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

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Abstract

In this experiment we study the complexity of learning with increasing k with a grammar with symmetric pairs and an additional function.

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3 B Treatments
- Treatment BoolT5sgp10k
- Treatment BoolT5sgp11k
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- Treatment BoolT5sgp4k
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- Treatment BoolT5sgp7k
- Treatment BoolT5sgp8k
- Treatment BoolT5sgp9k

4 C xega

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)

Summary of statistics of experiment ExpF.

	Treatment	Trials	Variable	min	mean	sd	ma
4	BoolT5sgp10k	10	Evaluations	2600.00	18060.00	12579.37	43600.0
8	BoolT5sgp11k	10	Evaluations	5200.00	17680.00	15147.34	56200.0
12	BoolT5sgp12k	10	Evaluations	22800.00	79180.00	30621.77	100000.0
16	BoolT5sgp2k	10	Evaluations	200.00	200.00	0.00	200.0
20	BoolT5sgp3k	10	Evaluations	200.00	200.00	0.00	200.0
24	BoolT5sgp4k	10	Evaluations	200.00	240.00	126.49	600.0
28	BoolT5sgp5k	10	Evaluations	200.00	300.00	194.37	800.0
32	BoolT5sgp6k	10	Evaluations	600.00	1720.00	1211.79	4800.0
36	BoolT5sgp7k	10	Evaluations	200.00	1280.00	626.81	2200.0
40	BoolT5sgp8k	10	Evaluations	2600.00	7620.00	2408.23	10600.0
44	BoolT5sgp9k	10	Evaluations	1400.00	4780.00	3182.52	13000.0
1	BoolT5sgp10k	10	Fitness	0.00	0.00	0.00	0.0
5	BoolT5sgp11k	10	Fitness	0.00	0.00	0.00	0.0
9	BoolT5sgp12k	10	Fitness	0.00	16.00	16.87	32.0
13	BoolT5sgp2k	10	Fitness	0.00	0.00	0.00	0.0

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

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
popsize	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

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

Parameters of treatment BoolT5sgp10k passed to xegaRun

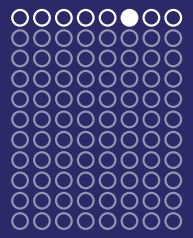
	Parameter Values
executionModel	MultiCore
verbose	1
batch	FALSE
semantics	byValue
path	.

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

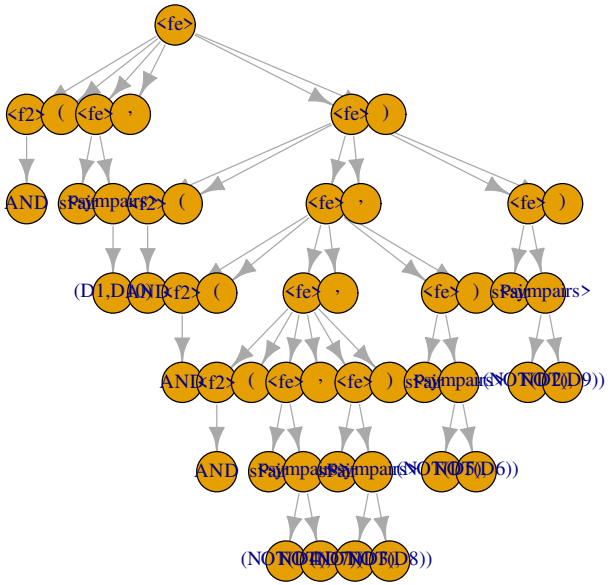


The Solution Table of Treatment BoolT5sgp10k of Experiment ExpF. Fit: 0. Unique Shortest Solutions: 10.

	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.

The Derivation Tree of a Solution of Treatment BoolT5sgp10k of Experiment ExpF


<fe>
<f2>
(
<fe>
,
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)
AND
<f2>
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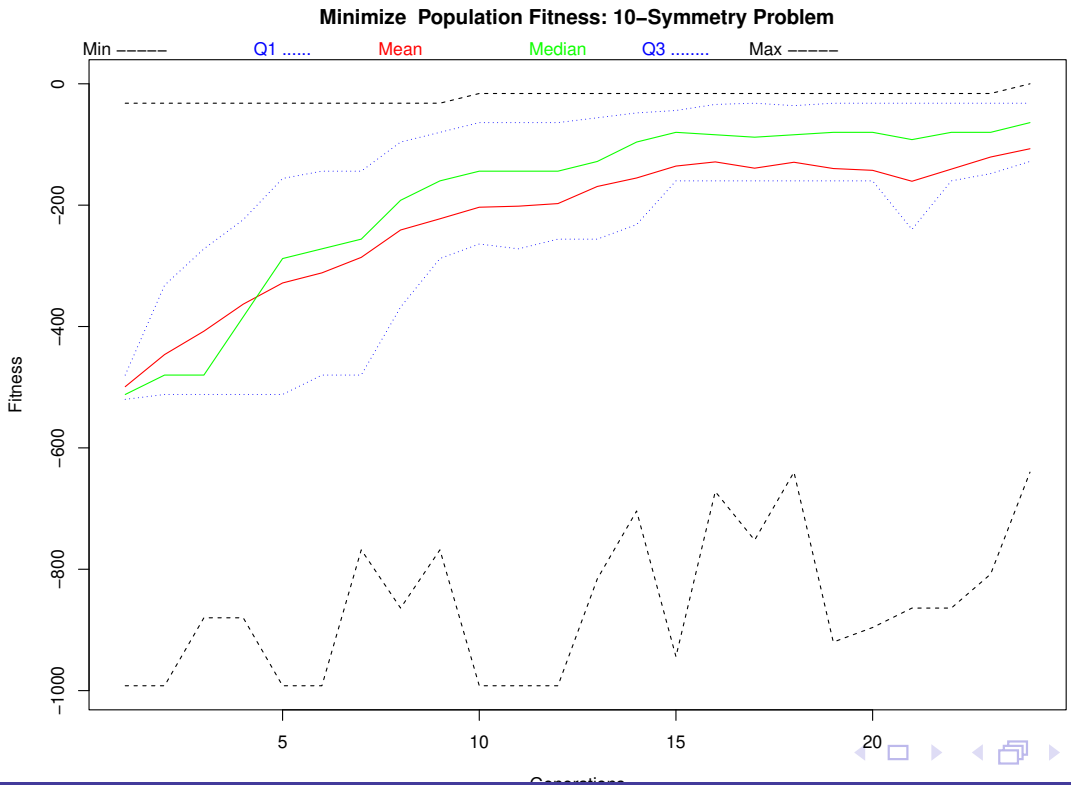
Plot of last xegaRun for Treatment BoolT5sgp10k of Experiment ExpF



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
popsize	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

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

Parameters of treatment BoolT5sgp11k passed to xegaRun

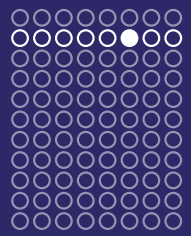
	Parameter Values
executionModel	MultiCore
verbose	1
batch	FALSE
semantics	byValue
path	.

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

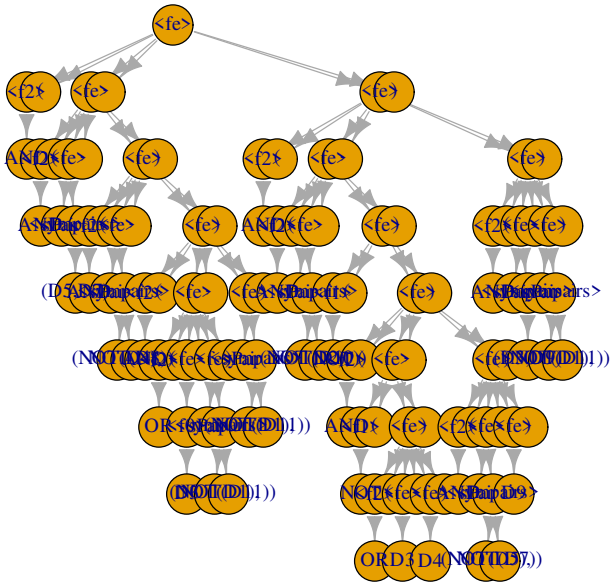


The Solution Table of Treatment BoolT5sgp11k of Experiment ExpF. Fit: 0. Unique Shortest Solutions: 10.

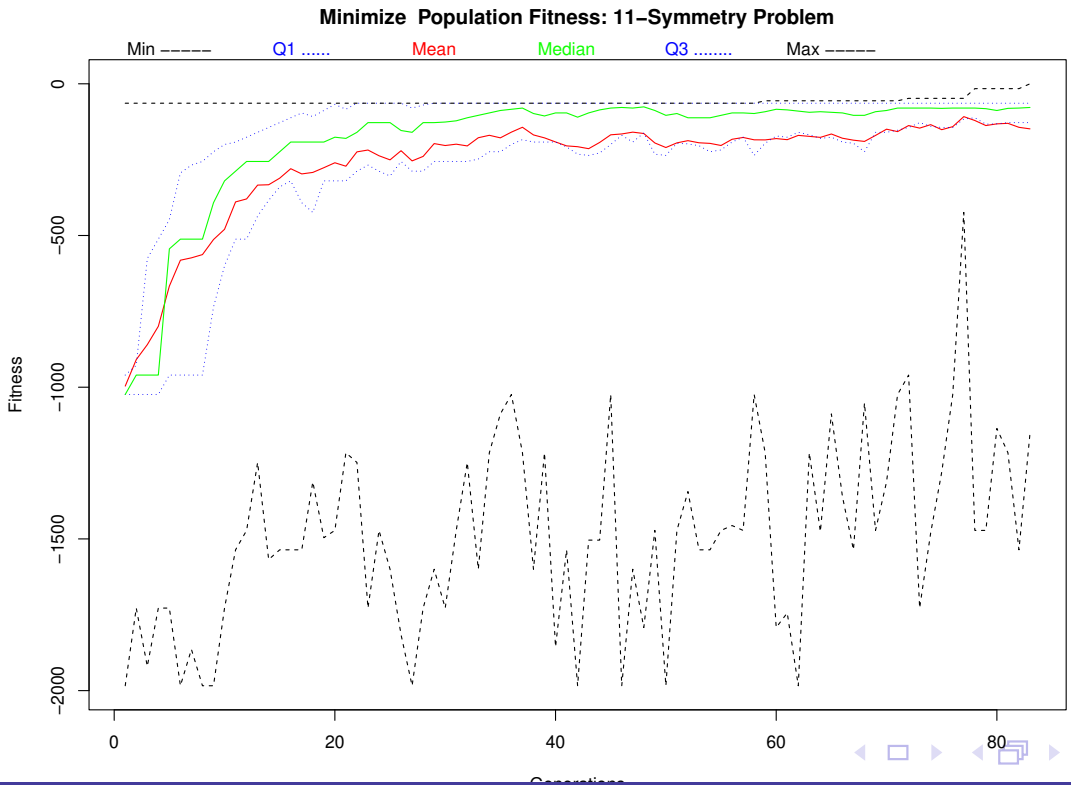
	Solution
1	NOT(NOT(AND(sPair(NOT(D1), NOT(D11)), AND(AND(AND(sPair(NOT(D3), NOT(D9)), sPair(D5, D7)), AND(sPair(D1, D11), sPair(D2, D10))), sPair(D4, D8)))))

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
popsize	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

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

Parameters of treatment BoolT5sgp12k passed to xegaRun

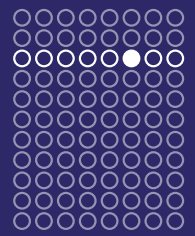
	Parameter Values
executionModel	MultiCore
verbose	1
batch	FALSE
semantics	byValue
path	.

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

Treatment: BoolT5sgp12k

	Treatment	Trials	Variable	min	mean	sd	m
12	BoolT5sgp12k	10	Evaluations	22800.00	79180.00	30621.77	100000.0
9	BoolT5sgp12k	10	Fitness	0.00	16.00	16.87	32.0
11	BoolT5sgp12k	10	Generations	114.00	395.90	153.11	500.0
10	BoolT5sgp12k	10	Seconds	587.79	2164.05	867.99	3009.0

Table: Treatment: BoolT5sgp12k

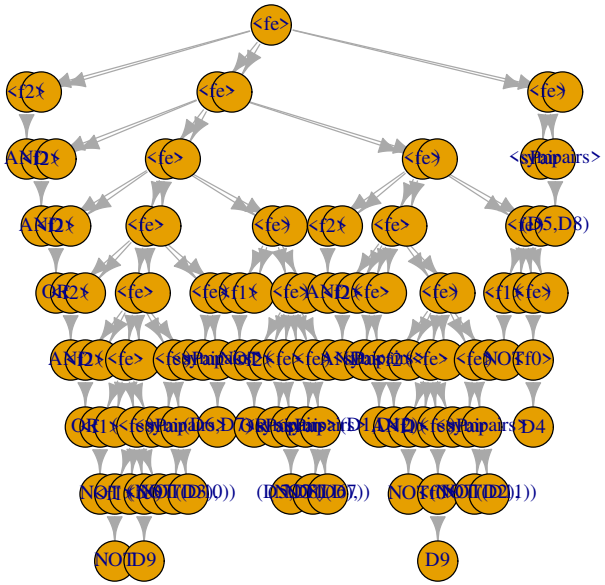


The Solution Table of Treatment BoolT5sgp12k of Experiment ExpF. Fit: 0. Unique Shortest Solutions: 5.

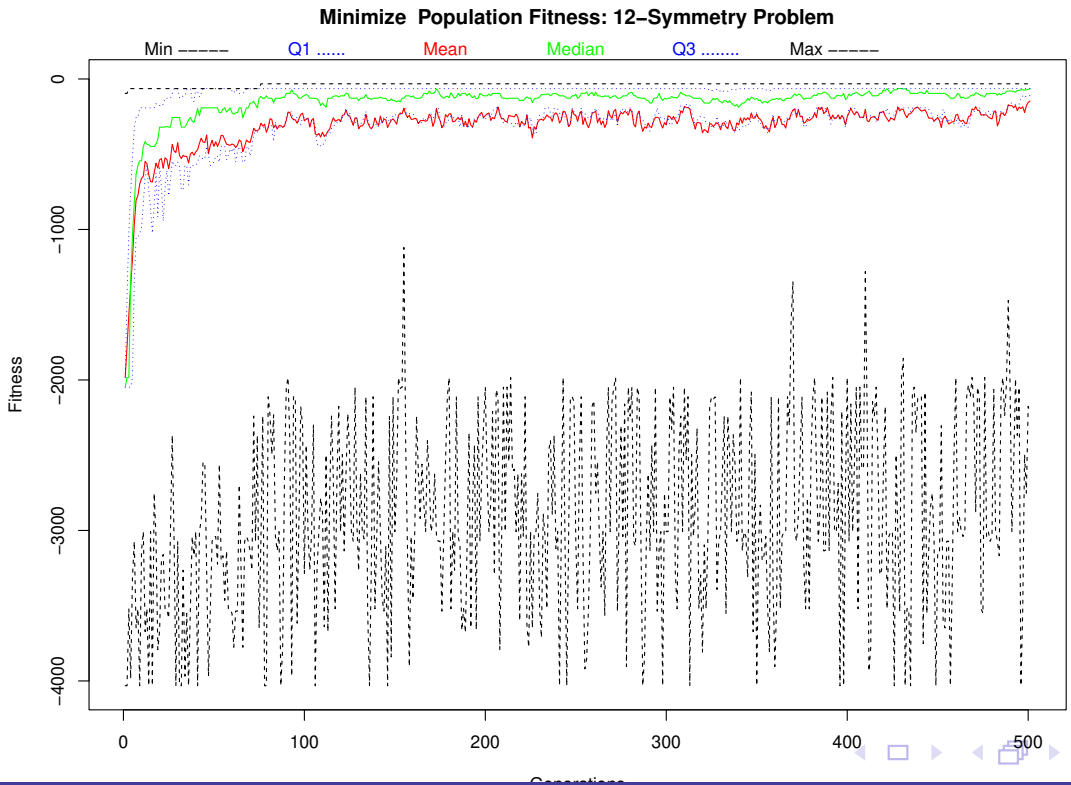
	Solution
1	AND(AND(AND(NOT(NOT(sPair(NOT(D3), NOT(D10)))), AND(sPair(D1, D12), sPair(NOT(D6), NOT(D7)))), sPair(NOT(D6), NOT(D7))), AND(AND(AND(sPair(NOT(D2), NOT(D11)), OR(sPair(D1, D12), NOT(D4))), AND(OR(NOT(D5), sPair(D2, D11)), sPair(NOT(D5), NOT(D8)))), sPair(D4, D9)))

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
popsize	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

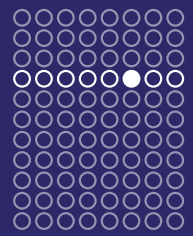
	Parameter Values
executionModel	MultiCore
verbose	1
batch	FALSE
semantics	byValue
path	.

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

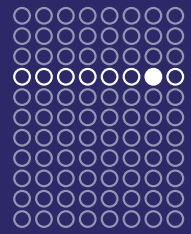
Table: Treatment: BoolT5sgp2k



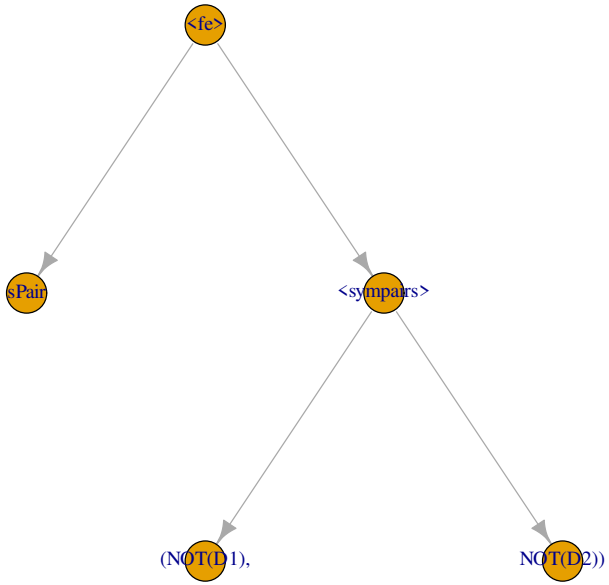
The Solution Table of Treatment BoolT5sgp2k of Experiment ExpF. Fit: 0. Unique Shortest Solutions: 6.

	Solution
1	sPair(D1, D2)

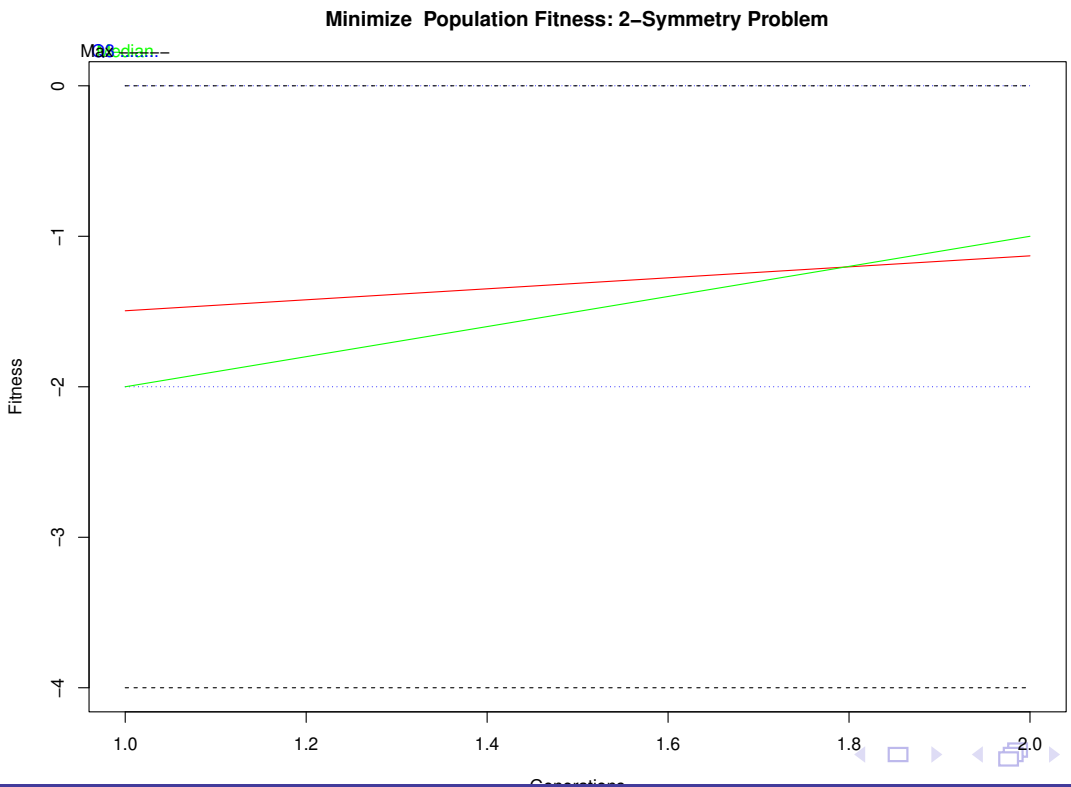
Table: The Solution Table of Treatment BoolT5sgp2k of Experiment ExpF. Fit: 0. Unique Shortest Solutions: 6.



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
popsize	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

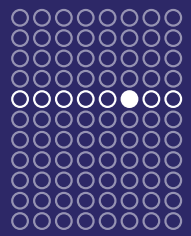
	Parameter Values
executionModel	MultiCore
verbose	1
batch	FALSE
semantics	byValue
path	.

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



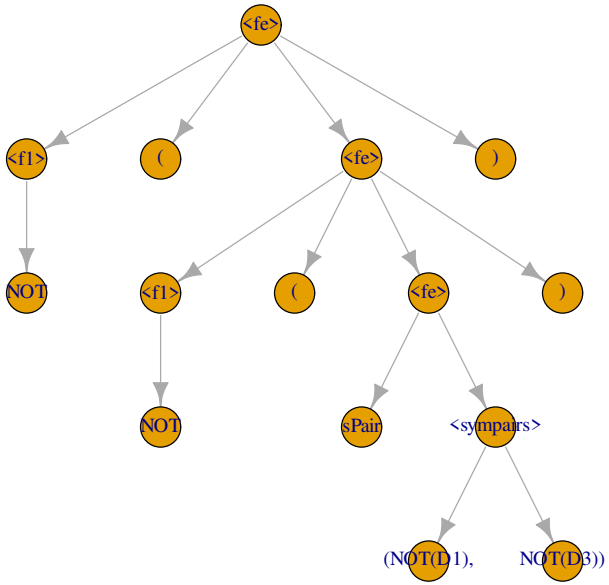
The Solution Table of Treatment BoolT5sgp3k of Experiment ExpF. Fit: 0. Unique Shortest Solutions: 4.

	Solution
1	sPair(D1, D3)

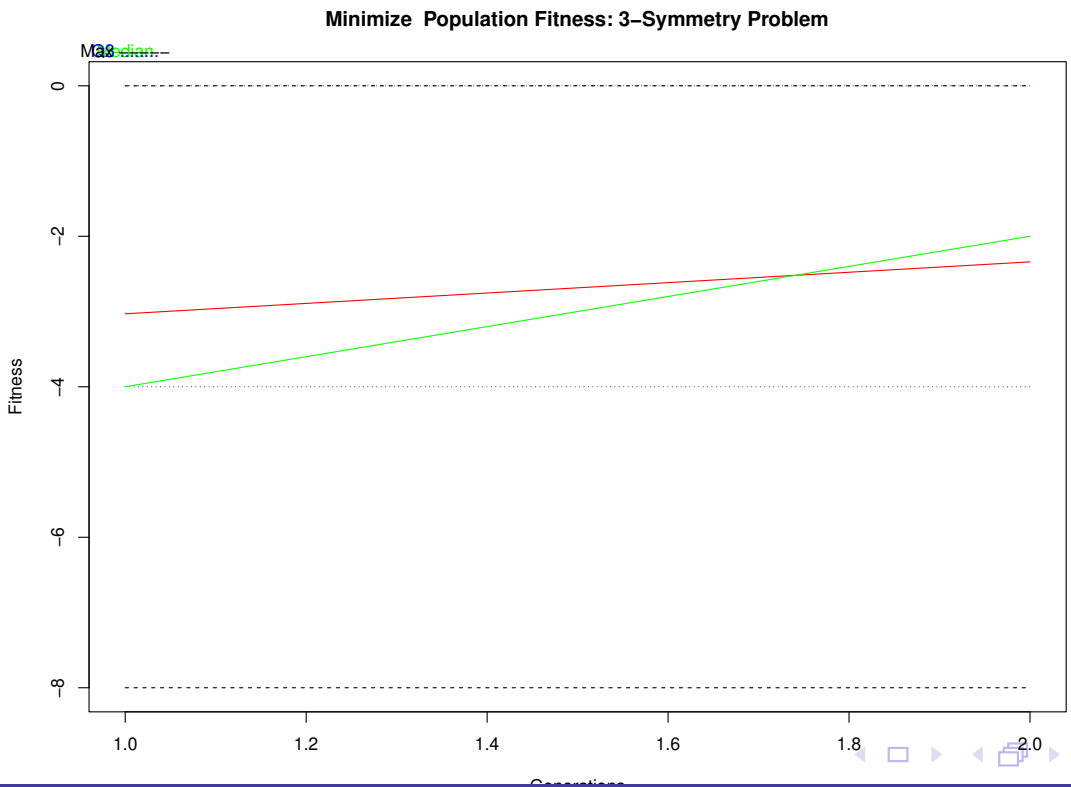
Table: The Solution Table of Treatment BoolT5sgp3k of Experiment ExpF. Fit: 0. Unique Shortest Solutions: 4.

Treatment BoolT5sgp3k

The Derivation Tree of a Solution of Treatment BoolT5sgp3k of Experiment ExpF



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
popsize	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

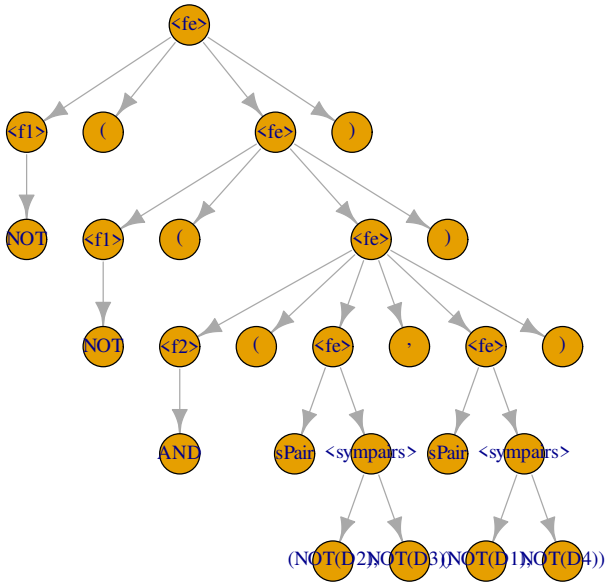
Table: Treatment: BoolT5sgp4k

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

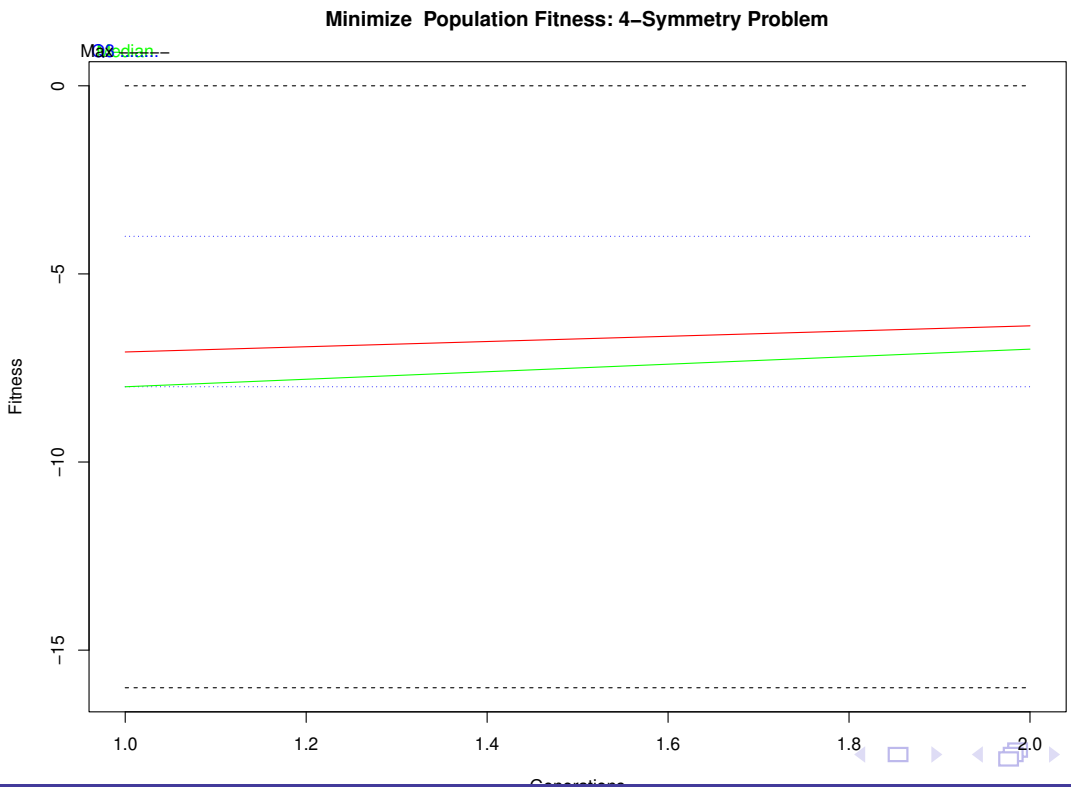
	Solution
1	AND(sPair(D1, D4), sPair(D2, D3))

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

The Derivation Tree of a Solution of Treatment BoolT5sgp4k of Experiment ExpF



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
popsize	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

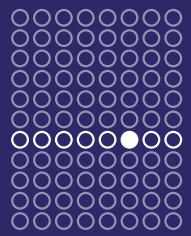
	Parameter Values
executionModel	MultiCore
verbose	1
batch	FALSE
semantics	byValue
path	.

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

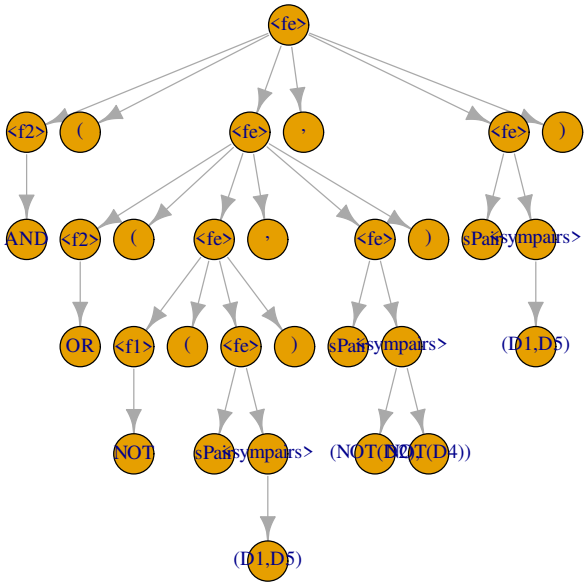


The Solution Table of Treatment BoolT5sgp5k of Experiment ExpF. Fit: 0. Unique Shortest Solutions: 9.

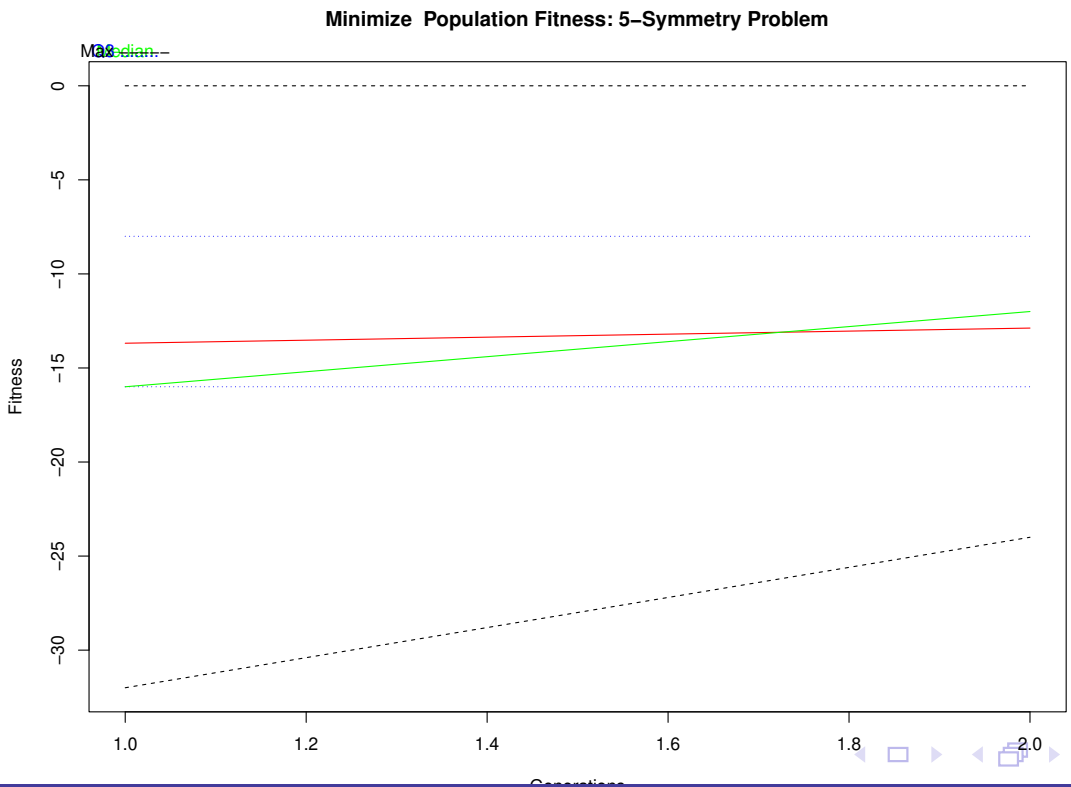
	Solution
1	AND(sPair(D2, D4), sPair(D1, D5))

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
popsize	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

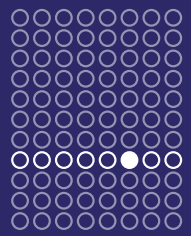
	Parameter Values
executionModel	MultiCore
verbose	1
batch	FALSE
semantics	byValue
path	.

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

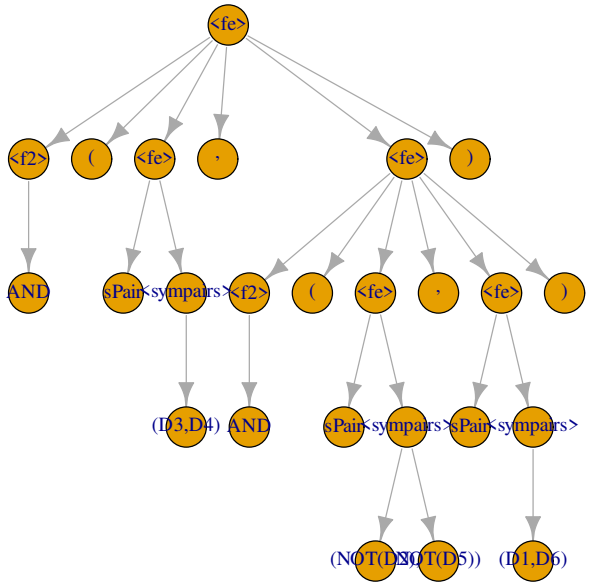


The Solution Table of Treatment BoolT5sgp6k of Experiment ExpF. Fit: 0. Unique Shortest Solutions: 10.

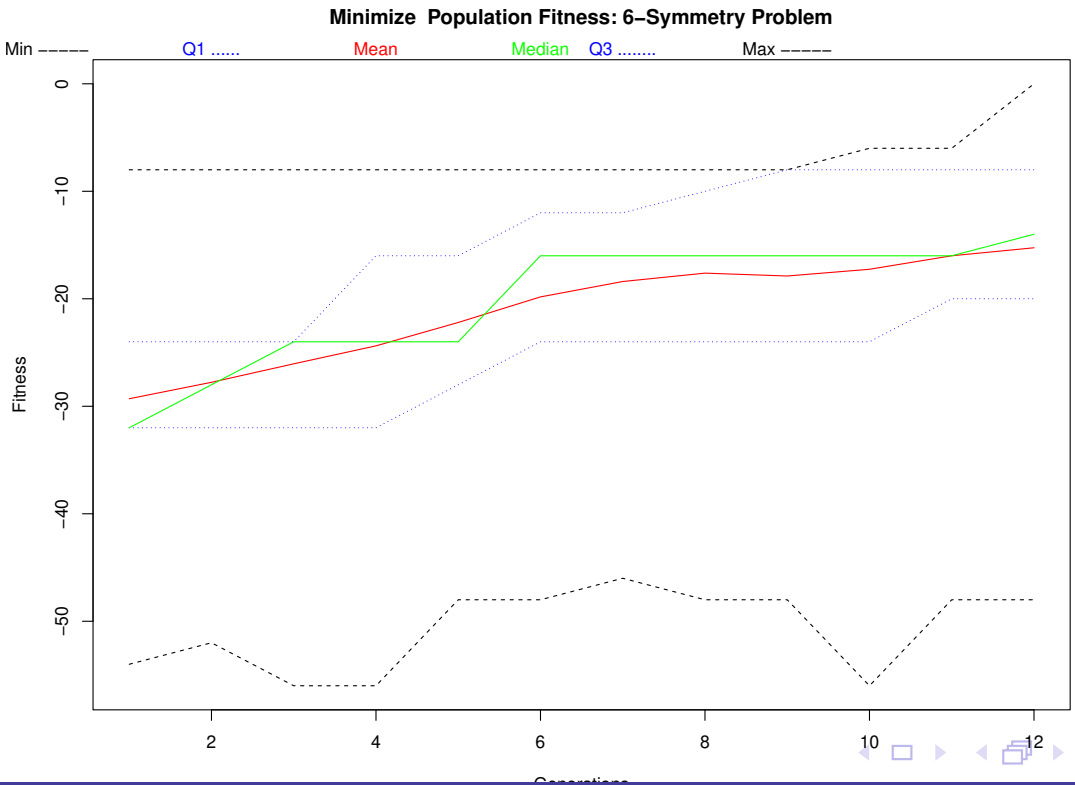
	Solution
1	AND(sPair(D2, D5), AND(sPair(D1, D6), sPair(D3, D4)))

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
popsize	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

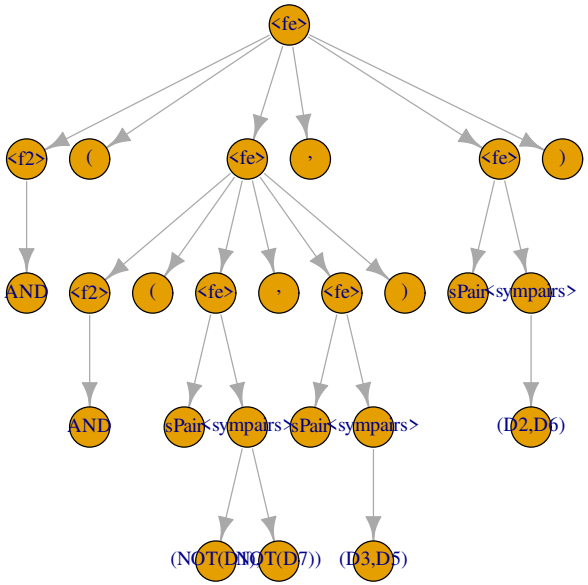
Table: Treatment: BoolT5sgp7k

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

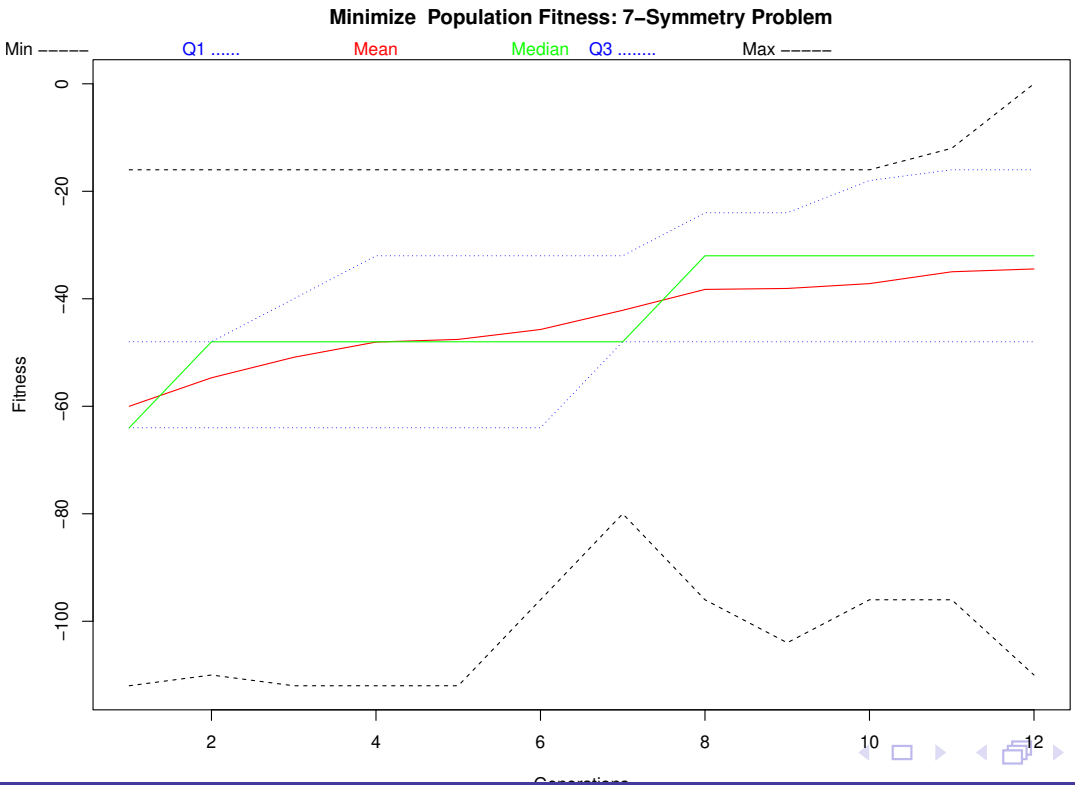
	Solution
1	AND(AND(sPair(NOT(D1), NOT(D7)), sPair(D3, D5)), sPair(D2, D6))

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
popsize	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

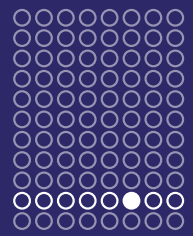
	Parameter Values
executionModel	MultiCore
verbose	1
batch	FALSE
semantics	byValue
path	.

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

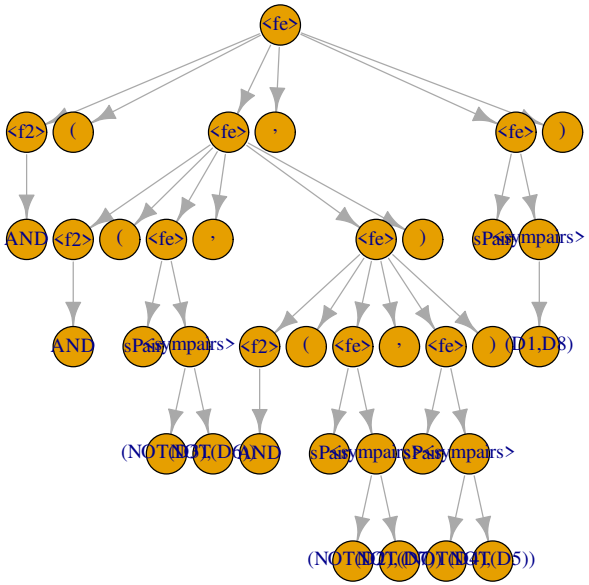


The Solution Table of Treatment BoolT5sgp8k of Experiment ExpF. Fit: 0. Unique Shortest Solutions: 10.

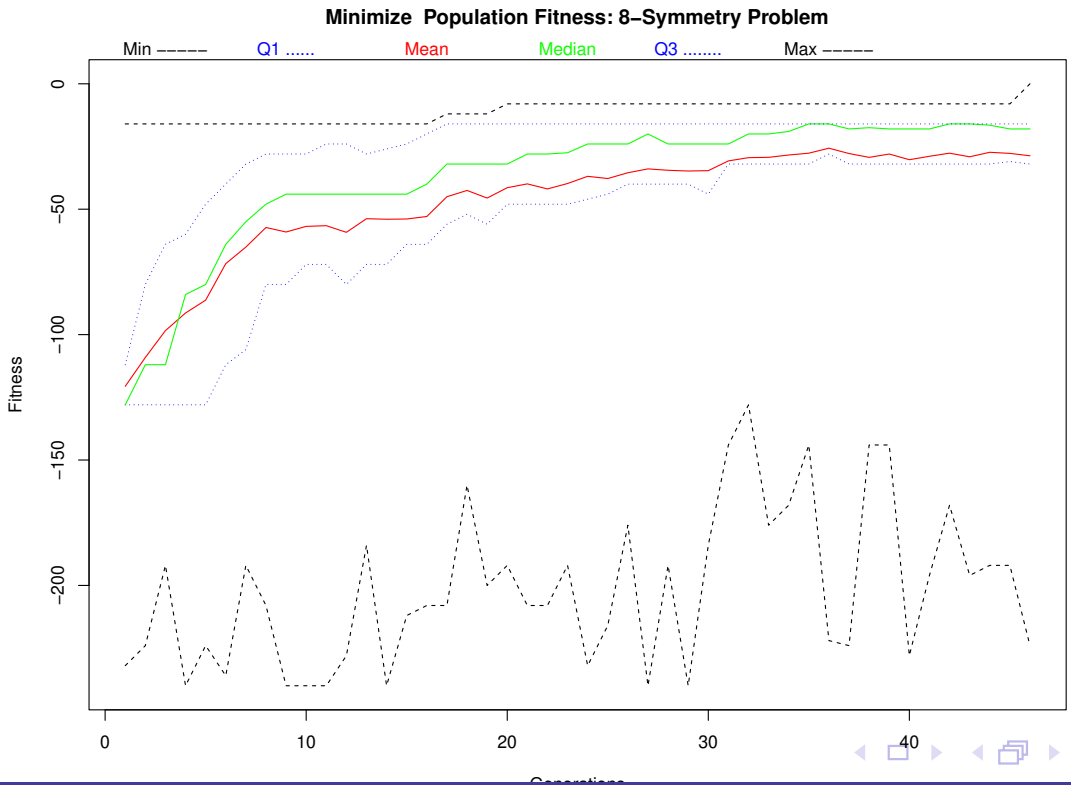
	Solution
1	AND(sPair(D1, D8), AND(AND(sPair(D4, D5), AND(sPair(D2, D7), sPair(D1, D8))), sPair(D3, D6)))

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

The Derivation Tree of a Solution of Treatment BoolT5sgp8k of Experiment ExpF



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
penv	9-Symmetry Problem
grammar	/home/dj2333/dev/cran/kSymmetry/BNF/AndOrNotTuned5.txt
replay	0
algorithm	sgp
maxdepth	7
max	FALSE
worstFitness	-512
popsize	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

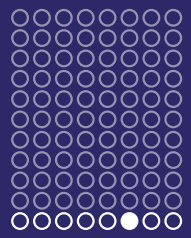
	Parameter Values
executionModel	MultiCore
verbose	1
batch	FALSE
semantics	byValue
path	.

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

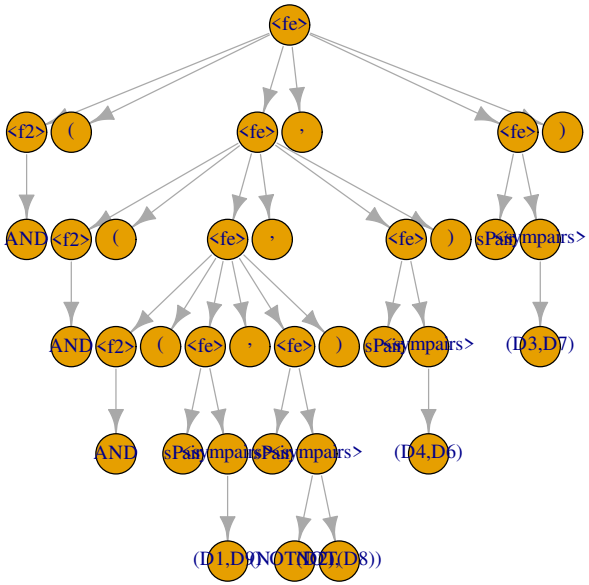


The Solution Table of Treatment BoolT5sgp9k of Experiment ExpF. Fit: 0. Unique Shortest Solutions: 10.

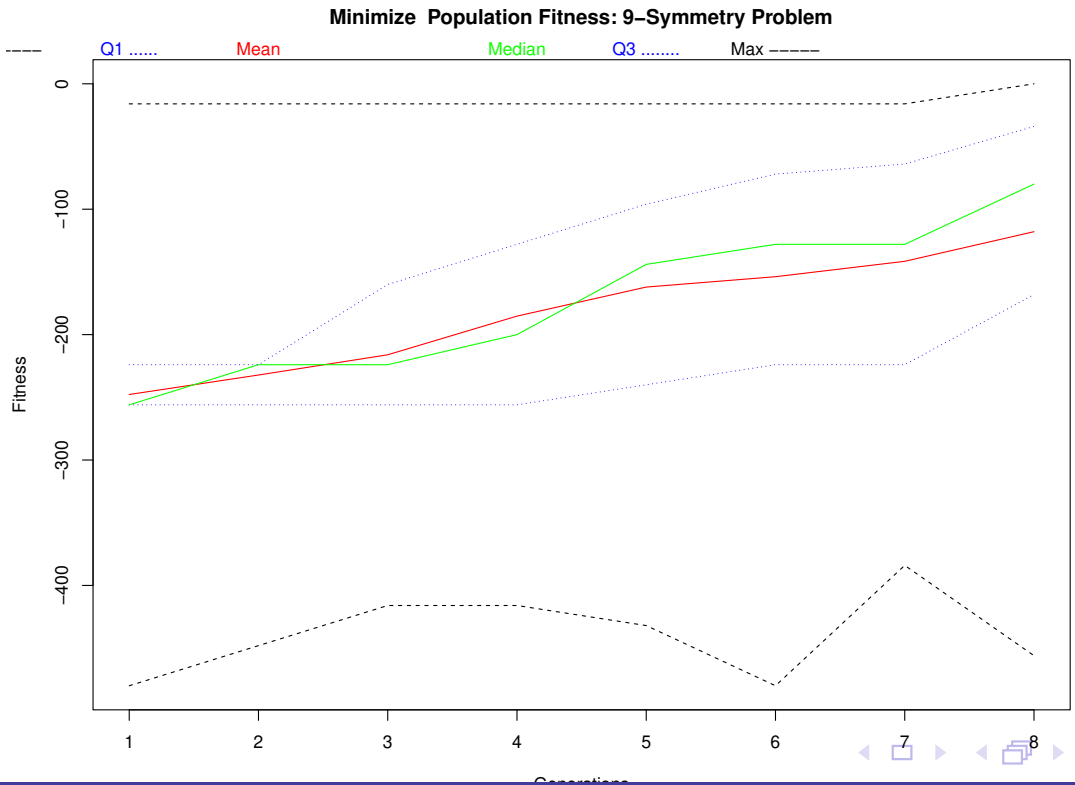
	Solution
1	AND(AND(AND(sPair(D1, D9), sPair(NOT(D2), NOT(D8))), sPair(D4, D6)), sPair(D3, D7))

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

The Derivation Tree of a Solution of Treatment BoolT5sgp9k of Experiment ExpF



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
popsize	200
generations	500
crossrate	0.2
mutrate	0.4
elitist	TRUE
replay	0
maxdepth	7
maxtrials	5
codons	400
codonBits	0
codonPrecision	LCM

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)