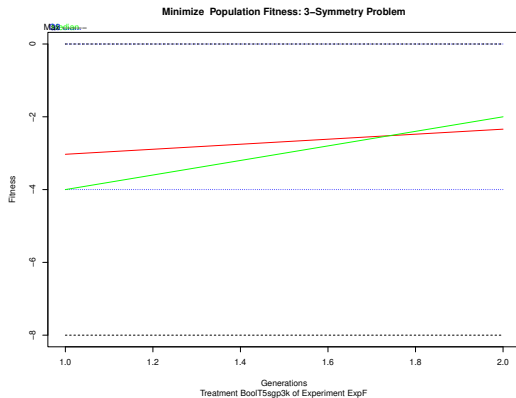
Table: Treatment: BoolT5sgp3k

The Solution Table of Treatment BoolT5sgp3k of Experiment ExpF. Fit: 0. Unique Shortest Solutions: 4.

Solution	
1	sPair(D1, D3)

Table: The Solution Table of Treatment BoolT5sgp3k of Experiment ExpF. Fit: 0. Unique Shortest Solutions: 4.

Plot of last xegaRun for Treatment BoolT5sgp3k of Experiment ExpF



Parameters of treatment: BoolT5sgp4k

	Parameter Values
tRNG	L'Ecuyer-CMRG Inversion Rejection
tReplay	0
experimentName	EE
treatmentName	BoolT5sgp4k
trials	10
everyK	10
outpath	data
batchPath	.
tVerbose	1

Table: Parameters of treatment: BoolT5sgp4k

Parameters of treatment BoolT5sgp4k passed to xegaRun

		Parameter Values
penv		4-Symmetry Problem
grammar	/home/dj2333/dev/cran/kSymmetry/BNF/AndOrNotTuned5.txt	
replay		0
algorithm		sgp
maxdepth		7
max		FALSE
worstFitness		-16
popsiz		200
generations		500
crossrate		0.2
mutrate		0.4
ivmutrate		Const
mutrate2		0.8
ivcrossrate		Const
crossrate2		0.4

Table: Parameters of treatment BoolT5sgp4k passed to xegaRun (Part 1)

Parameters of treatment BoolT5sgp4k passed to xegaRun

	Parameter Values
scalefactor	Uniform
genemap	Bin2Dec
initgene	InitGene
selection	SUS
mateselection	SUS
replication	Kid2
crossover	Cross2Gene
mutation	MutateGene
accept	All
reportEvalErrors	TRUE
codons	160
codonPrecision	LCM
terminationEps	-0.1
terminationCondition	AbsoluteError
evalmethod	Deterministic

Table: Parameters of treatment BoolT5sgp4k passed to xegaRun (Part 2)

Parameters of treatment BoolT5sgp4k passed to xegaRun

	Parameter Values
executionModel	MultiCore
verbose	1
batch	FALSE
semantics	byValue
path	.

Table: Parameters of treatment BoolT5sgp4k passed to xegaRun (Part 3)

Treatment: BoolT5sgp4k

	Treatment	Trials	Variable	min	mean	sd	max
24	BoolT5sgp4k	10	Evaluations	200.00	240.00	126.49	600.00
21	BoolT5sgp4k	10	Fitness	0.00	0.00	0.00	0.00
23	BoolT5sgp4k	10	Generations	1.00	1.20	0.63	3.00
22	BoolT5sgp4k	10	Seconds	0.18	0.24	0.08	0.46

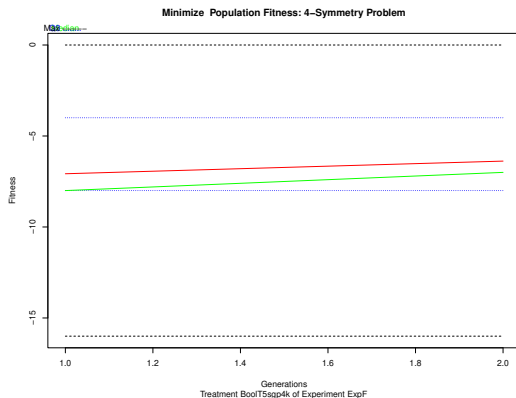
Table: Treatment: BoolT5sgp4k

The Solution Table of Treatment BoolT5sgp4k of Experiment ExpF. Fit: 0. Unique Shortest Solutions: 8.

Solution	
1	AND(sPair(D1, D4), sPair(D2, D3))

Table: The Solution Table of Treatment BoolT5sgp4k of Experiment ExpF. Fit: 0. Unique Shortest Solutions: 8.

Plot of last xegaRun for Treatment BoolT5sgp4k of Experiment ExpF



Parameters of treatment: BoolT5sgp5k

	Parameter Values
tRNG	L'Ecuyer-CMRG Inversion Rejection
tReplay	0
experimentName	EE
treatmentName	BoolT5sgp5k
trials	10
everyK	10
outpath	data
batchPath	.
tVerbose	1

Table: Parameters of treatment: BoolT5sgp5k

Parameters of treatment BoolT5sgp5k passed to xegaRun

		Parameter Values
penv	5-Symmetry Problem	
grammar	/home/dj2333/dev/cran/kSymmetry/BNF/AndOrNotTuned5.txt	
replay	0	
algorithm	sgp	
maxdepth	7	
max	FALSE	
worstFitness	-32	
popsiz	200	
generations	500	
crossrate	0.2	
mutrate	0.4	
ivmutrate	Const	
mutrate2	0.8	
ivcrossrate	Const	
crossrate2	0.4	

Table: Parameters of treatment BoolT5sgp5k passed to xegaRun (Part 1)

Parameters of treatment BoolT5sgp5k passed to xegaRun

	Parameter Values
scalefactor	Uniform
genemap	Bin2Dec
initgene	InitGene
selection	SUS
mateselection	SUS
replication	Kid2
crossover	Cross2Gene
mutation	MutateGene
accept	All
reportEvalErrors	TRUE
codons	200
codonPrecision	LCM
terminationEps	-0.1
terminationCondition	AbsoluteError
evalmethod	Deterministic

Table: Parameters of treatment BoolT5sgp5k passed to xegaRun (Part 2)

Parameters of treatment BoolT5sgp5k passed to xegaRun

	Parameter Values
executionModel	MultiCore
verbose	1
batch	FALSE
semantics	byValue
path	.

Table: Parameters of treatment BoolT5sgp5k passed to xegaRun (Part 3)

Treatment: BoolT5sgp5k

	Treatment	Trials	Variable	min	mean	sd	max
28	BoolT5sgp5k	10	Evaluations	200.00	300.00	194.37	800.00
25	BoolT5sgp5k	10	Fitness	0.00	0.00	0.00	0.00
27	BoolT5sgp5k	10	Generations	1.00	1.50	0.97	4.00
26	BoolT5sgp5k	10	Seconds	0.23	0.35	0.14	0.68

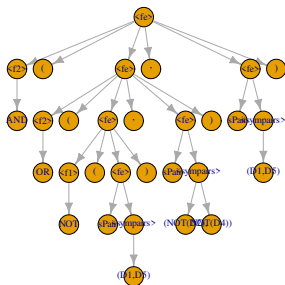
Table: Treatment: BoolT5sgp5k

The Solution Table of Treatment BoolT5sgp5k of Experiment ExpF. Fit: 0. Unique Shortest Solutions: 9.

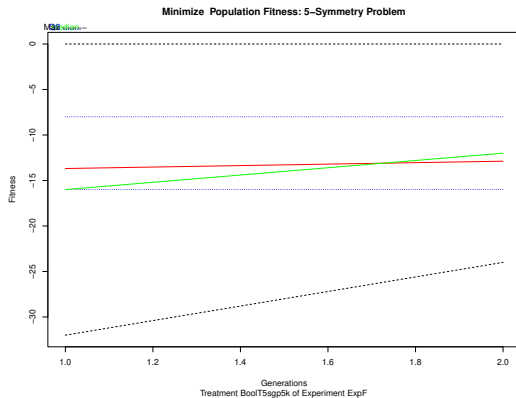
Solution	
1	AND(sPair(D2, D4), sPair(D1, D5))

Table: The Solution Table of Treatment BoolT5sgp5k of Experiment ExpF. Fit: 0. Unique Shortest Solutions: 9.

The Derivation Tree of a Solution of Treatment BoolT5sgp5k of Experiment ExpF



Plot of last xegaRun for Treatment BoolT5sgp5k of Experiment ExpF



Parameters of treatment: BoolT5sgp6k

	Parameter Values
tRNG	L'Ecuyer-CMRG Inversion Rejection
tReplay	0
experimentName	EE
treatmentName	BoolT5sgp6k
trials	10
everyK	10
outpath	data
batchPath	.
tVerbose	1

Table: Parameters of treatment: BoolT5sgp6k

Parameters of treatment BoolT5sgp6k passed to xegaRun

		Parameter Values
penv	6-Symmetry Problem	
grammar	/home/dj2333/dev/cran/kSymmetry/BNF/AndOrNotTuned5.txt	
replay	0	
algorithm	sgp	
maxdepth	7	
max	FALSE	
worstFitness	-64	
popsiz	200	
generations	500	
crossrate	0.2	
mutrate	0.4	
ivmutrate	Const	
mutrate2	0.8	
ivcrossrate	Const	
crossrate2	0.4	

Table: Parameters of treatment BoolT5sgp6k passed to xegaRun (Part 1)

Parameters of treatment BoolT5sgp6k passed to xegaRun

	Parameter Values
scalefactor	Uniform
genemap	Bin2Dec
initgene	InitGene
selection	SUS
mateselection	SUS
replication	Kid2
crossover	Cross2Gene
mutation	MutateGene
accept	All
reportEvalErrors	TRUE
codons	240
codonPrecision	LCM
terminationEps	-0.1
terminationCondition	AbsoluteError
evalmethod	Deterministic

Table: Parameters of treatment BoolT5sgp6k passed to xegaRun (Part 2)

Parameters of treatment BoolT5sgp6k passed to xegaRun

	Parameter Values
executionModel	MultiCore
verbose	1
batch	FALSE
semantics	byValue
path	.

Table: Parameters of treatment BoolT5sgp6k passed to xegaRun (Part 3)

Treatment: BoolT5sgp6k

	Treatment	Trials	Variable	min	mean	sd	max
32	BoolT5sgp6k	10	Evaluations	600.00	1720.00	1211.79	4800.00
29	BoolT5sgp6k	10	Fitness	0.00	0.00	0.00	0.00
31	BoolT5sgp6k	10	Generations	3.00	8.60	6.06	24.00
30	BoolT5sgp6k	10	Seconds	0.57	2.00	2.00	7.42

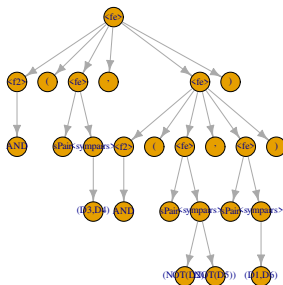
Table: Treatment: BoolT5sgp6k

The Solution Table of Treatment BoolT5sgp6k of Experiment ExpF. Fit: 0. Unique Shortest Solutions: 10.

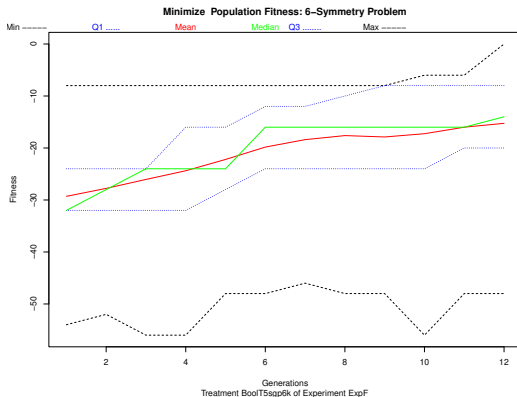
Solution	
1	AND(sPair(D2, D5), AND(sPair(D1, D6), sPair(D3, D4)))

Table: The Solution Table of Treatment BoolT5sgp6k of Experiment ExpF. Fit: 0. Unique Shortest Solutions: 10.

The Derivation Tree of a Solution of Treatment BoolT5sgp6k of Experiment ExpF



Plot of last xegaRun for Treatment BoolT5sgp6k of Experiment ExpF



Parameters of treatment: BoolT5sgp7k

	Parameter Values
tRNG	L'Ecuyer-CMRG Inversion Rejection
tReplay	0
experimentName	EE
treatmentName	BoolT5sgp7k
trials	10
everyK	10
outpath	data
batchPath	.
tVerbose	1

Table: Parameters of treatment: BoolT5sgp7k

Parameters of treatment BoolT5sgp7k passed to xegaRun

	Parameter Values
penv	7-Symmetry Problem
grammar	/home/dj2333/dev/cran/kSymmetry/BNF/AndOrNotTuned5.txt
replay	0
algorithm	sgp
maxdepth	7
max	FALSE
worstFitness	-128
popsiz	200
generations	500
crossrate	0.2
mutrate	0.4
ivmutrate	Const
mutrate2	0.8
ivcrossrate	Const
crossrate2	0.4

Table: Parameters of treatment BoolT5sgp7k passed to xegaRun (Part 1)

Parameters of treatment BoolT5sgp7k passed to xegaRun

	Parameter Values
scalefactor	Uniform
genemap	Bin2Dec
initgene	InitGene
selection	SUS
mateselection	SUS
replication	Kid2
crossover	Cross2Gene
mutation	MutateGene
accept	All
reportEvalErrors	TRUE
codons	280
codonPrecision	LCM
terminationEps	-0.1
terminationCondition	AbsoluteError
evalmethod	Deterministic

Table: Parameters of treatment BoolT5sgp7k passed to xegaRun (Part 2)

Parameters of treatment BoolT5sgp7k passed to xegaRun

	Parameter Values
executionModel	MultiCore
verbose	1
batch	FALSE
semantics	byValue
path	.

Table: Parameters of treatment BoolT5sgp7k passed to xegaRun (Part 3)

Treatment: BoolT5sgp7k

	Treatment	Trials	Variable	min	mean	sd	max
36	BoolT5sgp7k	10	Evaluations	200.00	1280.00	626.81	2200.00
33	BoolT5sgp7k	10	Fitness	0.00	0.00	0.00	0.00
35	BoolT5sgp7k	10	Generations	1.00	6.40	3.13	11.00
34	BoolT5sgp7k	10	Seconds	0.52	1.91	0.86	2.98

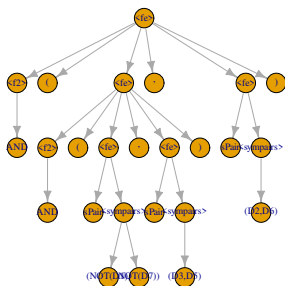
Table: Treatment: BoolT5sgp7k

The Solution Table of Treatment BoolT5sgp7k of Experiment ExpF. Fit: 0. Unique Shortest Solutions: 10.

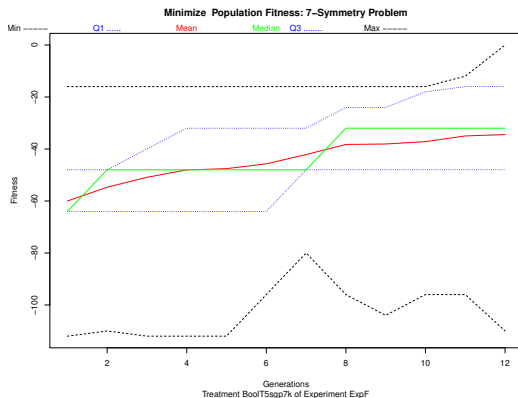
Solution	
1	AND(AND(sPair(NOT(D1), NOT(D7)), sPair(D3, D5)), sPair(D2, D6))

Table: The Solution Table of Treatment BoolT5sgp7k of Experiment ExpF. Fit: 0. Unique Shortest Solutions: 10.

The Derivation Tree of a Solution of Treatment BoolT5sgp7k of Experiment ExpF



Plot of last xegaRun for Treatment BoolT5sgp7k of Experiment ExpF



Parameters of treatment: BoolT5sgp8k

	Parameter Values
tRNG	L'Ecuyer-CMRG Inversion Rejection
tReplay	0
experimentName	EE
treatmentName	BoolT5sgp8k
trials	10
everyK	10
outpath	data
batchPath	.
tVerbose	1

Table: Parameters of treatment: BoolT5sgp8k

Parameters of treatment BoolT5sgp8k passed to xegaRun

		Parameter Values
penv	8-Symmetry Problem	
grammar	/home/dj2333/dev/cran/kSymmetry/BNF/AndOrNotTuned5.txt	
replay	0	
algorithm	sgp	
maxdepth	7	
max	FALSE	
worstFitness	-256	
popsiz	200	
generations	500	
crossrate	0.2	
mutrate	0.4	
ivmutrate	Const	
mutrate2	0.8	
ivcrossrate	Const	
crossrate2	0.4	

Table: Parameters of treatment BoolT5sgp8k passed to xegaRun (Part 1)

Parameters of treatment BoolT5sgp8k passed to xegaRun

	Parameter Values
scalefactor	Uniform
genemap	Bin2Dec
initgene	InitGene
selection	SUS
mateselection	SUS
replication	Kid2
crossover	Cross2Gene
mutation	MutateGene
accept	All
reportEvalErrors	TRUE
codons	320
codonPrecision	LCM
terminationEps	-0.1
terminationCondition	AbsoluteError
evalmethod	Deterministic

Table: Parameters of treatment BoolT5sgp8k passed to xegaRun (Part 2)

Parameters of treatment BoolT5sgp8k passed to xegaRun

	Parameter Values
executionModel	MultiCore
verbose	1
batch	FALSE
semantics	byValue
path	.

Table: Parameters of treatment BoolT5sgp8k passed to xegaRun (Part 3)

Treatment: BoolT5sgp8k

	Treatment	Trials	Variable	min	mean	sd	max
40	BoolT5sgp8k	10	Evaluations	2600.00	7620.00	2408.23	10600.00
37	BoolT5sgp8k	10	Fitness	0.00	0.00	0.00	0.00
39	BoolT5sgp8k	10	Generations	13.00	38.10	12.04	53.00
38	BoolT5sgp8k	10	Seconds	6.10	19.12	7.29	29.78

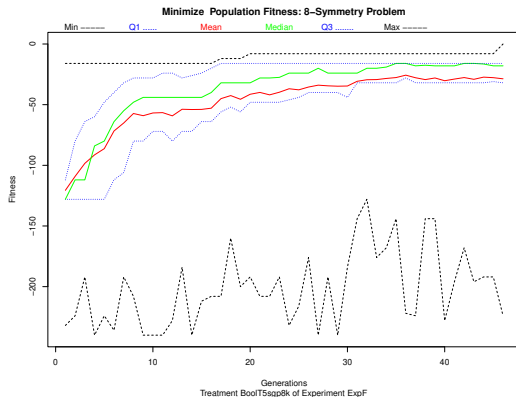
Table: Treatment: BoolT5sgp8k

The Solution Table of Treatment BoolT5sgp8k of Experiment ExpF. Fit: 0. Unique Shortest Solutions: 10.

	Solution
1	AND(sPair(D1, D8), AND(AND(sPair(D4, D5), AND(sPair(D2, D7), sPair(D1, D8))), sPair(D3, D6)))

Table: The Solution Table of Treatment BoolT5sgp8k of Experiment ExpF. Fit: 0. Unique Shortest Solutions: 10.

Plot of last xegaRun for Treatment BoolT5sgp8k of Experiment ExpF



Parameters of treatment: BoolT5sgp9k

	Parameter Values
tRNG	L'Ecuyer-CMRG Inversion Rejection
tReplay	0
experimentName	EE
treatmentName	BoolT5sgp9k
trials	10
everyK	10
outpath	data
batchPath	.
tVerbose	1

Table: Parameters of treatment: BoolT5sgp9k

Parameters of treatment BoolT5sgp9k passed to xegaRun

		Parameter Values
		9-Symmetry Problem
penv		
grammar	/home/dj2333/dev/cran/kSymmetry/BNF/AndOrNotTuned5.txt	
replay	0	
algorithm	sgp	
maxdepth	7	
max	FALSE	
worstFitness	-512	
popsiz	200	
generations	500	
crossrate	0.2	
mutrate	0.4	
ivmutrate	Const	
mutrate2	0.8	
ivcrossrate	Const	
crossrate2	0.4	

Table: Parameters of treatment BoolT5sgp9k passed to xegaRun (Part 1)

Parameters of treatment BoolT5sgp9k passed to xegaRun

	Parameter Values
scalefactor	Uniform
genemap	Bin2Dec
initgene	InitGene
selection	SUS
mateselection	SUS
replication	Kid2
crossover	Cross2Gene
mutation	MutateGene
accept	All
reportEvalErrors	TRUE
codons	360
codonPrecision	LCM
terminationEps	-0.1
terminationCondition	AbsoluteError
evalmethod	Deterministic

Table: Parameters of treatment BoolT5sgp9k passed to xegaRun (Part 2)

Parameters of treatment BoolT5sgp9k passed to xegaRun

	Parameter Values
executionModel	MultiCore
verbose	1
batch	FALSE
semantics	byValue
path	.

Table: Parameters of treatment BoolT5sgp9k passed to xegaRun (Part 3)

Treatment: BoolT5sgp9k

	Treatment	Trials	Variable	min	mean	sd	max
44	BoolT5sgp9k	10	Evaluations	1400.00	4780.00	3182.52	13000.00
41	BoolT5sgp9k	10	Fitness	0.00	0.00	0.00	0.00
43	BoolT5sgp9k	10	Generations	7.00	23.90	15.91	65.00
42	BoolT5sgp9k	10	Seconds	4.45	15.40	10.97	44.27

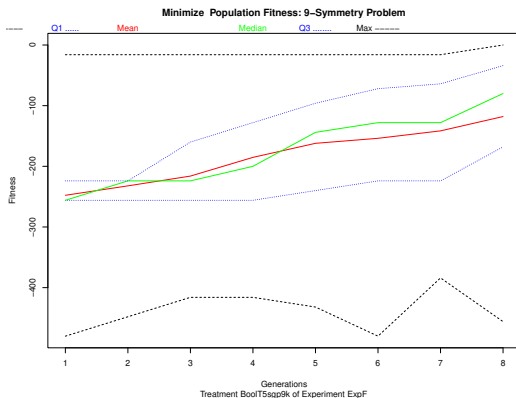
Table: Treatment: BoolT5sgp9k

The Solution Table of Treatment BoolT5sgp9k of Experiment ExpF. Fit: 0. Unique Shortest Solutions: 10.

	Solution
1	AND(AND(AND(sPair(D1, D9), sPair(NOT(D2), NOT(D8))), sPair(D4, D6)), sPair(D3, D7))

Table: The Solution Table of Treatment BoolT5sgp9k of Experiment ExpF. Fit: 0. Unique Shortest Solutions: 10.

Plot of last xegaRun for Treatment BoolT5sgp9k of Experiment ExpF



All parameters of xegaRun of treatment BoolT5sgp10k

		Parameter Values
penv	10-Symmetry Problem	
grammar	/home/dj2333/dev/cran/kSymmetry/BNF/AndOrNotTuned5.txt	
max		FALSE
algorithm		sgp
popsiz		200
generations		500
crossrate		0.2
mutrate		0.4
elitist		TRUE
replay		0
maxdepth		7
maxtrials		5
codons		400
codonBits		0
codonPrecision		LCM

Table: All parameters of xegaRun of treatment BoolT5sgp10k (Part 1)

All parameters of xegaRun of treatment BoolT5sgp10k

Parameter Values	
maxPBias	0.01
evalmethod	Deterministic
evalrep	1
reportEvalErrors	TRUE
genemap	Bin2Dec
decoder	DecodeGene
crossrate2	0.4
ivcrossrate	Const
crossover	Cross2Gene
uCrossSwap	0.2
mincrossdepth	1
maxcrossdepth	7
ivmutrate	Const
mutrate2	0.8
bitmutrate	0.005

Table: All parameters of xegaRun of treatment BoolT5sgp10k (Part 2)

All parameters of xegaRun of treatment BoolT5sgp10k

	Parameter Values
bitmutrate2	0.01
maxmutdepth	3
minmutinsertiondepth	1
maxmutinsertiondepth	7
lambda	0.05
max2opt	100
scalefactor1	0.9
scalefactor2	0.3
scalefactor	Uniform
cutoffFit	0.5
mutation	MutateGene
replication	Kid2
initgene	InitGene
offset	1
eps	0.01

Table: All parameters of xegaRun of treatment BoolT5sgp10k (Part 3)

All parameters of xegaRun of treatment BoolT5sgp10k

	Parameter Values
tournamentSize	2
selectionBias	1.5
maxTSR	1.5
selection	SUS
mateselection	SUS
selectionContinuation	TRUE
scaling	NoScaling
scalingThreshold	0
scalingExp	1
scalingExp2	1
rdmWeight	1
drMax	2
drMin	0.5
dispersionMeasure	var
scalingDelay	1

Table: All parameters of xegaRun of treatment BoolT5sgp10k (Part 4)

All parameters of xegaRun of treatment BoolT5sgp10k

Parameter Values	
accept	All
alpha	0.99
beta	2
cooling	ExponentialMultiplicative
coolingPower	1
temp0	40
tempN	0.01
verbose	1
logevals	FALSE
allsolutions	FALSE
early	FALSE
terminationCondition	AbsoluteError
terminationEps	-0.1
terminationThreshold	0
worstFitness	-1024

Table: All parameters of xegaRun of treatment BoolT5sgp10k (Part 5)

All parameters of xegaRun of treatment BoolT5sgp10k

Parameter Values	
PACdelta	0.01
fSpace	Hilbert
cores	16
executionModel	MultiCore
uParApply	NULL
Cluster	NULL
profile	FALSE
batch	FALSE
path	.
semantics	byValue

Table: All parameters of xegaRun of treatment BoolT5sgp10k (Part 6)