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

Andreas Geyer-Schulz

Design of Experiment

A Summary

B Treatments

Treatment BoolT5sgp002k

Treatment BoolT5sgp003k

Treatment BoolT5sgp004k

Treatment BoolT5sgp005k

Treatment BoolT5sgp006k

Treatment BoolT5sgp007k

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

Andreas Geyer-Schulz

May 8, 2025

Abstract

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Treatment BoolT5sgp003k

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Treatment BoolT5sgp005k

Treatment BoolT5sgp006k

Treatment BoolT5sgp007k

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

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- Treatment BoolT5sgp003k
- Treatment BoolT5sgp004k
- Treatment BoolT5sgp005k
- Treatment BoolT5sgp006k
- Treatment BoolT5sgp007k
- Treatment BoolT5sgp008k
- Treatment BoolT5sgp009k
- Treatment BoolT5sgp010k
- Treatment BoolT5sgp011k
- Treatment BoolT5sgp012k

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Design of Experiment

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Treatment BoolT5sgp002k

Treatment BoolT5sgp003k

Treatment BoolT5sgp004k

Treatment BoolT5sgp005k

Treatment BoolT5sgp006k

Treatment BoolT5sgp007k

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	320
Max.Generations	1000
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)

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Treatment BoolT5sgp003k

Treatment BoolT5sgp004k

Treatment BoolT5sgp005k

Treatment BoolT5sgp006k

Treatment BoolT5sgp007k

	Treatment	Problem Environment	Worst Fitness	Codons
1	BoolT5sgp002k	2-Symmetry Problem	-4	80
2	BoolT5sgp003k	3-Symmetry Problem	-8	120
3	BoolT5sgp004k	4-Symmetry Problem	-16	160
4	BoolT5sgp005k	5-Symmetry Problem	-32	200
5	BoolT5sgp006k	6-Symmetry Problem	-64	240
6	BoolT5sgp007k	7-Symmetry Problem	-128	280
7	BoolT5sgp008k	8-Symmetry Problem	-256	320
8	BoolT5sgp009k	9-Symmetry Problem	-512	360
9	BoolT5sgp010k	10-Symmetry Problem	-1024	400
10	BoolT5sgp011k	11-Symmetry Problem	-2048	440
11	BoolT5sgp012k	12-Symmetry Problem	-4096	480

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	<fe>	sPair<sympairs>
7	<sympairs>	(D1,D2)
8	<sympairs>	(NOT(D1),NOT(D2))
9	<f1>	NOT
10	<f2>	OR
11	<f2>	AND

Table: The Production Table of Experiment ExpF

Summary of statistics of experiment ExpF.

	Treatment	Trials	Variable	min	mean	sd
4	BoolT5sgp002k	10	Evaluations	320.00	320.00	0.00
8	BoolT5sgp003k	10	Evaluations	320.00	320.00	0.00
12	BoolT5sgp004k	10	Evaluations	320.00	320.00	0.00
16	BoolT5sgp005k	10	Evaluations	320.00	320.00	0.00
20	BoolT5sgp006k	10	Evaluations	960.00	2528.00	1613.81
24	BoolT5sgp007k	10	Evaluations	320.00	1440.00	932.95
28	BoolT5sgp008k	10	Evaluations	1600.00	7232.00	5881.58
32	BoolT5sgp009k	10	Evaluations	1920.00	8352.00	6931.61
36	BoolT5sgp010k	10	Evaluations	5440.00	27840.00	23461.82
40	BoolT5sgp011k	10	Evaluations	4800.00	54912.00	94134.91
44	BoolT5sgp012k	10	Evaluations	1280.00	83424.00	54311.68
1	BoolT5sgp002k	10	Fitness	0.00	0.00	0.00
5	BoolT5sgp003k	10	Fitness	0.00	0.00	0.00
9	BoolT5sgp004k	10	Fitness	0.00	0.00	0.00
13	BoolT5sgp005k	10	Fitness	0.00	0.00	0.00

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

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Treatment BoolT5sgp003k

Treatment BoolT5sgp004k

Treatment BoolT5sgp005k

Treatment BoolT5sgp006k

Treatment BoolT5sgp007k

	Treatment	Trials	Variable	min	mean	sd	max
17	BoolT5sgp006k	10	Fitness	0.00	0.00	0.00	0.00
21	BoolT5sgp007k	10	Fitness	0.00	0.00	0.00	0.00
25	BoolT5sgp008k	10	Fitness	0.00	0.00	0.00	0.00
29	BoolT5sgp009k	10	Fitness	0.00	0.00	0.00	0.00
33	BoolT5sgp010k	10	Fitness	0.00	0.00	0.00	0.00
37	BoolT5sgp011k	10	Fitness	0.00	3.20	10.12	32.00
41	BoolT5sgp012k	10	Fitness	0.00	0.00	0.00	0.00
3	BoolT5sgp002k	10	Generations	1.00	1.00	0.00	1.00
7	BoolT5sgp003k	10	Generations	1.00	1.00	0.00	1.00
11	BoolT5sgp004k	10	Generations	1.00	1.00	0.00	1.00
15	BoolT5sgp005k	10	Generations	1.00	1.00	0.00	1.00
19	BoolT5sgp006k	10	Generations	3.00	7.90	5.04	20.00
23	BoolT5sgp007k	10	Generations	1.00	4.50	2.92	10.00
27	BoolT5sgp008k	10	Generations	5.00	22.60	18.38	56.00
31	BoolT5sgp009k	10	Generations	6.00	26.10	21.66	64.00

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

Summary of statistics of experiment ExpF.

	Treatment	Trials	Variable	min	mean	sd	r
35	BoolT5sgp010k	10	Generations	17.00	87.00	73.32	229
39	BoolT5sgp011k	10	Generations	15.00	171.60	294.17	1000
43	BoolT5sgp012k	10	Generations	4.00	260.70	169.72	612
2	BoolT5sgp002k	10	Seconds	0.26	0.33	0.05	0
6	BoolT5sgp003k	10	Seconds	0.28	0.32	0.02	0
10	BoolT5sgp004k	10	Seconds	0.35	0.41	0.03	0
14	BoolT5sgp005k	10	Seconds	0.33	0.38	0.06	0
18	BoolT5sgp006k	10	Seconds	1.03	2.94	2.13	8
22	BoolT5sgp007k	10	Seconds	0.73	1.99	1.18	4
26	BoolT5sgp008k	10	Seconds	3.15	15.37	13.59	41
30	BoolT5sgp009k	10	Seconds	5.62	28.06	26.01	75
34	BoolT5sgp010k	10	Seconds	27.94	193.54	191.81	593
38	BoolT5sgp011k	10	Seconds	45.78	704.29	1312.58	4403
42	BoolT5sgp012k	10	Seconds	22.16	2090.05	1461.07	5253

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

Parameters of treatment: BoolT5sgp002k

	Parameter Values
tRNG	L'Ecuyer-CMRG Inversion Rejection
tReplay	0
experimentName	EE
treatmentName	BoolT5sgp002k
trials	10
everyK	3
outpath	data
batchPath	.
tVerbose	1

Table: Parameters of treatment: BoolT5sgp002k

Parameters of treatment BoolT5sgp002k 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	320
generations	1000
crossrate	0.2
mutrate	0.4
ivmutrate	Const
mutrate2	0.8
ivcrossrate	Const
crossrate2	0.4

Table: Parameters of treatment BoolT5sgp002k passed to xegaRun (Part 1)

Parameters of treatment BoolT5sgp002k 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 BoolT5sgp002k passed to xegaRun (Part 2)

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Treatment BoolT5sgp003k

Treatment BoolT5sgp004k

Treatment BoolT5sgp005k

Treatment BoolT5sgp006k

Treatment BoolT5sgp007k

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

Table: Parameters of treatment BoolT5sgp002k passed to xegaRun (Part 3)

Treatment: BoolT5sgp002k

	Treatment	Trials	Variable	min	mean	sd	max
4	BoolT5sgp002k	10	Evaluations	320.00	320.00	0.00	320.00
1	BoolT5sgp002k	10	Fitness	0.00	0.00	0.00	0.00
3	BoolT5sgp002k	10	Generations	1.00	1.00	0.00	1.00
2	BoolT5sgp002k	10	Seconds	0.26	0.33	0.05	0.40

Table: Treatment: BoolT5sgp002k

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Treatment BoolT5sgp002k

Treatment BoolT5sgp003k

Treatment BoolT5sgp004k

Treatment BoolT5sgp005k

Treatment BoolT5sgp006k

Treatment BoolT5sgp007k

	Solution
1	sPair(D1, D2)

Table: The Solution Table of Treatment BoolT5sgp002k of Experiment ExpF. Fit: 0. Unique Shortest Solutions: 3.

The Derivation Tree of a Solution of Treatment BoolT5sgp002k of Experiment ExpF

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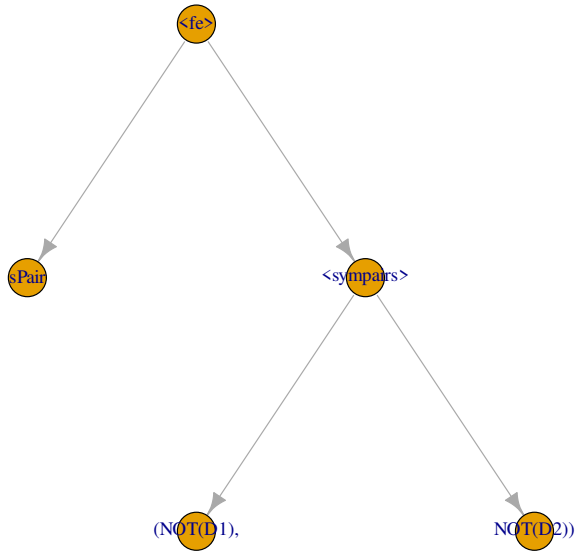
Treatment BoolT5sgp003k

Treatment BoolT5sgp004k

Treatment BoolT5sgp005k

Treatment BoolT5sgp006k

Treatment BoolT5sgp007k



Plot of last xegaRun for Treatment BoolT5sgp002k of Experiment ExpF

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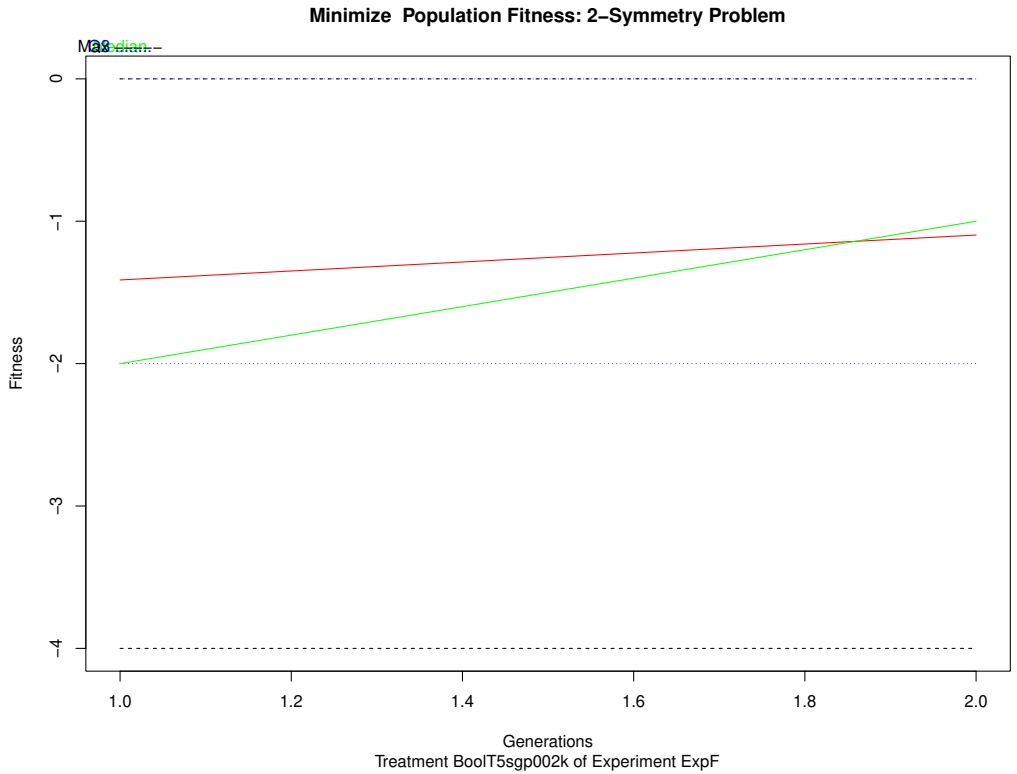
Treatment BoolT5sgp003k

Treatment BoolT5sgp004k

Treatment BoolT5sgp005k

Treatment BoolT5sgp006k

Treatment BoolT5sgp007k



Parameters of treatment: BoolT5sgp003k

	Parameter Values
tRNG	L'Ecuyer-CMRG Inversion Rejection
tReplay	0
experimentName	EE
treatmentName	BoolT5sgp003k
trials	10
everyK	3
outpath	data
batchPath	.
tVerbose	1

Table: Parameters of treatment: BoolT5sgp003k

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Treatment BoolT5sgp002k

Treatment BoolT5sgp003k

Treatment BoolT5sgp004k

Treatment BoolT5sgp005k

Treatment BoolT5sgp006k

Treatment BoolT5sgp007k

	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	320
generations	1000
crossrate	0.2
mutrate	0.4
ivmutrate	Const
mutrate2	0.8
ivcrossrate	Const
crossrate2	0.4

Table: Parameters of treatment BoolT5sgp003k passed to xegaRun (Part 1)

Parameters of treatment BoolT5sgp003k 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 BoolT5sgp003k passed to xegaRun (Part 2)

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Treatment BoolT5sgp002k

Treatment BoolT5sgp003k

Treatment BoolT5sgp004k

Treatment BoolT5sgp005k

Treatment BoolT5sgp006k

Treatment BoolT5sgp007k

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

Table: Parameters of treatment BoolT5sgp003k passed to xegaRun (Part 3)

Treatment: BoolT5sgp003k

	Treatment	Trials	Variable	min	mean	sd	max
8	BoolT5sgp003k	10	Evaluations	320.00	320.00	0.00	320.00
5	BoolT5sgp003k	10	Fitness	0.00	0.00	0.00	0.00
7	BoolT5sgp003k	10	Generations	1.00	1.00	0.00	1.00
6	BoolT5sgp003k	10	Seconds	0.28	0.32	0.02	0.35

Table: Treatment: BoolT5sgp003k

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B Treatments

Treatment BoolT5sgp002k

Treatment BoolT5sgp003k

Treatment BoolT5sgp004k

Treatment BoolT5sgp005k

Treatment BoolT5sgp006k

Treatment BoolT5sgp007k

	Solution
1	sPair(D1, D3)

Table: The Solution Table of Treatment BoolT5sgp003k of Experiment ExpF. Fit: 0. Unique Shortest Solutions: 5.

The Derivation Tree of a Solution of Treatment BoolT5sgp003k of Experiment ExpF

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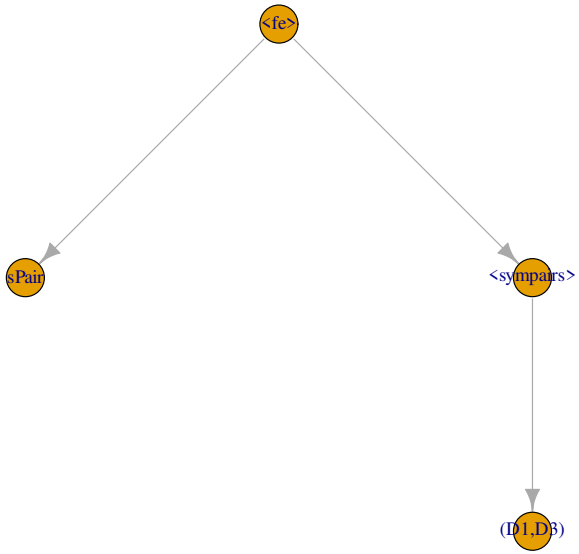
Treatment BoolT5sgp003k

Treatment BoolT5sgp004k

Treatment BoolT5sgp005k

Treatment BoolT5sgp006k

Treatment BoolT5sgp007k



Plot of last xegaRun for Treatment BoolT5sgp003k of Experiment ExpF

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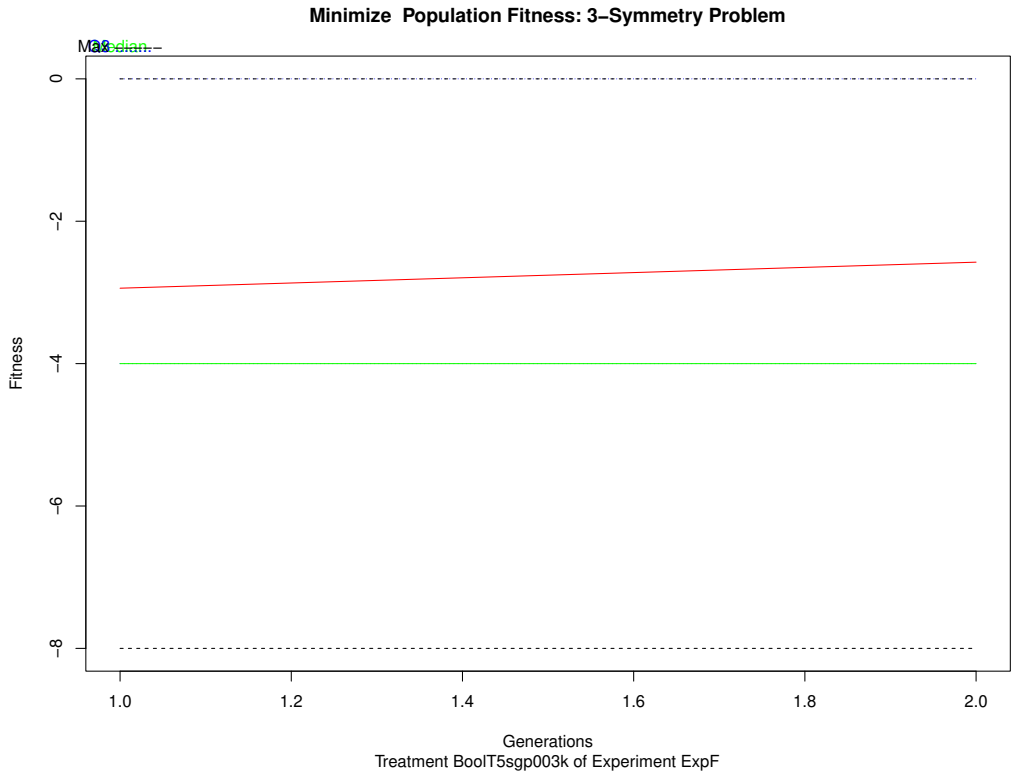
Treatment BoolT5sgp003k

Treatment BoolT5sgp004k

Treatment BoolT5sgp005k

Treatment BoolT5sgp006k

Treatment BoolT5sgp007k



Parameters of treatment: BoolT5sgp004k

	Parameter Values
tRNG	L'Ecuyer-CMRG Inversion Rejection
tReplay	0
experimentName	EE
treatmentName	BoolT5sgp004k
trials	10
everyK	3
outpath	data
batchPath	.
tVerbose	1

Table: Parameters of treatment: BoolT5sgp004k

Parameters of treatment BoolT5sgp004k 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	320
generations	1000
crossrate	0.2
mutrate	0.4
ivmutrate	Const
mutrate2	0.8
ivcrossrate	Const
crossrate2	0.4

Table: Parameters of treatment BoolT5sgp004k passed to xegaRun (Part 1)

Parameters of treatment BoolT5sgp004k 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 BoolT5sgp004k passed to xegaRun (Part 2)

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Treatment BoolT5sgp002k

Treatment BoolT5sgp003k

Treatment BoolT5sgp004k

Treatment BoolT5sgp005k

Treatment BoolT5sgp006k

Treatment BoolT5sgp007k

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

Table: Parameters of treatment BoolT5sgp004k passed to xegaRun (Part 3)

Treatment: BoolT5sgp004k

	Treatment	Trials	Variable	min	mean	sd	max
12	BoolT5sgp004k	10	Evaluations	320.00	320.00	0.00	320.00
9	BoolT5sgp004k	10	Fitness	0.00	0.00	0.00	0.00
11	BoolT5sgp004k	10	Generations	1.00	1.00	0.00	1.00
10	BoolT5sgp004k	10	Seconds	0.35	0.41	0.03	0.44

Table: Treatment: BoolT5sgp004k

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Treatment BoolT5sgp002k

Treatment BoolT5sgp003k

Treatment BoolT5sgp004k

Treatment BoolT5sgp005k

Treatment BoolT5sgp006k

Treatment BoolT5sgp007k

	Solution
1	AND(sPair(NOT(D1), NOT(D4)), sPair(D2, D3))

Table: The Solution Table of Treatment BoolT5sgp004k of Experiment ExpF. Fit: 0. Unique Shortest Solutions: 8.

The Derivation Tree of a Solution of Treatment BoolT5sgp004k of Experiment ExpF

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Treatment BoolT5sgp002k

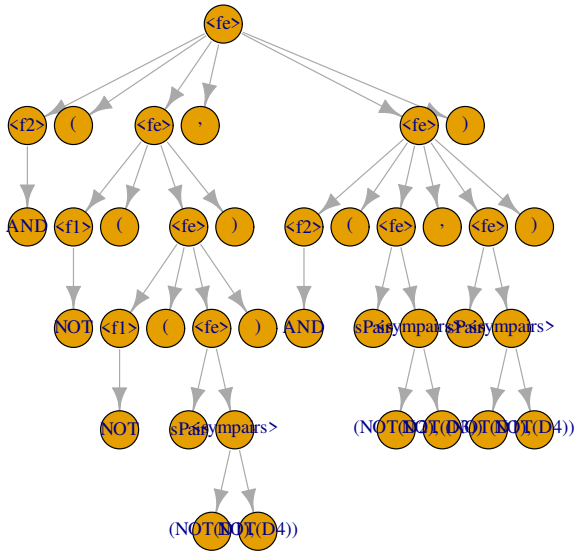
Treatment BoolT5sgp003k

Treatment BoolT5sgp004k

Treatment BoolT5sgp005k

Treatment BoolT5sgp006k

Treatment BoolT5sgp007k



Plot of last xegaRun for Treatment BoolT5sgp004k of Experiment ExpF

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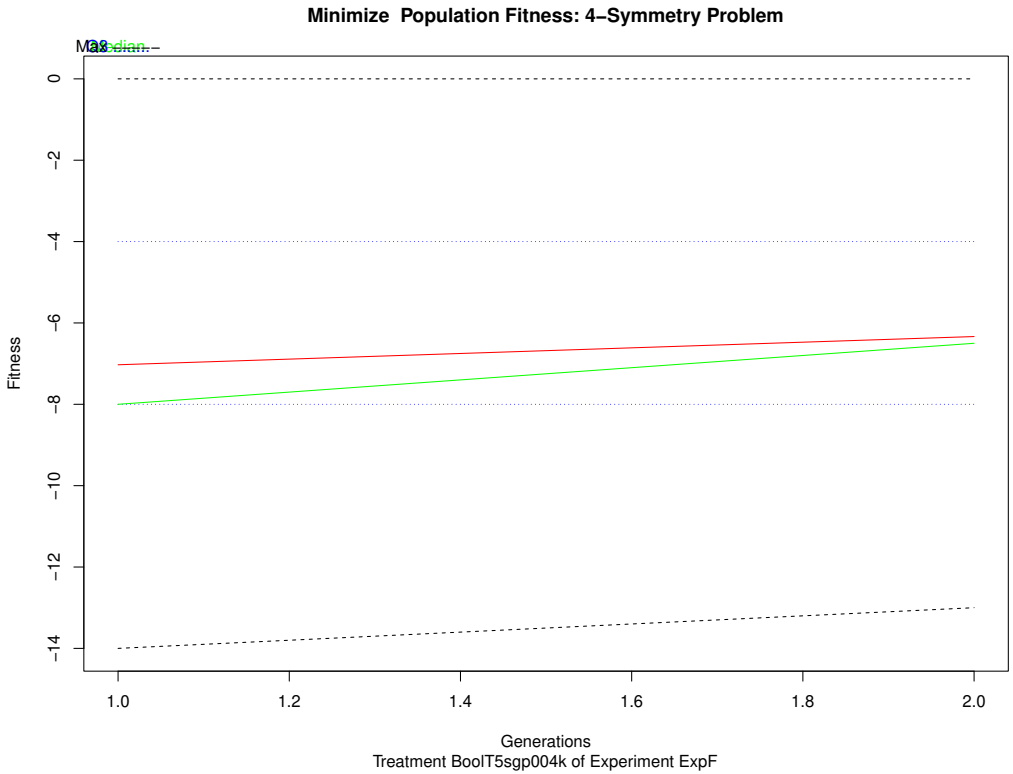
Treatment BoolT5sgp003k

Treatment BoolT5sgp004k

Treatment BoolT5sgp005k

Treatment BoolT5sgp006k

Treatment BoolT5sgp007k



Parameters of treatment: BoolT5sgp005k

	Parameter Values
tRNG	L'Ecuyer-CMRG Inversion Rejection
tReplay	0
experimentName	EE
treatmentName	BoolT5sgp005k
trials	10
everyK	3
outpath	data
batchPath	.
tVerbose	1

Table: Parameters of treatment: BoolT5sgp005k

Parameters of treatment BoolT5sgp005k 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	320
generations	1000
crossrate	0.2
mutrate	0.4
ivmutrate	Const
mutrate2	0.8
ivcrossrate	Const
crossrate2	0.4

Table: Parameters of treatment BoolT5sgp005k passed to xegaRun (Part 1)

Parameters of treatment BoolT5sgp005k 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 BoolT5sgp005k passed to xegaRun (Part 2)

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Treatment BoolT5sgp003k

Treatment BoolT5sgp004k

Treatment BoolT5sgp005k

Treatment BoolT5sgp006k

Treatment BoolT5sgp007k

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

Table: Parameters of treatment BoolT5sgp005k passed to xegaRun (Part 3)

Treatment: BoolT5sgp005k

	Treatment	Trials	Variable	min	mean	sd	max
16	BoolT5sgp005k	10	Evaluations	320.00	320.00	0.00	320.00
13	BoolT5sgp005k	10	Fitness	0.00	0.00	0.00	0.00
15	BoolT5sgp005k	10	Generations	1.00	1.00	0.00	1.00
14	BoolT5sgp005k	10	Seconds	0.33	0.38	0.06	0.50

Table: Treatment: BoolT5sgp005k

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

Andreas Geyer-Schulz

Design of Experiment

A Summary

B Treatments

Treatment BoolT5sgp002k

Treatment BoolT5sgp003k

Treatment BoolT5sgp004k

Treatment BoolT5sgp005k

Treatment BoolT5sgp006k

Treatment BoolT5sgp007k

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

Table: The Solution Table of Treatment BoolT5sgp005k of Experiment ExpF. Fit: 0. Unique Shortest Solutions: 7.

The Derivation Tree of a Solution of Treatment BoolT5sgp005k of Experiment ExpF

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

Andreas Geyer-Schulz

Design of Experiment

A Summary

B Treatments

Treatment BoolT5sgp002k

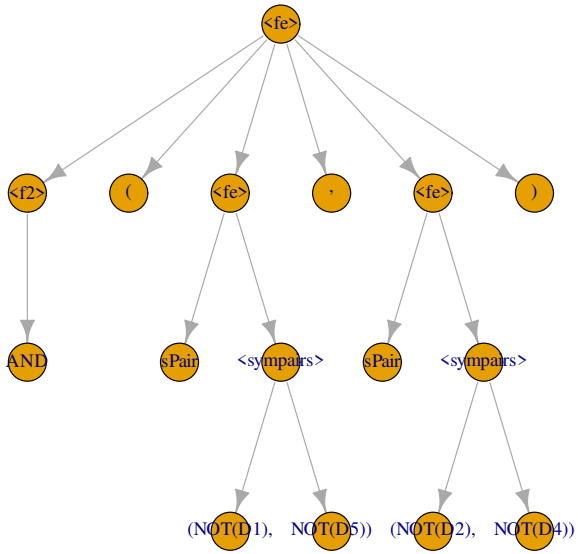
Treatment BoolT5sgp003k

Treatment BoolT5sgp004k

Treatment BoolT5sgp005k

Treatment BoolT5sgp006k

Treatment BoolT5sgp007k



Plot of last xegaRun for Treatment BoolT5sgp005k of Experiment ExpF

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

Andreas Geyer-Schulz

Design of Experiment

A Summary

B Treatments

Treatment BoolT5sgp002k

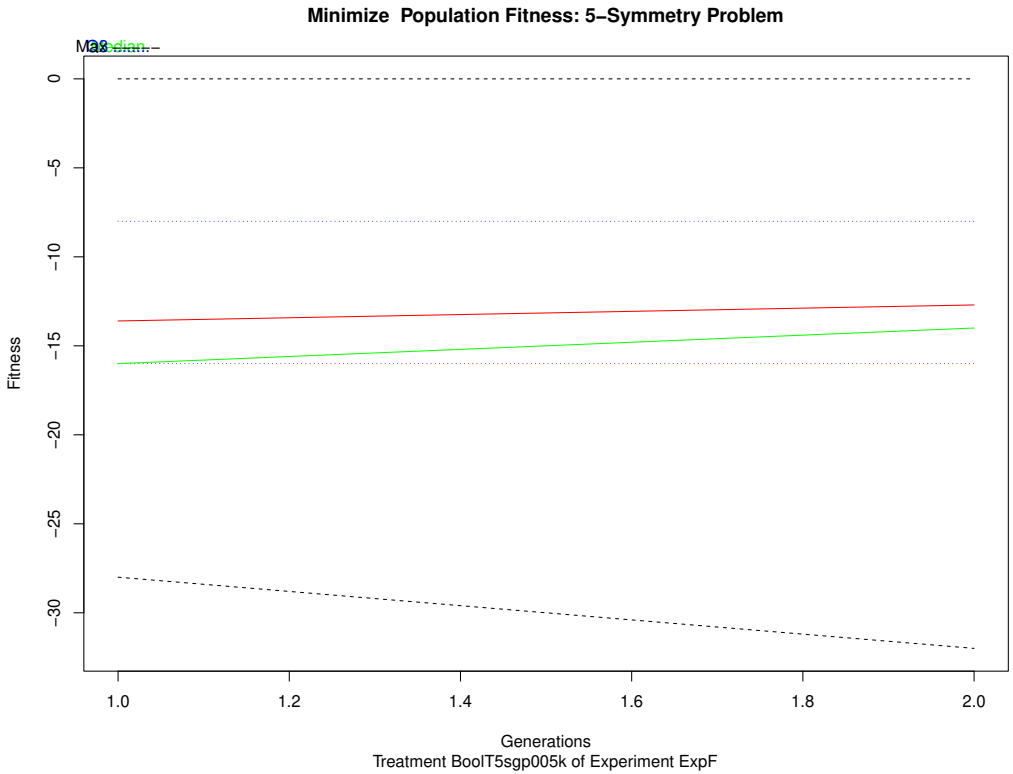
Treatment BoolT5sgp003k

Treatment BoolT5sgp004k

Treatment BoolT5sgp005k

Treatment BoolT5sgp006k

Treatment BoolT5sgp007k



Parameters of treatment: BoolT5sgp006k

	Parameter Values
tRNG	L'Ecuyer-CMRG Inversion Rejection
tReplay	0
experimentName	EE
treatmentName	BoolT5sgp006k
trials	10
everyK	3
outpath	data
batchPath	.
tVerbose	1

Table: Parameters of treatment: BoolT5sgp006k

Parameters of treatment BoolT5sgp006k 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	320
generations	1000
crossrate	0.2
mutrate	0.4
ivmutrate	Const
mutrate2	0.8
ivcrossrate	Const
crossrate2	0.4

Table: Parameters of treatment BoolT5sgp006k passed to xegaRun (Part 1)

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

Andreas Geyer-Schulz

Design of Experiment

A Summary

B Treatments

Treatment BoolT5sgp002k

Treatment BoolT5sgp003k

Treatment BoolT5sgp004k

Treatment BoolT5sgp005k

Treatment BoolT5sgp006k

Treatment BoolT5sgp007k

	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 BoolT5sgp006k passed to xegaRun (Part 2)

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

Andreas Geyer-Schulz

Design of Experiment

A Summary

B Treatments

Treatment BoolT5sgp002k

Treatment BoolT5sgp003k

Treatment BoolT5sgp004k

Treatment BoolT5sgp005k

Treatment BoolT5sgp006k

Treatment BoolT5sgp007k

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

Table: Parameters of treatment BoolT5sgp006k passed to xegaRun (Part 3)

Treatment: BoolT5sgp006k

	Treatment	Trials	Variable	min	mean	sd	
20	BoolT5sgp006k	10	Evaluations	960.00	2528.00	1613.81	640
17	BoolT5sgp006k	10	Fitness	0.00	0.00	0.00	
19	BoolT5sgp006k	10	Generations	3.00	7.90	5.04	2
18	BoolT5sgp006k	10	Seconds	1.03	2.94	2.13	

Table: Treatment: BoolT5sgp006k

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

Andreas Geyer-Schulz

Design of Experiment

A Summary

B Treatments

Treatment BoolT5sgp002k

Treatment BoolT5sgp003k

Treatment BoolT5sgp004k

Treatment BoolT5sgp005k

Treatment BoolT5sgp006k

Treatment BoolT5sgp007k

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

Table: The Solution Table of Treatment BoolT5sgp006k of Experiment ExpF. Fit: 0. Unique Shortest Solutions: 10.

The Derivation Tree of a Solution of Treatment BoolT5sgp006k of Experiment ExpF

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

Andreas Geyer-Schulz

Design of Experiment

A Summary

B Treatments

Treatment BoolT5sgp002k

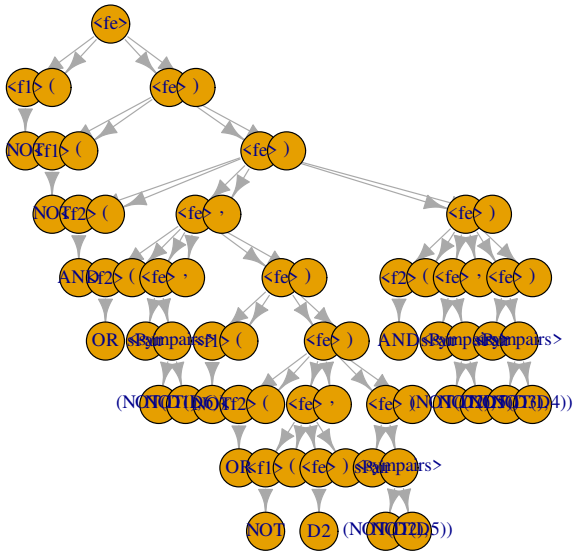
Treatment BoolT5sgp003k

Treatment BoolT5sgp004k

Treatment BoolT5sgp005k

Treatment BoolT5sgp006k

Treatment BoolT5sgp007k



Plot of last xegaRun for Treatment BoolT5sgp006k of Experiment ExpF

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

Andreas Geyer-Schulz

Design of Experiment

A Summary

B Treatments

Treatment BoolT5sgp002k

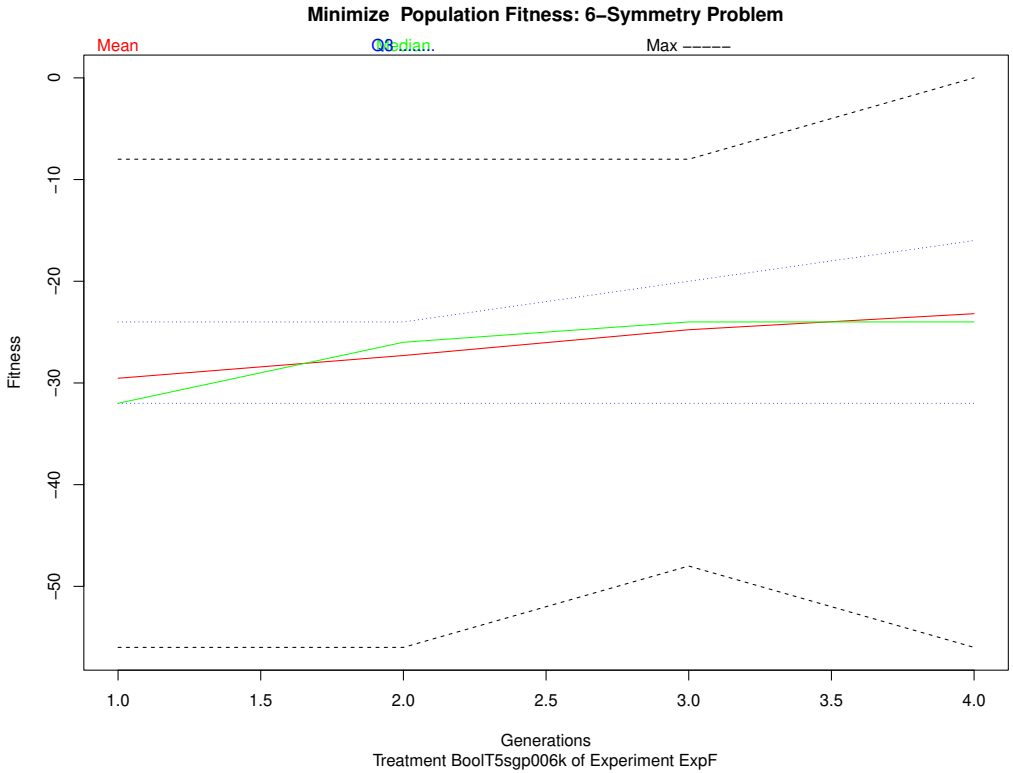
Treatment BoolT5sgp003k

Treatment BoolT5sgp004k

Treatment BoolT5sgp005k

Treatment BoolT5sgp006k

Treatment BoolT5sgp007k



Parameters of treatment: BoolT5sgp007k

	Parameter Values
tRNG	L'Ecuyer-CMRG Inversion Rejection
tReplay	0
experimentName	EE
treatmentName	BoolT5sgp007k
trials	10
everyK	3
outpath	data
batchPath	.
tVerbose	1

Table: Parameters of treatment: BoolT5sgp007k

Parameters of treatment BoolT5sgp007k 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	320
generations	1000
crossrate	0.2
mutrate	0.4
ivmutrate	Const
mutrate2	0.8
ivcrossrate	Const
crossrate2	0.4

Table: Parameters of treatment BoolT5sgp007k passed to xegaRun (Part 1)

Parameters of treatment BoolT5sgp007k 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 BoolT5sgp007k passed to xegaRun (Part 2)

Parameters of treatment BoolT5sgp007k passed to xegaRun

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

Table: Parameters of treatment BoolT5sgp007k passed to xegaRun (Part 3)

Treatment: BoolT5sgp007k

	Treatment	Trials	Variable	min	mean	sd	r
24	BoolT5sgp007k	10	Evaluations	320.00	1440.00	932.95	3200
21	BoolT5sgp007k	10	Fitness	0.00	0.00	0.00	0
23	BoolT5sgp007k	10	Generations	1.00	4.50	2.92	10
22	BoolT5sgp007k	10	Seconds	0.73	1.99	1.18	4

Table: Treatment: BoolT5sgp007k

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

Andreas Geyer-Schulz

Design of Experiment

A Summary

B Treatments

Treatment BoolT5sgp002k

Treatment BoolT5sgp003k

Treatment BoolT5sgp004k

Treatment BoolT5sgp005k

Treatment BoolT5sgp006k

Treatment BoolT5sgp007k

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

Table: The Solution Table of Treatment BoolT5sgp007k of Experiment ExpF. Fit: 0. Unique Shortest Solutions: 10.

The Derivation Tree of a Solution of Treatment BoolT5sgp007k of Experiment ExpF

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

Andreas Geyer-Schulz

Design of Experiment

A Summary

B Treatments

Treatment BoolT5sgp002k

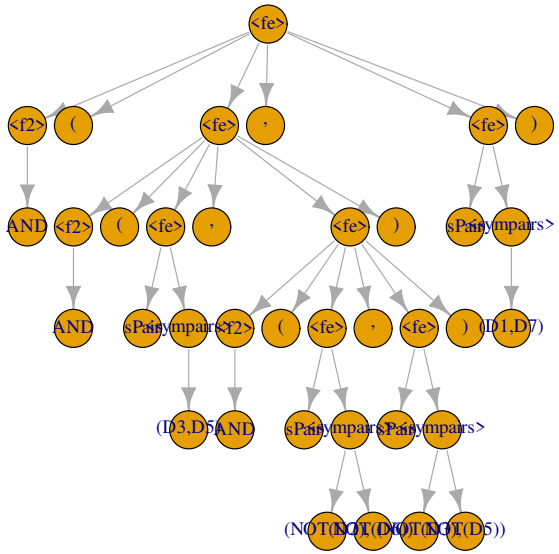
Treatment BoolT5sgp003k

Treatment BoolT5sgp004k

Treatment BoolT5sgp005k

Treatment BoolT5sgp006k

Treatment BoolT5sgp007k



Plot of last xegaRun for Treatment BoolT5sgp007k of Experiment ExpF

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

Andreas Geyer-Schulz

Design of Experiment

A Summary

B Treatments

Treatment BoolT5sgp002k

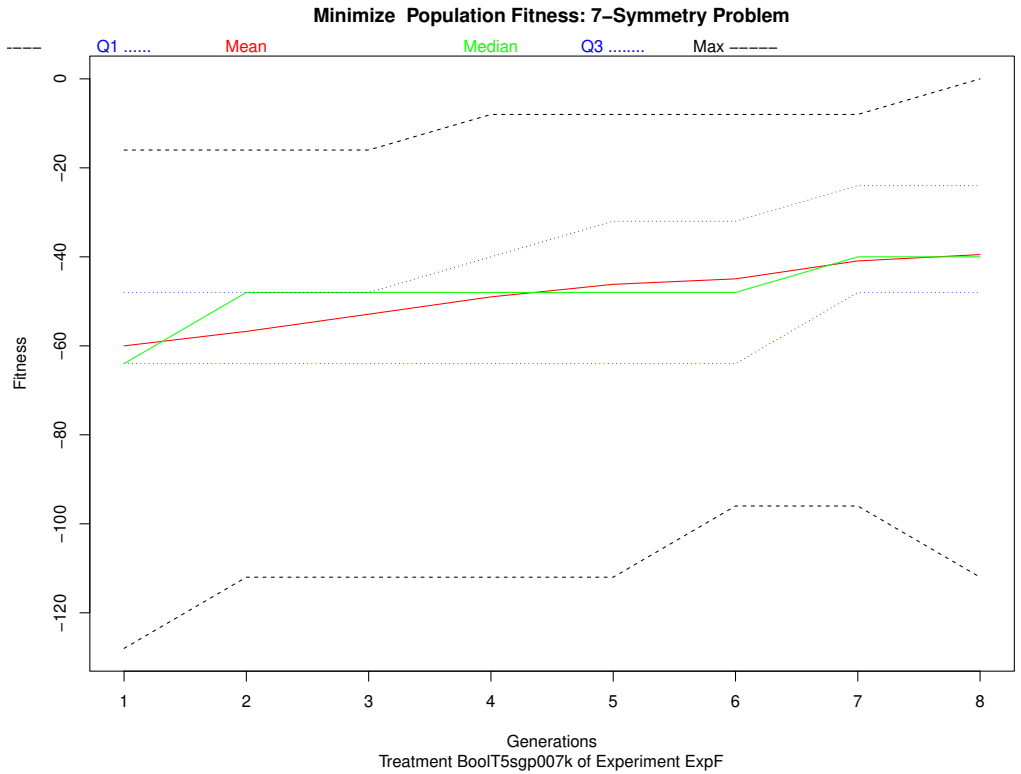
Treatment BoolT5sgp003k

Treatment BoolT5sgp004k

Treatment BoolT5sgp005k

Treatment BoolT5sgp006k

Treatment BoolT5sgp007k



Parameters of treatment: BoolT5sgp008k

	Parameter Values
tRNG	L'Ecuyer-CMRG Inversion Rejection
tReplay	0
experimentName	EE
treatmentName	BoolT5sgp008k
trials	10
everyK	3
outpath	data
batchPath	.
tVerbose	1

Table: Parameters of treatment: BoolT5sgp008k

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

Andreas Geyer-Schulz

Design of Experiment

A Summary

B Treatments

Treatment BoolT5sgp002k

Treatment BoolT5sgp003k

Treatment BoolT5sgp004k

Treatment BoolT5sgp005k

Treatment BoolT5sgp006k

Treatment BoolT5sgp007k

	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	320
generations	1000
crossrate	0.2
mutrate	0.4
ivmutrate	Const
mutrate2	0.8
ivcrossrate	Const
crossrate2	0.4

Table: Parameters of treatment BoolT5sgp008k passed to xegaRun (Part 1)

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

Andreas Geyer-Schulz

Design of Experiment

A Summary

B Treatments

Treatment BoolT5sgp002k

Treatment BoolT5sgp003k

Treatment BoolT5sgp004k

Treatment BoolT5sgp005k

Treatment BoolT5sgp006k

Treatment BoolT5sgp007k

	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 BoolT5sgp008k passed to xegaRun (Part 2)

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

Andreas Geyer-Schulz

Design of Experiment

A Summary

B Treatments

Treatment BoolT5sgp002k

Treatment BoolT5sgp003k

Treatment BoolT5sgp004k

Treatment BoolT5sgp005k

Treatment BoolT5sgp006k

Treatment BoolT5sgp007k

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

Table: Parameters of treatment BoolT5sgp008k passed to xegaRun (Part 3)

Treatment: BoolT5sgp008k

	Treatment	Trials	Variable	min	mean	sd	
28	BoolT5sgp008k	10	Evaluations	1600.00	7232.00	5881.58	17
25	BoolT5sgp008k	10	Fitness	0.00	0.00	0.00	
27	BoolT5sgp008k	10	Generations	5.00	22.60	18.38	
26	BoolT5sgp008k	10	Seconds	3.15	15.37	13.59	

Table: Treatment: BoolT5sgp008k

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

Andreas Geyer-Schulz

Design of Experiment

A Summary

B Treatments

Treatment BoolT5sgp002k

Treatment BoolT5sgp003k

Treatment BoolT5sgp004k

Treatment BoolT5sgp005k

Treatment BoolT5sgp006k

Treatment BoolT5sgp007k

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

Table: The Solution Table of Treatment BoolT5sgp008k of Experiment ExpF. Fit: 0. Unique Shortest Solutions: 10.

The Derivation Tree of a Solution of Treatment BoolT5sgp008k of Experiment ExpF

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

Andreas Geyer-Schulz

Design of Experiment

A Summary

B Treatments

Treatment BoolT5sgp002k

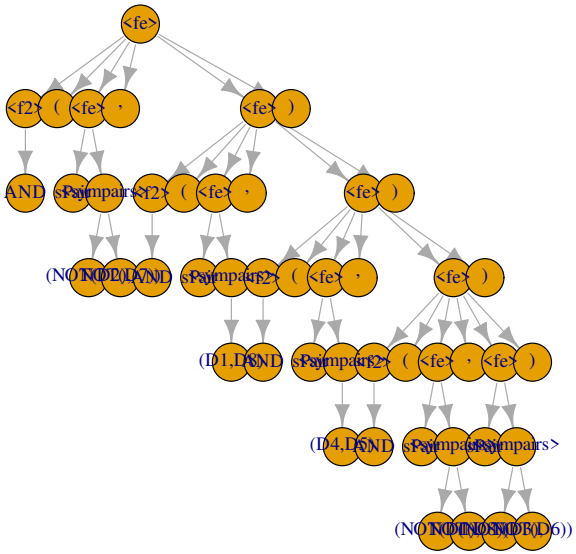
Treatment BoolT5sgp003k

Treatment BoolT5sgp004k

Treatment BoolT5sgp005k

Treatment BoolT5sgp006k

Treatment BoolT5sgp007k



Plot of last xegaRun for Treatment BoolT5sgp008k of Experiment ExpF

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

Andreas Geyer-Schulz

Design of Experiment

A Summary

B Treatments

Treatment BoolT5sgp002k

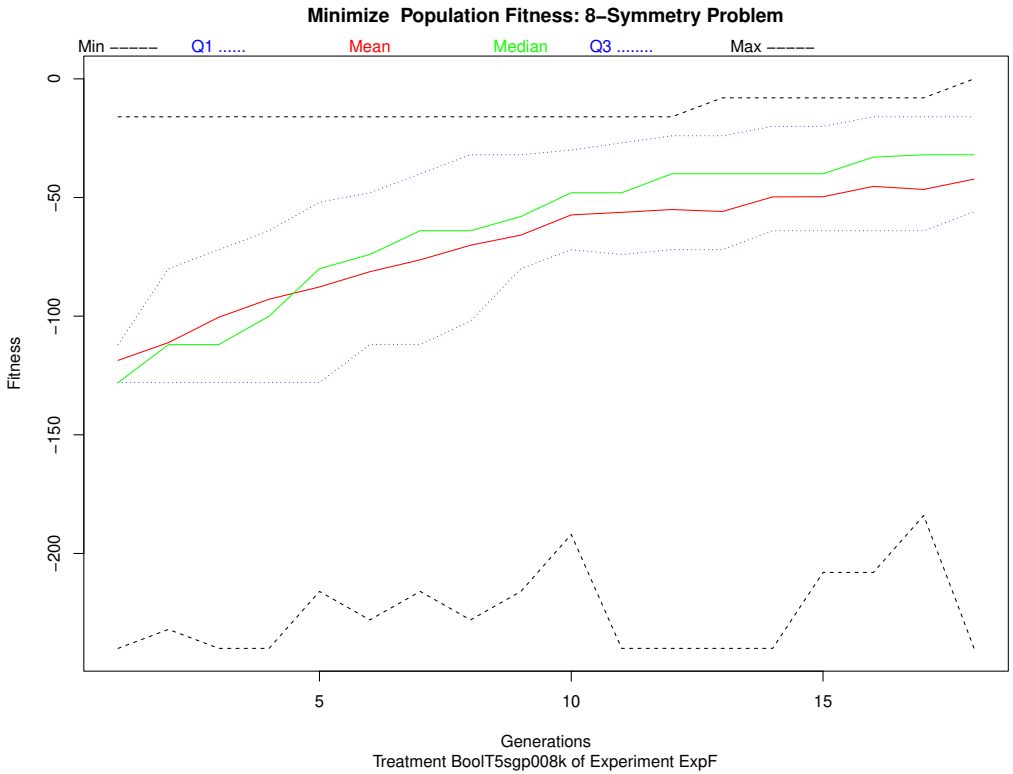
Treatment BoolT5sgp003k

Treatment BoolT5sgp004k

Treatment BoolT5sgp005k

Treatment BoolT5sgp006k

Treatment BoolT5sgp007k



Parameters of treatment: BoolT5sgp009k

	Parameter Values
tRNG	L'Ecuyer-CMRG Inversion Rejection
tReplay	0
experimentName	EE
treatmentName	BoolT5sgp009k
trials	10
everyK	3
outpath	data
batchPath	.
tVerbose	1

Table: Parameters of treatment: BoolT5sgp009k

Parameters of treatment BoolT5sgp009k 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	320
generations	1000
crossrate	0.2
mutrate	0.4
ivmutrate	Const
mutrate2	0.8
ivcrossrate	Const
crossrate2	0.4

Table: Parameters of treatment BoolT5sgp009k passed to xegaRun (Part 1)

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

Andreas Geyer-Schulz

Design of Experiment

A Summary

B Treatments

Treatment BoolT5sgp002k

Treatment BoolT5sgp003k

Treatment BoolT5sgp004k

Treatment BoolT5sgp005k

Treatment BoolT5sgp006k

Treatment BoolT5sgp007k

	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 BoolT5sgp009k passed to xegaRun (Part 2)

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

Andreas Geyer-Schulz

Design of Experiment

A Summary

B Treatments

Treatment BoolT5sgp002k

Treatment BoolT5sgp003k

Treatment BoolT5sgp004k

Treatment BoolT5sgp005k

Treatment BoolT5sgp006k

Treatment BoolT5sgp007k

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

Table: Parameters of treatment BoolT5sgp009k passed to xegaRun (Part 3)

Treatment: BoolT5sgp009k

	Treatment	Trials	Variable	min	mean	sd	
32	BoolT5sgp009k	10	Evaluations	1920.00	8352.00	6931.61	20
29	BoolT5sgp009k	10	Fitness	0.00	0.00	0.00	
31	BoolT5sgp009k	10	Generations	6.00	26.10	21.66	
30	BoolT5sgp009k	10	Seconds	5.62	28.06	26.01	

Table: Treatment: BoolT5sgp009k

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

Andreas Geyer-Schulz

Design of Experiment

A Summary

B Treatments

Treatment BoolT5sgp002k

Treatment BoolT5sgp003k

Treatment BoolT5sgp004k

Treatment BoolT5sgp005k

Treatment BoolT5sgp006k

Treatment BoolT5sgp007k

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

Table: The Solution Table of Treatment BoolT5sgp009k of Experiment ExpF. Fit: 0. Unique Shortest Solutions: 10.

The Derivation Tree of a Solution of Treatment BoolT5sgp009k of Experiment ExpF

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

Andreas Geyer-Schulz

Design of Experiment

A Summary

B Treatments

Treatment BoolT5sgp002k

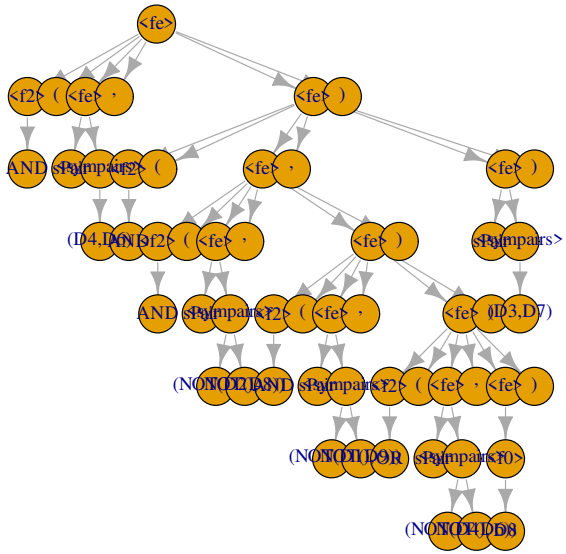
Treatment BoolT5sgp003k

Treatment BoolT5sgp004k

Treatment BoolT5sgp005k

Treatment BoolT5sgp006k

Treatment BoolT5sgp007k



Plot of last xegaRun for Treatment BoolT5sgp009k of Experiment ExpF

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

Andreas Geyer-Schulz

Design of Experiment

A Summary

B Treatments

Treatment BoolT5sgp002k

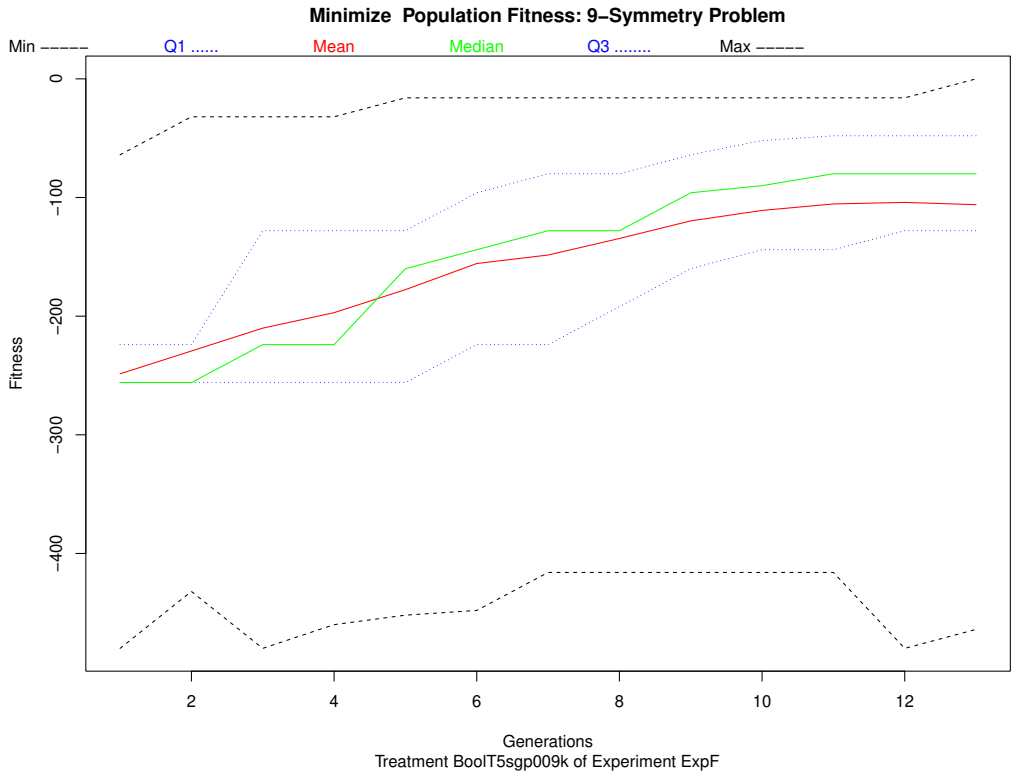
Treatment BoolT5sgp003k

Treatment BoolT5sgp004k

Treatment BoolT5sgp005k

Treatment BoolT5sgp006k

Treatment BoolT5sgp007k



Parameters of treatment: BoolT5sgp010k

	Parameter Values
tRNG	L'Ecuyer-CMRG Inversion Rejection
tReplay	0
experimentName	EE
treatmentName	BoolT5sgp010k
trials	10
everyK	3
outpath	data
batchPath	.
tVerbose	1

Table: Parameters of treatment: BoolT5sgp010k

Parameters of treatment BoolT5sgp010k 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	320
generations	1000
crossrate	0.2
mutrate	0.4
ivmutrate	Const
mutrate2	0.8
ivcrossrate	Const
crossrate2	0.4

Table: Parameters of treatment BoolT5sgp010k passed to xegaRun (Part 1)

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

Andreas Geyer-Schulz

Design of Experiment

A Summary

B Treatments

Treatment BoolT5sgp002k

Treatment BoolT5sgp003k

Treatment BoolT5sgp004k

Treatment BoolT5sgp005k

Treatment BoolT5sgp006k

Treatment BoolT5sgp007k

	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 BoolT5sgp010k passed to xegaRun (Part 2)

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

Andreas Geyer-Schulz

Design of Experiment

A Summary

B Treatments

Treatment BoolT5sgp002k

Treatment BoolT5sgp003k

Treatment BoolT5sgp004k

Treatment BoolT5sgp005k

Treatment BoolT5sgp006k

Treatment BoolT5sgp007k

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

Table: Parameters of treatment BoolT5sgp010k passed to xegaRun (Part 3)

Treatment: BoolT5sgp010k

	Treatment	Trials	Variable	min	mean	sd
36	BoolT5sgp010k	10	Evaluations	5440.00	27840.00	23461.82
33	BoolT5sgp010k	10	Fitness	0.00	0.00	0.00
35	BoolT5sgp010k	10	Generations	17.00	87.00	73.32
34	BoolT5sgp010k	10	Seconds	27.94	193.54	191.81

Table: Treatment: BoolT5sgp010k

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

Andreas Geyer-Schulz

Design of Experiment

A Summary

B Treatments

Treatment BoolT5sgp002k

Treatment BoolT5sgp003k

Treatment BoolT5sgp004k

Treatment BoolT5sgp005k

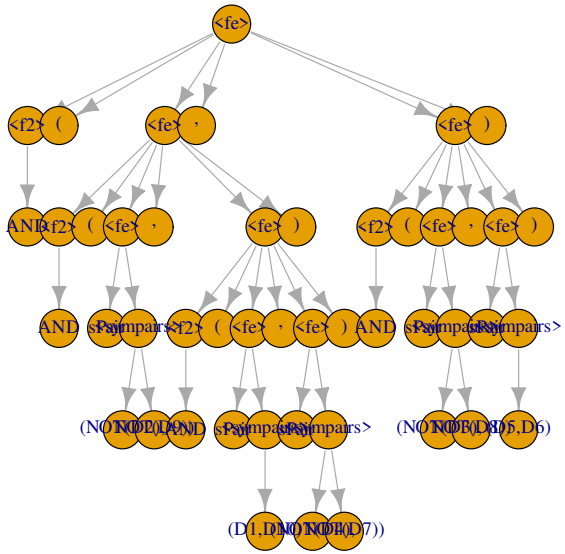
Treatment BoolT5sgp006k

Treatment BoolT5sgp007k

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

Table: The Solution Table of Treatment BoolT5sgp010k of Experiment ExpF. Fit: 0. Unique Shortest Solutions: 10.

The Derivation Tree of a Solution of Treatment BoolT5sgp010k of Experiment ExpF



Plot of last xegaRun for Treatment BoolT5sgp010k of Experiment ExpF

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

Andreas Geyer-Schulz

Design of Experiment

A Summary

B Treatments

Treatment BoolT5sgp002k

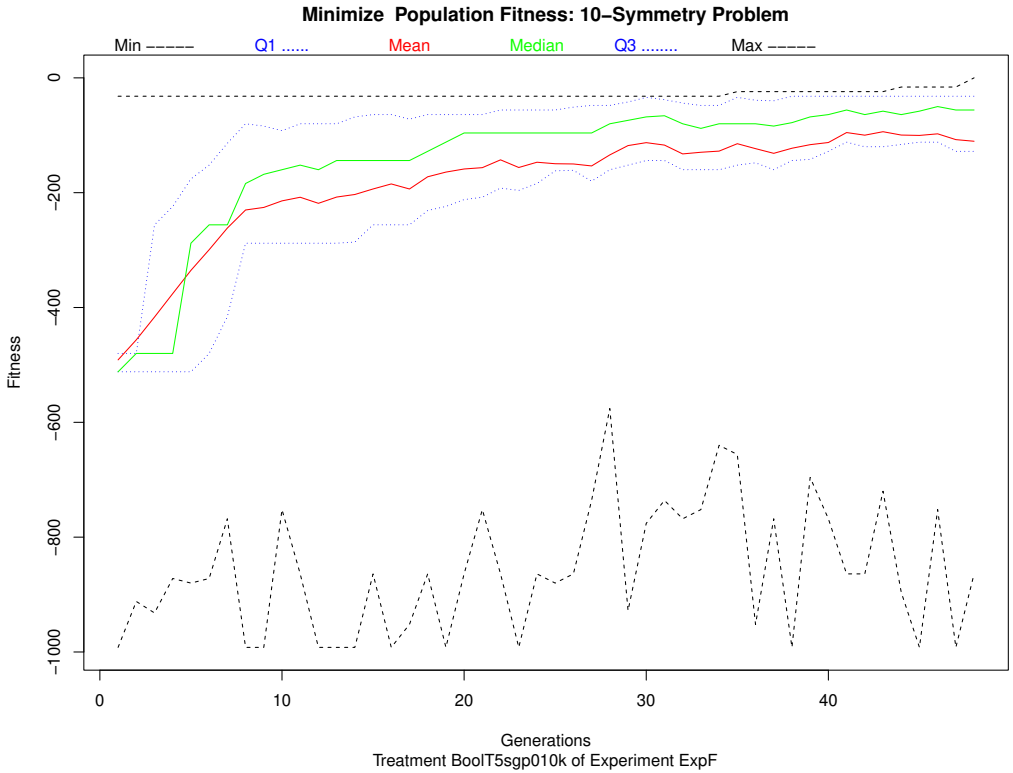
Treatment BoolT5sgp003k

Treatment BoolT5sgp004k

Treatment BoolT5sgp005k

Treatment BoolT5sgp006k

Treatment BoolT5sgp007k



Parameters of treatment: BoolT5sgp011k

	Parameter Values
tRNG	L'Ecuyer-CMRG Inversion Rejection
tReplay	0
experimentName	EE
treatmentName	BoolT5sgp011k
trials	10
everyK	3
outpath	data
batchPath	.
tVerbose	1

Table: Parameters of treatment: BoolT5sgp011k

Parameters of treatment BoolT5sgp011k 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	320
generations	1000
crossrate	0.2
mutrate	0.4
ivmutrate	Const
mutrate2	0.8
ivcrossrate	Const
crossrate2	0.4

Table: Parameters of treatment BoolT5sgp011k passed to xegaRun (Part 1)

Parameters of treatment BoolT5sgp011k 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 BoolT5sgp011k passed to xegaRun (Part 2)

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A Summary

B Treatments

Treatment BoolT5sgp002k

Treatment BoolT5sgp003k

Treatment BoolT5sgp004k

Treatment BoolT5sgp005k

Treatment BoolT5sgp006k

Treatment BoolT5sgp007k

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

Table: Parameters of treatment BoolT5sgp011k passed to xegaRun (Part 3)

Treatment: BoolT5sgp011k

	Treatment	Trials	Variable	min	mean	sd
40	BoolT5sgp011k	10	Evaluations	4800.00	54912.00	94134.91
37	BoolT5sgp011k	10	Fitness	0.00	3.20	10.12
39	BoolT5sgp011k	10	Generations	15.00	171.60	294.17
38	BoolT5sgp011k	10	Seconds	45.78	704.29	1312.58

Table: Treatment: BoolT5sgp011k

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A Summary

B Treatments

Treatment BoolT5sgp002k

Treatment BoolT5sgp003k

Treatment BoolT5sgp004k

Treatment BoolT5sgp005k

Treatment BoolT5sgp006k

Treatment BoolT5sgp007k

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

Table: The Solution Table of Treatment BoolT5sgp011k of Experiment ExpF. Fit: 0. Unique Shortest Solutions: 9.

The Derivation Tree of a Solution of Treatment BoolT5sgp011k of Experiment ExpF

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

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A Summary

B Treatments

Treatment BoolT5sgp002k

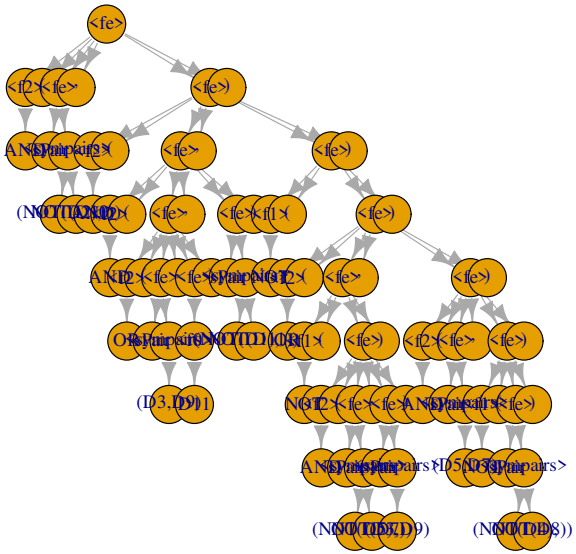
Treatment BoolT5sgp003k

Treatment BoolT5sgp004k

Treatment BoolT5sgp005k

Treatment BoolT5sgp006k

Treatment BoolT5sgp007k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Plot of last xegaRun for Treatment BoolT5sgp011k of Experiment ExpF

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

Andreas Geyer-Schulz

Design of Experiment

A Summary

B Treatments

Treatment BoolT5sgp002k

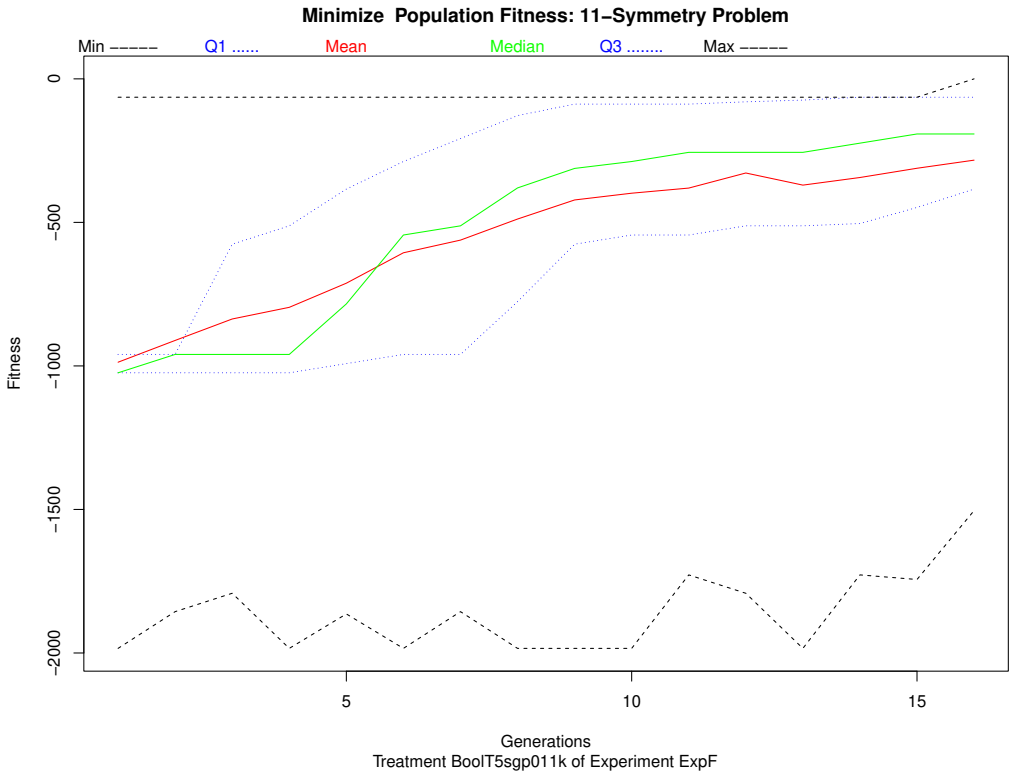
Treatment BoolT5sgp003k

Treatment BoolT5sgp004k

Treatment BoolT5sgp005k

Treatment BoolT5sgp006k

Treatment BoolT5sgp007k



Parameters of treatment: BoolT5sgp012k

	Parameter Values
tRNG	L'Ecuyer-CMRG Inversion Rejection
tReplay	0
experimentName	EE
treatmentName	BoolT5sgp012k
trials	10
everyK	3
outpath	data
batchPath	.
tVerbose	1

Table: Parameters of treatment: BoolT5sgp012k

Parameters of treatment BoolT5sgp012k 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	320
generations	1000
crossrate	0.2
mutrate	0.4
ivmutrate	Const
mutrate2	0.8
ivcrossrate	Const
crossrate2	0.4

Table: Parameters of treatment BoolT5sgp012k passed to xegaRun (Part 1)

Parameters of treatment BoolT5sgp012k 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 BoolT5sgp012k passed to xegaRun (Part 2)

Parameters of treatment BoolT5sgp012k passed to xegaRun

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

Table: Parameters of treatment BoolT5sgp012k passed to xegaRun (Part 3)

Treatment: BoolT5sgp012k

	Treatment	Trials	Variable	min	mean	sd
44	BoolT5sgp012k	10	Evaluations	1280.00	83424.00	54311.68
41	BoolT5sgp012k	10	Fitness	0.00	0.00	0.00
43	BoolT5sgp012k	10	Generations	4.00	260.70	169.72
42	BoolT5sgp012k	10	Seconds	22.16	2090.05	1461.07

Table: Treatment: BoolT5sgp012k

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

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Design of Experiment

A Summary

B Treatments

Treatment BoolT5sgp002k

Treatment BoolT5sgp003k

Treatment BoolT5sgp004k

Treatment BoolT5sgp005k

Treatment BoolT5sgp006k

Treatment BoolT5sgp007k

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

Table: The Solution Table of Treatment BoolT5sgp012k of Experiment ExpF. Fit: 0. Unique Shortest Solutions: 10.

The Derivation Tree of a Solution of Treatment BoolT5sgp012k of Experiment ExpF

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

Andreas Geyer-Schulz

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A Summary

B Treatments

Treatment BoolT5sgp002k

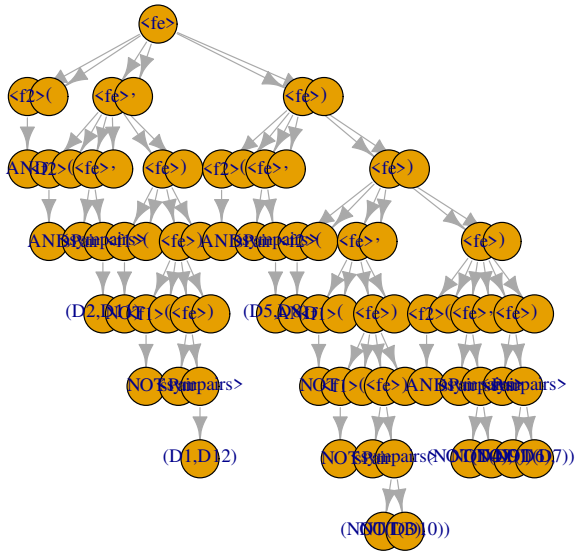
Treatment BoolT5sgp003k

Treatment BoolT5sgp004k

Treatment BoolT5sgp005k

Treatment BoolT5sgp006k

Treatment BoolT5sgp007k



Plot of last xegaRun for Treatment BoolT5sgp012k of Experiment ExpF

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

Andreas Geyer-Schulz

Design of Experiment

A Summary

B Treatments

Treatment BoolT5sgp002k

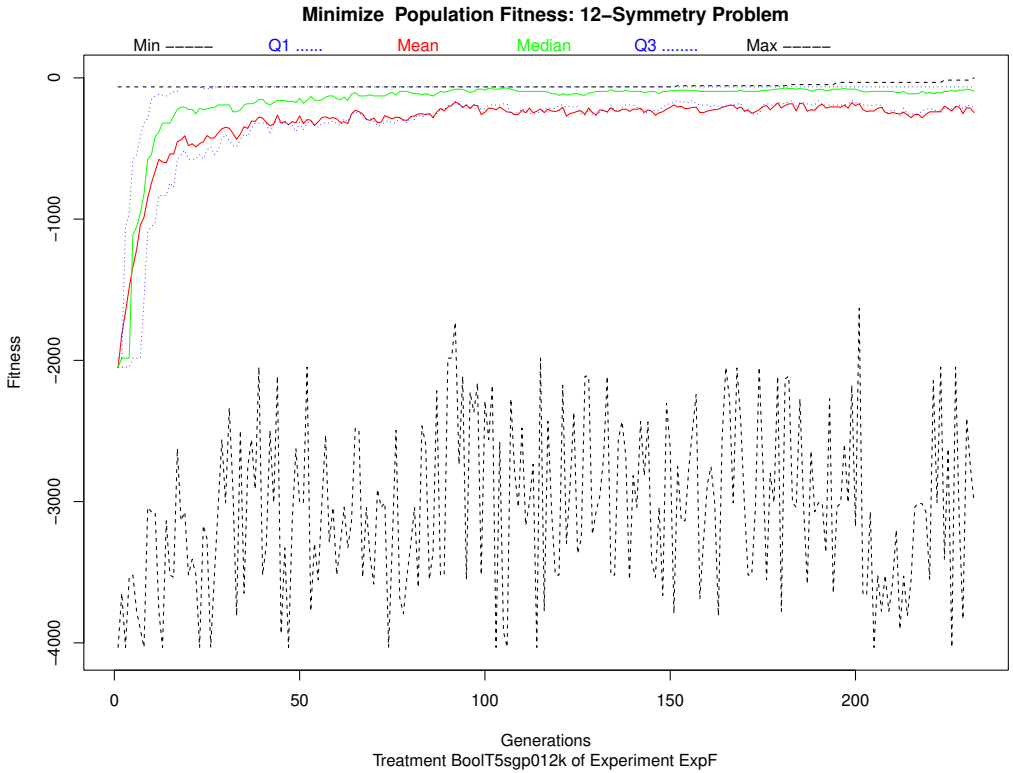
Treatment BoolT5sgp003k

Treatment BoolT5sgp004k

Treatment BoolT5sgp005k

Treatment BoolT5sgp006k

Treatment BoolT5sgp007k



All parameters of xegaRun of treatment BoolT5sgp002k

	Parameter Values
penv	2-Symmetry Problem
grammar	/home/dj2333/dev/cran/kSymmetry/BNF/AndOrNotTuned5.txt
max	FALSE
algorithm	sgp
popsize	320
generations	1000
crossrate	0.2
mutrate	0.4
elitist	TRUE
replay	0
maxdepth	7
maxtrials	5
codons	80
codonBits	0
codonPrecision	LCM

Table: All parameters of xegaRun of treatment BoolT5sgp002k (Part 1)

All parameters of xegaRun of treatment BoolT5sgp002k

	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 BoolT5sgp002k (Part 2)

All parameters of xegaRun of treatment BoolT5sgp002k

	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 BoolT5sgp002k (Part 3)

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

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Design of Experiment

A Summary

B Treatments

Treatment BoolT5sgp002k

Treatment BoolT5sgp003k

Treatment BoolT5sgp004k

Treatment BoolT5sgp005k

Treatment BoolT5sgp006k

Treatment BoolT5sgp007k

	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 BoolT5sgp002k (Part 4)

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

Andreas Geyer-Schulz

Design of Experiment

A Summary

B Treatments

Treatment BoolT5sgp002k

Treatment BoolT5sgp003k

Treatment BoolT5sgp004k

Treatment BoolT5sgp005k

Treatment BoolT5sgp006k

Treatment BoolT5sgp007k

	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	-4

Table: All parameters of xegaRun of treatment BoolT5sgp002k (Part 5)

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

Andreas Geyer-Schulz

Design of Experiment

A Summary

B Treatments

Treatment BoolT5sgp002k

Treatment BoolT5sgp003k

Treatment BoolT5sgp004k

Treatment BoolT5sgp005k

Treatment BoolT5sgp006k

Treatment BoolT5sgp007k

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

Table: All parameters of xegaRun of treatment BoolT5sgp002k (Part 6)