

Keyword Index

- 2D HP model 385
abstraction 1875
accuracy threshold 941
ACO 2121
ACO meta-heuristic 275
active interval scheduling problem 2205
ad hoc networks 1993
adaptation 1123, 1575, 1579
adaptation/self adaptation 1595
adaptive behavior 35
adaptive behavior and evolutionary robotics 51
adaptive image interpretation 2029
adaptive mutation 1257
adaptive operator allocation 1539
adaptive pursuit 1539
aerial vehicle, unmanned 1523
agent-based model 545, 1897, 1905
agents 35
AIDS 305
air pump 2215
algorithm whole proceedings
algorithm, compact genetic 679
algorithm, competent genetic 735
algorithm, evolutionary ... 3, 423, 469, 563, 599, 615, 649, 755, 889, 957, 975, 999, 1079, 1209, 1333, 1409, 1433, 1729, 1843, 1937, 2053, 2075, 2181, 2193
algorithm, genetic 67, 129, 149, 161, 185, 217, 377, 385, 415, 447, 471, 475, 557, 559, 581, 607, 663, 671, 695, 751, 787, 829, 927, 949, 975, 983, 1021, 1045, 1115, 1131, 1147, 1177, 1185, 1193, 1217, 1225, 1233, 1249, 1257, 1265, 1271, 1279, 1287, 1303, 1309, 1317, 1341, 1347, 1385, 1393, 1401, 1417, 1425, 1441, 1463, 1471, 1477, 1485, 1493, 1507, 1515, 1523, 1531, 1549, 1553, 1555, 1565, 1567, 1569, 1573, 1575, 1579, 1581, 1583, 1587, 1591, 1595, 1597, 1599, 1601, 1657, 1737, 1811, 1921, 1929, 1961, 1993, 2021, 2029, 2037, 2045, 2067, 2083, 2097, 2105, 2113, 2133, 2157, 2165, 2191, 2199, 2203, 2209, 2217, 2221
algorithms, hybrid evolutionary 377
algorithm, island model parallel memetic 621
algorithm, multiple objective evolutionary 477
algorithm, performance 1579
algorithm, proportional genetic 1177
algorithm, unit clause 1241
algorithm, univariate marginal distribution 745
algorithm for automatized optimum design 749
algorithmic chemistries 1635
algorithms theory 1595
a-life 35
alternative chromosomes 1401
alternative phenotypes 409
ambiguous environments 115
analog filter synthesis 1619
analysis, runtime 763, 841, 849
analysis, theoretical 679, 1161
annealing, simulated 921, 927, 1061, 1555, 1601
annular sorting 217
anomaly detection 297, 321, 345
anomaly visualization 297
ant 217
ant colony optimization 249
ant system 271
antigenic search 353
application 1681, 1945
approximation, fitness 671
approximation, function 1835, 1827, 2089
architectures, recurrent 1787
archive 483
artificial embryogeny 149
artificial evolution of populations 1597
artificial genetic engineering 1597
artificial immune network 361
artificial immune system 297, 313, 321, 329, 337, 345, 353, 361, 371, 2105
artificial intelligence 43, 1233, 1587
artificial life 51, 137
artificial neural networks 371
artificial ontogeny 99
assembly 99
assignment problem 1921
asymptotic correctness 1553
ATNoSFERES 1867
attribute interaction 1811
automated design 1619, 1953, 2215
automated test case generation 1013, 1053
automatic image registration 2045
automatic programming 1781
automatic target recognition 1803
automated test case generation 1083
automatic test program generation 2193
automation 1061
automobile industry 2195
autonomous control 1721
autonomous navigation 121
backward chaining 1777
BAliBASE 477
BAS 249
Bayesian optimization algorithm 655, 1485
Bentley's GA 1553
biased mutation 917
bi-criteria scheduling 803
binary adder 559
binary tree 1441
binomial-3 1627
bioinformatics 471, 479
bionic 273
bloat 1673
Blob code 585
Blocks, building 671, 1627, 1713
blocks world 1819
BOA 663
Boltzmann distribution 695
bond graph 1619, 2215
branching process 1241
breeding swarms 161, 185
Brill tagger 2067
Bucky ball 1565
building block processing 655
building blocks 671, 1627, 1713
bulk handling port system 2197
burnable poison 1477
calculus, fractional 1571
card sorts 1551
cardinality constraint 1193
Cartesian genetic programming 1613, 1649
CDMA 2015
cellular automata 559, 2007, 2149
cellular genetic algorithms 1123
cellular representation 19, 59
chaining approach 1013, 1053

Keyword Index

- characterizing dynamism 1433
CHC 1921
chromosome representation 1325
classification 1597
classification of cancer data 453
classification problem 2037
classifier systems 637
classifier system, learning 655, 1819, 1827, 1835, 1843, 1851, 1859, 1883, 1967, 1875, 1893, 2201
classification problems, decomposable 655
climbing, dynamic hill 927
clock routing 1441
clonal selection 373, 2015, 2105
clone detection 1079
Clustal X 477
cluster computing 1585
clustering 217, 663, 719, 865, 1029, 1417
code bloat 91, 1605, 1783
code generation 147
code growth 1605, 1673, 1783
code-division
 multiple-access systems 2105
codings 585
coevolution 483, 491, 499, 515, 523, 531, 539, 545, 557, 1355, 1961
collaborative interactive evolution 2199
collagen 471
collective robotics 121
color image sequence 2045
combinatorial auctions 2097
combinatorial landscapes 579
combinatorial optimization 599, 621, 647, 651, 921, 1471, 1601
combinators 1689
commonality hypothesis 1601
communication 51
compact classifier system 1893
compact genetic algorithm 679
competent genetic algorithms 735
competitive learning 11
complex systems 11, 233
computation time 1409
computation, evolutionary 11, 19, 59, 177, 267, 337, 409, 555, 557, 637, 727, 873, 991, 1131, 1153, 1295, 1569, 1673, 1697, 1791, 2007
computational effort 1649
computational geometry 337
computation, interactive
 evolutionary 1363
computer-automated design 1729
computing, internet 1575, 1579
concatenated coding 941
conditional strategies 409
constant creation 1665
constrained optimization 209
constrained problems 917
constraint handling 27, 225, 749, 889, 917
constraint indexing, fuzzy 1985
constraint satisfaction problem 599
construction, feature 1811
constructive induction 1811
context-sensitive grammar 687
continuous optimization 719
control 147
control systems 2165
convergence 1455
cooperation 1705
cooperative agents 1721
cooperative coevolution 507, 539, 555, 557
cooperative search 269
cooperative-competitive evolution 557
coordinate transformation 1559
correlated information 749
correlated mutation 917
coupling from the past 615
covariance matrix adaptation 2173
coverage, detector 281
cross-correlation 2061
cross-entropy 647
crossover 703, 1147
crossover real coded 1347
crowding distance 257
crystallographic phasing 377
crystallography 377
cultural algorithms 27
cutting stock 637
c-value paradox 91
data clustering 371
data mining 1551
data reduction 1791
data selection 1597
decision maker's preference 787
decision variables 1477
decomposable classification problems 655
dependability 2053
design 11, 19, 27, 59, 99, 153, 233, 271, 305, 313, 371, 373, 385, 393, 461, 475, 557, 647, 651, 671, 687, 747, 771, 795, 811, 897, 905, 933, 949, 957, 1021, 1045, 1079, 1217, 1265, 1279, 1317, 1325, 1355, 1363, 1447, 1477, 1501, 1571, 1597, 1619, 1641, 1649, 1697, 1729, 1753, 1761, 1803, 1811, 1893, 1953, 1969, 2007, 2015, 2075, 2105, 2113, 2141, 2149, 2157, 2173, 2191, 2195, 2197, 2201, 2209, 2213, 2215, 2165
design and tuning 2165
design heuristics 1045
design, open-ended 1729
design optimization 897, 2173
design representations 2007
detector coverage 281
development 83
developmental error 1317
developmental timing 1561
differential evolution 27, 177, 225, 439, 873, 881, 967, 991, 2157
diffraction, x-ray 471
digit concatenation 1665
digital adders 1649
digital comparators 1649
digital multipliers 1649
digital symbol set design 2213
dimensionality reduction 1549
directed mutation 917
directional self-learning numerical
 optimization 1569
dissimilar schemata 1455
distance measure 1393, 1581
distance metrics 1153
distributed computation 1791
distributed data mining 1883
distribution theory, product 751
diversity 1485, 1531, 1557
diversity of non-dominated solutions 817
diversity-preserving strategies 787, 817
DNA computing 1761
Dominance, immune 373
dormant node 1745
drift analysis 1409

Keyword Index

- drift, genetic 745, 865, 1531
drug design 1969
dynamic control 2181
dynamic environment 545, 923, 1433, 1493, 1557
dynamic hill climbing 927
dynamic limits 1673
dynamic optimization 289, 841
dynamic optimization problem 711, 1115
dynamics 507
Dynkin's formula 1409
- eCGA 671
economics 129, 233, 273, 1897, 1905, 2097, 2203
EDAs 719, 749, 2141
edge assembly crossover (EAX) 1471
edge detector 795
edge-sets 585
editing frequency 545
effective fitness 1605
efficiency 1745
EFSM 1081
eligibility traces 1851
embodiment 43
embryonics 941
emergence 1177
emergence of complexity 599
empirical study 747
energy efficient routing 153
enforced sub-populations 1913
engineering, genetic 1507
ensembles 1379
environment, dynamic 545, 923, 1433, 1493, 1557
ephemeral random constants 1665
epilepsy 461
epistasis 1169
equation induction 1999
ergodicity 1553
estimation of distribution algorithm 655, 663, 671, 695, 727, 745, 751, 1775
event-driven 2201
evolution 35, 571
evolution, differential 27, 177, 225, 439, 873, 881, 967, 991, 2157
evolution and learning 1795
evolution of networks 563
- evolution strategies 409, 629, 827, 849, 865, 897, 915, 917, 919, 923
evolutionary activity metrics 137
evolutionary algorithm 3, 423, 469, 563, 599, 615, 649, 755, 889, 957, 975, 999, 1079, 1209, 1333, 1409, 1433, 1729, 1843, 1937, 2053, 2075, 2181, 2193
evolutionary computation 11, 19, 59, 177, 267, 337, 409, 555, 557, 637, 727, 873, 991, 1131, 1153, 1295, 1569, 1673, 1697, 1791, 2007
- evolutionary computation
 benchmarks 1589
- evolutionary computing 1657, 1775
evolutionary design 99, 1729
evolutionary genetics 91
evolutionary learning 1139
evolutionary multiobjective
 optimization 779, 787, 817
- evolutionary optimization 2181
evolutionary plant design 1985
evolutionary programming 1641
evolutionary robotics 3, 147, 1385
evolutionary robotics and adaptive
 behavior 51
- evolutionary search 2133
evolutionary stability 1317
evolutionary strategies 881, 905, 2173, 2181
- evolutionary testing 1013, 1037, 1053, 1083
- evolvability 1355
evolvable hardware 927, 933, 957
evolved transforms 1599
- expectation maximization 703
expected optimization time 1161
experiment management 1791
experimentation 11, 35, 51, 67, 75, 83, 91, 107, 137, 147, 217, 233, 249, 273, 275, 305, 313, 353, 377, 409, 439, 447, 483, 491, 545, 557, 559, 579, 621, 629, 655, 671, 711, 719, 755, 763, 803, 889, 921, 933, 957, 967, 999, 1009, 1021, 1029, 1079, 1115, 1201, 1225, 1249, 1265, 1271, 1279, 1295, 1317, 1379, 1507, 1551, 1597, 1599, 1605, 1627, 1657, 1673, 1681, 1689, 1697, 1713, 1721, 1745, 1779, 1781, 1787, 1791, 1795, 1803, 1811, 1835, 1843, 1867, 1913, 1937, 1961, 1969, 1977, 1985, 1993, 2037, 2053, 2061, 2067, 2141, 2207, 2211, 2221
- expert systems 1737
exploration vs. exploitation 1531
exponentiation 1689
expression, gene 453
extended compact GA 655
extended operating conditions 1803
extraction, feature 461, 2089
- fabrication 99
factorial 1689
factorial experiment 2181
factorization 695
feature construction 1811
feature extraction 461, 2089
feature extractor 795
feature influence 1139
feature selection 275, 1139, 1225, 1811
feed-forward neural network 2061
Fibonacci sequence 1689
financial network 2061
first order logic 1819
fitness approximation 671
fitness, effective 1605
fitness estimation 671
fitness function 1029, 1591
fitness inheritance 779
fitness landscape 1287, 1425, 1515
fitness preserving crossover 1745
fitness sharing 557, 1161
fitness value 277
fixed points 1233
flapping flight 957
flight midcourse guidance control 1501
foraging 273
forecasting 353, 2221
fractional calculus 1571
free market-based
 architectural approach 1325
function approximation 1835, 1827, 2089
function choice 1771
function minimization 161
function optimization 873, 949, 967
fuzzy constraint indexing 1985
fuzzy control 1385
fuzzy discretization 2037
fuzzy logic 1585, 1737

Keyword Index

- GA.....249, 1081, 1835, 2197
 GA optimization1085
 gadolinium1477
 game theory2097
 Gaussian mixture model703
 gene decomposition1507
 gene duplication919
 gene expression453
 gene libraries313
 gene regulation469
 gene regulatory network439
 gene subset selection453
 generalization1803, 1859
 generalized geometric programming ... 329
 generative representations2007
 genetic algorithm... 67, 129, 149, 161, 185,
 217, 377, 385, 415, 447, 471, 475, 557, 559,
 581, 607, 663, 671, 695, 751, 787, 829, 927,
 949, 975, 983, 1021, 1045, 1115, 1131,
 1147, 1177, 1185, 1193, 1217, 1225, 1233,
 1249, 1257, 1265, 1271, 1279, 1287, 1303,
 1309, 1317, 1341, 1347, 1385, 1393, 1401,
 1417, 1425, 1441, 1463, 1471, 1477, 1485,
 1493, 1507, 1515, 1523, 1531, 1549, 1553,
 1555, 1565, 1567, 1569, 1573, 1575, 1579,
 1581, 1583, 1587, 1591, 1595, 1597, 1599,
 1601, 1657, 1737, 1811, 1921, 1929, 1961,
 1993, 2021, 2029, 2037, 2045, 2067, 2083,
 2097, 2105, 2113, 2133, 2157, 2165, 2191,
 2199, 2203, 2209, 2217, 2221
 genetic algorithms
 and logic circuit design.....1571
 genetic algorithms and real world
 applications1577
 genetic crossover1585
 genetic drift745, 865, 1531
 genetic engineering1507
 genetic network programming1705
 genetic program1737
 genetic programming.....91, 169, 401,
 461, 523, 687, 747, 1551, 1619,
 1635, 1641, 1657, 1657, 1665,
 1673, 1681, 1697, 1721, 1745, 1753,
 1771, 1775, 1779, 1781, 1783,
 1785, 1789, 1953, 1999,
 2215
 genetic programs1761
 genetic vehicle representation1523
 genetics-based machine learning.....1875
 genomic self-similarity1177
 genomics393
 genotype editing545
 genotype-phenotype-mapping415, 1561
 geographic information
 systems (GIS).....1463
 global optimization225
 global search1209
 GP1777
 GP problem difficulty1627
 gradients755
 grammar, context-sensitive687
 grammatical evolution1665
 graph bisection1507
 graph clustering1507
 graph matching1567
 graph partitioning1507
 graph theory1563
 greedy operators607
 grid1447
 growth1771
 guidance control, flight midcourse 1501
 gyroscope927
 hacker1905
 hardware, evolvable927, 933, 957
 hardware pipeline949
 hardware-in-the-loop evolution957
 harmony search651
 heavy atom method377
 height field1463
 heterogeneous computing capability .. 1447
 heterogeneous systems2209
 heuristic rules2191
 heuristic search.....1061, 1601, 2029
 heuristics249, 559, 1697
 hierarchical-if-and-only-if
 (HIFF) problem1153
 hierarchy1201
 highlander problem1713
 hill-climbers1597
 HIV-1305
 honeybees273
 human decision behavior2021
 human evaluation1363
 human factors.....1363, 1969, 2113, 2199
 human-competitive results1953
 HVAC2075
 hybrid393
 hybrid evolutionary algorithms377
 hybrid-PSO209
 hydraulics1999
 hydrology1999
 hyper-heuristics637
 hyperplane-defined functions.....1493
 hypothesis testing281
 hypothesis verification305
 IIR filter2157
 image compression1961
 image processing1463
 immune dominance373
 immune network289
 immune network, artificial361
 immune system, artificial.... 297, 313, 321,
 329, 337, 345, 353, 361, 371, 2105
 immune systems modeling305
 immunocomputing2015
 in vitro evolution1761
 in-core fuel management2191
 induced defense409
 inexact pattern matching1567
 infant cry1597
 inference469
 infinite population models1233
 informative genes453
 initial populations1627, 1713
 initial public offering983
 initialization bias241
 input sequences1081
 intelligence, swarm153, 169, 193,
 216, 233, 241, 263, 431
 interactive evolution..... 1897, 1969, 2199
 interactive evolutionary
 computation1363
 internet computing1575, 1579
 intransitivity515
 intrinsic emergence559
 intron1745
 intrusion detection systems1591
 invention machine1953
 inventor's search heuristics129
 IR image sequence2045
 Ising model1161
 island model621, 1295
 island model
 parallel memetic algorithm621
 isomorphism1581

Keyword Index

- isomorphous replacement 377
 iteration 1689
 job shop scheduling 313, 1593
 kernel density estimation 703
 kernel function 905
 knapsack problem,
 multi-dimensional 1257
 knapsack problem, zero/one multiple .. 629
 k-nearest neighbor classifier 453
 k-nearest neighbors 1549
 k-tablet 1347
 Lagrange multiplier 629
 landscape 1347
 landscape generator 967
 landscapes 507
 landscapes, rugged 579
 language processing, natural 2067
 languages 1689, 1787, 1819, 2067
 latent variable 1347
 LCS 655, 1819,
 1827, 1835, 1843, 1851, 1859, 1883,
 1967, 1875, 1893, 2201
 learning 147
 learning classifier system 655, 1819,
 1827, 1835, 1843, 1851, 1859, 1883,
 1967, 1875, 1893, 2201
 learning classifier systems
 and ant stigmergy 121
 learning, structural 1803
 learning, supervised 345
 least squares 1827
 lifting 1961
 limit distributions 1153
 limited resources 1673
 linear genetic programming 1787
 linkage 1169
 linkage learning 1217, 1507
 loading pattern 2191
 local optima 1781
 local search 599, 649, 967, 1009, 1471
 locomotion 687
 log analysis 1905
 long-term evolutionary dynamics 137
 loss of diversity 1131
 low-discrepancy sequence 1341
 lymphoma cancer classification 1641
 machine learning 2029
 maintenance scheduling, power plant .. 249
 management 233, 249, 1085, 2197, 2217
 map-labelling 1937
 mapping, genotype-phenotype 415, 1561
 marginal distribution algorithm 745
 Markov chain model 1553
 Markov decision process 1867, 2029
 Markov simulation 865
 maternal effects 149
 mathematical models 193
 Matlab/Simulink 1061
 max-cut 999
 maximal hyper-rectangle 1185
 maximally general classifiers 1893
 maximum likelihood 415
 MC-CDMA 2121
 MDL 1883
 measurement 137, 233, 373, 1083,
 1209, 1265, 1355, 1569,
 1883, 2083, 2217
 measurement units 1999
 memetic algorithm 267, 755, 967,
 999, 1009
 memory scheme 711, 1115
 MEMS 927
 merging and spawning populations ... 1893
 messy genetic algorithms 1593
 metabolic pathways 2133
 metaevolution 1355
 metagrammars 1665
 metaheuristic 921, 999
 methods, morphing 897
 metric 1083
 microarray data 439
 migration 1295
 migration interval 1295, 1447
 migration size 1295
 migration topology 1579
 mission planning 1929
 MMAS 249
 mobile ad hoc networks 153
 mobile networks 1993
 mobility 1209
 model building 1217
 model building, probabilistic 453,
 1507, 1775
 model, Gaussian mixture 703
 model, infinite population 1233
 model, Ising 1161
 model, island 621, 1295
 models, probabilistic 671, 779
 modification-reinterpretation,
 search space 1559
 modularity 1201, 1649
 modularization 1029
 module acquisition 1649, 1773
 MOEA 749
 molecular conformation 1565
 molecular evolutionary computation
 (MEC) 1761
 molecular programming (MP) 1761
 molecule 1969
 monotonic progress 499
 morphing methods 897
 mosaic world 115
 motif finding 447
 MRI 2141
 multary alphabet 1303
 multi criterion 827
 multi-agent simulation 305
 multi-agent systems 51, 555, 591, 751,
 1309, 1539
 multiarmed bandit 1539
 multi-carrier modulation 2121
 multicollinearity 2207
 multicriteria genetic algorithm 803
 multi-dimensional
 knapsack problem 1257
 multilegged robot control 145
 multi-level model 1441
 multi-level optimization 1053
 multimodal 671
 multimodal function optimization 873
 multimodal optimization 289, 865,
 1417, 1573
 multi-objective 393, 671, 1557, 2219
 multiobjective
 combinatorial optimization 817
 multi-objective
 evolutionary algorithms 1455, 2213
 multiobjective evolutionary
 construction 1985
 multi-objective genetic
 algorithm 771, 2195
 multi-objective
 genetic programming 795

Keyword Index

- multiobjective optimization 233, 257,
 373, 423, 663, 755, 763,
 829, 1009, 1937, 1945, 2127
 multiobjectivizing 829
 multiple objective
 evolutionary algorithm 477
 multiple optima search 915
 multiple regression 2207
 multiple sequence alignment 477
 multiplex PCR 67, 475
 multi-population scheme 711
 multiuser detection 2105, 2121
 mutation operator, self-adaptive 917
 mutation operators 841
 mutation strategies 687
 mutation testing 1061
 mutation vs. crossover 1161

 natural language processing 2067
 nearest neighbors 1597
 NEAT 1977
 negative selection 281, 297,
 321, 337, 345
 neighbour joining 415
 neighbor classifier, k-nearest 453
 neighbors, k-nearest 1549
 network reliability 1279
 network survivability 1279
 neural network 43, 149, 217, 591,
 881, 1224, 1309, 1379, 1581, 1913,
 2127, 2221
 neural networks, recurrent 185, 491, 1795
 neuroevolution 1913, 1977
 neuro-genetic hybrid 2089
 niching 557, 671, 865, 1573, 1641
 niching methods 915
 NK landscape 579, 1241
 noise 779
 nondominated sorting 663
 nonlinear control 2165
 non-linear function optimization 269
 nonlinear programming 329
 non-stationary environment 1539
 non-stationary operator probabilities 1539
 normalization 1581
 NP-hard search 1565
 NSGA-II 663, 787, 817
 nuclear 1477
 number mutation step sizes 923

 number sequence, pseudo-random 1341
 numbers games 515
 numerical optimization 267, 755, 1417

 object-oriented testing 1053
 offspring population size 841
 one-class SVM 321
 ontogeny 1317
 open-ended design 1729
 operators, mutation 841, 917
 opt-aiNet 289
 optical lens system 1953
 optimal design 647
 optimization 27, 193, 241, 579,
 615, 637, 881, 975, 1185, 1347, 1477,
 1599, 2015, 2113, 2197
 optimization, combinatorial 599, 621,
 647, 651, 921, 1471, 1601
 optimization, multiobjective 233, 257,
 373, 423, 663, 755, 763,
 1009, 1937, 1945, 2127
 optimization, parameter 1993
 optimization, particle swarm 161, 169,
 177, 185, 209, 257, 267,
 269, 277, 991, 2157
 optimization, shape 749
 optimization, simulation 1279
 optimization, single objective 889
 optimization, topological 2075
 optimum parameter 249
 order problem 1785
 ornithopter 957
 overfitting 1779
 overlapping building blocks 1217

 parallel algorithms 921
 parallel computing 649
 parallel evolutionary algorithms 479
 parallel genetic algorithms 811, 1447,
 1555, 1585, 2149
 parallel processing 921, 2209
 parameter optimization 1993
 parameter sweep 1791
 parameter tuning 1265
 Pareto archive evolutionary strategy 2127
 Pareto coevolution 539
 Pareto optima 233
 parity 1689

 partially observable Markov
 decision processes 1867
 particle swarm optimization 161, 169,
 177, 185, 209, 257, 267,
 269, 277, 991, 2157
 particle swarms 201
 partition coefficient 1303
 patents 1953
 pattern formation 83
 pattern generators 11
 pattern recognition 949, 1549
 pattern search 377
 penalty-based constraint handling 1257
 peptide design 423
 performance 11, 35, 83, 107, 145,
 169, 233, 249, 269, 281, 313, 373, 377,
 401, 439, 453, 477, 479, 483, 491, 545,
 559, 571, 591, 621, 647, 655, 671, 679,
 711, 719, 727, 735, 751, 755, 763, 779,
 811, 833, 841, 849, 889, 905, 915, 921,
 957, 967, 975, 1009, 1021, 1069, 1085,
 1115, 1123, 1147, 1161, 1185, 1201,
 1209, 1249, 1265, 1287, 1295, 1309,
 1355, 1423, 1477, 1515, 1539, 1557,
 1575, 1585, 1597, 1599, 1605, 1627,
 1649, 1673, 1705, 1713, 1721, 1737,
 1745, 1753, 1777, 1779, 1785, 1791,
 1795, 1827, 1835, 1851, 1859, 1875,
 1883, 1913, 1945, 1961, 1993, 2007,
 2029, 2037, 2083, 2089, 2112, 2141,
 2149, 2209, 2217
 performance algorithms 1579
 performance and experimentation 121
 performance and robustness trade-off 771
 performance assessment 373
 performance design 1569
 petri nets 2133
 permutation representation 1593
 phase problem 377
 phase transition 1241
 phenotypic recombination 897
 phylogenetic inference 415
 piece-wise linear approximation 1835
 PIPE 1785
 pipelined GA 949
 planning, production 2217
 p-median problem 649
 point spread function 2083
 poker 1819
 POMDP 491
 population diversity 1271

Keyword Index

- population dynamics 1627
population sizing 1455, 1575
population-based
 incremental learning 711
population-based
 optimization methods 1485
positional 277
positive selection 321, 345
power plant maintenance scheduling 249
power system reliability 2127
practical design-guidelines 1583
predator-prey 827
premature convergence 1531
pressurized water reactor (PWR) 2191
Price's equation 1371
Price's theorem 1355
primer 475
primer design 67
prisoner's dilemma 59
probabilistic 735
probabilistic models 671, 779
probabilistic model
 building 435, 1507, 1775
probabilistic model building
 genetic algorithm 453, 1775
probabilistic modelling 727
probability collectives 751
probability, schema disruption 1401
problem, tracking 841
problem, trap 1785
problem, traveling
 salesman 271, 1169, 1471
problem, tunably-difficult 1713
problem, vehicle routing 1523
product distribution theory 751
product invention 129
production planning 2217
processing, natural language 2067
program evolution 1775
program generation, automatic test 2193
programming, genetic 91, 169, 401, 461,
 523, 687, 747, 1551, 1619, 1635, 1641,
 1657, 1657, 1665, 1673, 1681, 1697,
 1721, 1745, 1753, 1771, 1775, 1779,
 1781, 1783, 1785, 1789, 1953, 1999,
 2215
programming, linear genetic 1787
programming, multi-objective genetic 795
progressive step reduction 2181
proportional genetic algorithm 1177
protein folding problem 385
protein motifs 401
proteomics 431
PSA 1913
pseudo-random number sequence 1341
push 1689

q-learning 145, 1851
QoS-aware composition 1069
q-table restructuring
 by genetic algorithm 145
quadratic assignment problem 621, 975
quadratic knapsack problem 607
quantum computing 1657
quantum Fourier transform 1657

radial bases 1835
radial basis functions 881, 905, 2127
random immigrants 1115, 1557
random k-SAT problem 1241
random number generators 479, 1341
random selection 1249
reactor 1477
real coded GA 703, 1559
real-coded mutation 1563
real parameter 1347
real-time learning 2201
real world application 2173, 2199
real-world problem 2141
recurrent architectures 1787
recurrent fuzzy systems 1385
recurrent neural networks 185, 491, 1795
recursion 1689
reduced Boolean parity 1613
reduced rank approximation 1507
reducts 275
redundancy 1317
reference solutions 787
registration 2083
reinforcement learning 1379
relational learning 1819
reliability 281, 483, 655, 941,
 1021, 1037, 1069, 1147, 1279, 1317,
 1575, 1783, 2053, 2165
reliable coevolution 483
remanufacturing 2217
remodularization 1045

repeating permutation
 representation 1593
representation, chromosome 1325
representation development 1177, 1201
representations 401, 747, 1729, 1753
resilience 1279
resiliency 1771
resource management 1737
resource sharing 523, 557
resources, water 647
restricted 2-opt 1471
reverse engineering 439
reversing a list 1689
RL 1859
RNA editing 545
RNA secondary
 structure prediction 479
robust design 1619
robust design optimization 771
robustness 19
robustness and performance trade-off 771
role assignment 1705
rough set theory 275
routing cost 585
rugged landscapes 579
rule induction 1843
runtime 679
runtime analysis 763, 841, 849

SA 249
safety 2113
sampling 2203
scalability 83, 1201, 1785
schedulability theory 1021
scheduling 571, 1587, 2209
schema average 1303
schema disruption probability 1401
schema theory 1153, 1303, 1401,
 1553, 1773
script kiddies 1905
search 579
search, local 599, 649, 967, 1009, 1471
search space 1559, 1613
search space
 modification-reinterpretation 1559
search strategy 2021
security 1037, 1037, 1591
seizure detection 461

Keyword Index

- selection 1595, 2203
selection methods 1627
selection, negative 281, 297,
 321, 337, 345
selective local search 621
self-adaptation 919, 1493
self-adaptive EAs 1355
self-adaptive mutation operator 917
self-morphing 1737
self-organization 11, 153, 233,
 563, 1177
self-organized criticality 233
self-organizing map 297, 1531
sensitivity analysis 249
sensor fusion 2045
sensor network 2205
service-oriented
 software engineering 1069
shape nesting 557
shape optimization 749
shared attributes 1811
simple ranking 889
simplex 393
simulated annealing 921, 927, 1061,
 1555, 1601
simulated evolution 921
simulated robotics 1721
simulation 129, 2197
simulation, multi-agent 305
simulation optimization 1279
single objective optimization 889
singular perturbation technique 1501
singular value decomposition 1507
situatedness 43
sizing, population 1455, 1575
small-world networks 1333
snakebot 687
soccer game 2201
social science simulation 555
soft computing 975
software agents 1085
software clustering 1045
software engineering 1079
software measurement 1083
software metrics 1045
software tools 1681
Solis and Wets local search strategy 267
solution concepts 499
solution diversity 313
sorting 217, 1689
sorting networks 1265
spanning trees 585
spatial crossover 1565
spatial evolution 523
spawning and merging populations 1893
special architecture 949
speciation 557
spectral clustering 1507
spectroscopy, x-ray 811
speedup 811
speedup technique 559, 1945
sphere function 849
spontaneous cortical activity 11
S-system 439
stack-based genetic programming 1689
state-based programs 1013
state-space reconstruction 461
stationary distribution 1147
statistical learning theory 1783
step reduction, progressive 2181
stochastic selection 949
stock prediction 2061
stopping criteria 615
strategies, diversity-preserving 787, 817
stress testing 1037
structural design 651, 2007
structural learning 1803
structural optimization 1193
structured populations 1333
superresolution 2083
supervised learning 345
supervised ranking 1325
support vector machines 431, 453,
 905, 1363
swarm intelligence 153, 169, 193,
 216, 233, 241, 263, 431
synchronicity 1123
synthetic fitness 1363
system design 2075
system identification 531
system-level diagnosis 2053
systems biology 469
systems, artificial immune 297, 313, 321,
 329, 337, 345, 353,
 361, 371, 2105
systems, learning classifier 655, 1819,
 1827, 1835, 1843, 1851, 1859, 1883,
 1967, 1875, 1893, 2201
systems, multi-agent 51, 555, 591, 751,
 1309, 1539
tabu search 975, 2097
takeover times 1333
target recognition, automatic 1803
teacher-learner 515
team coordination strategy 1325
team evolution 1753
temporal-difference learning 1851
tensegrity structures 3
terrain generation 1463
test case generation 1083
test data generation 1037, 1061
test program generation 2193
test functions 1589
test suite 1295
theoretical analysis 679, 1161
theoretical biology 91
theory 51, 75, 107, 137, 153,
 193, 233, 277, 305, 313, 499, 515,
 539, 571, 629, 651, 655, 679, 727,
 745, 751, 755, 763, 795, 833, 841,
 849, 857, 921, 941, 957, 1009, 1021,
 1081, 1147, 1153, 1161, 1169, 1201,
 1217, 1241, 1265, 1287, 1303, 1355,
 1363, 1371, 1393, 1401, 1425, 1493,
 1507, 1515, 1553, 1559, 1601, 1605,
 1627, 1665, 1713, 1737, 1781, 1783,
 1835, 1851, 1893
theory, schema 1153, 1303, 1401,
 1553, 1773
theory of evolutionary algorithms 1233
threshold model 409
time series 353, 2221
time-series prediction 1795
topological optimization 2075
total synthesis 1635
tournament selection 1131, 1777
tracking problems 841
transcription factor 447
transformation 1581
transition path 1081
trap problem 1785
traveling salesman
 problem 271, 1169, 1471
tree semantics 1773

Keyword Index

trees.....	1401	vehicle	1977	water resources.....	647
TSP	1169	vehicle design.....	2113	watermarking.....	2219
tunably-difficult problems	1713	vehicle routing problem.....	1523	wavelets	1599, 1961
underpricing.....	983	velocity.....	277	weighted fitness.....	453
undesigned data	2207	verification	305, 1013, 1021, 1053, 1061, 1083, 1355	working principles of evolutionary computing.....	763
unit clause algorithm	1241	video-game.....	2201	wrapper model.....	1597
unitation functions	1233	vision evolution.....	115		
univariate marginal distribution algorithm	745	VNS.....	999	XCS	1819, 1827, 1835, 1851, 1859, 1883
unmanned aerial vehicle.....	1523	Voronoi diagrams.....	1385	x-ray diffraction.....	471
value decomposition, singular.....	1507	vulnerability assessment	1905	x-ray spectroscopy	811
variable length	1249	Walsh coefficient.....	1303	zero/one multiple knapsack problem....	629
vector machines, support.....	431, 453, 905, 1363	Walsh function	1303		
		warning.....	1977		
		water distribution systems	647		