Index

A
acceleration constants 71, 80, 98
adaptive memory 22, 24, 26-28, 30, 35, 39-41, 53-54, 57
additive noise signal 248, 255, 257
agent 226
agent lattice 226-227, 229
ant colony optimization (ACO) 23, 194, 196-197
ants 138, 164, 193, 196-201, 203, 206-207, 210
approximation error 168-170, 173, 177, 181-185
Art Gallery Problem 193-194
artificial immune system 138, 238
automatic parameter tuning 129
average percent deviation (APD) 61

B
bacteria foraging optimization algorithm (BFOA) 212
Boltzmann distribution 44
boundary constraint handling 96-97, 101, 104, 109, 112, 122
brainstorming 139
brain storm optimization (BSO) 137, 145
Braitenberg controller 266-267, 269

C
chaos 126-127
chaotic tunneling 126, 129, 134-136
clustering 142
clustering criterion function 211, 213
color separations 225
competitive behavior 227-229
competitive neural network (CNN) 211
competitive ratio (CR) 273, 276
concentric tabu search 66
conscience selection principle 73-74
constrained multiobjective optimization problems (CMOPs) 71-72
continuous tabu simplex search (CTSS) 23
cooling schedule 43, 128, 131
cyber swarm algorithm (CyberSA) 24, 26-27

d
decision logic system 237, 239, 246, 258
design optimization 133
deterministic method 101
differential evolution (DE) 169, 174, 188, 211
disruption 143-144
diversification-generation method 5-6
dual-purpose research reactor (DPRR) 239
dynamic formation maintenance 264

e
ejection chain 9-11, 41
elite set 42, 46, 48
e-puck robots 272, 280, 282-283
error squares 211
evolutionary algorithm (EA) 72, 210
Evolutionary Algorithm of Non-dominated Sorting with Radial Slots (ENORA) 74
evolutionary path-relinking algorithm 53
exploitation 100
exploration 100

f
fault diagnosis 238
feasibility ratio 77-78, 80, 82-83, 92
firefly algorithm (FA) 126
fitness function 176, 212-213, 244-245
focal solutions 54-57, 59
frequency assignment problems (FAPs) 223-224
frequency insertion strategy (FIS) 224, 232
Index

Frobenius norm 172, 174-177, 181, 190
frontal increase minimization (FIM) 7
full-search method 5
Fuzzy C-Means (FCM) 142, 210

G

genetic algorithm (GA) 72, 170
global best archive maintenance method 72, 78-80, 92
global equilibrium search (GES) 42
graph coloring problems (GCPs) 224
greedy randomized adaptive search procedure (GRASP) 8, 23, 69
Griewank function 151, 156, 162
ground penetrating radar (GPR) 261

H

hardware redundancy 239
hill-climbing method 5
hybrid algorithm 26, 219
hypervolume indicator 84-86, 91

I

image segmentation 209-211, 216, 219-222
immune mechanism-based evolutionary algorithm (IMEA) 239
improvement method 3-7, 9, 12, 15-18, 52, 54-57, 60, 68
instrument fault detection (IFD) 237
inter-cluster diversity 137, 156-157, 163-164
iterative local search (ILS) 66

L

law of sufficiency 169
Lena image 219
localization noise 277, 280-281
locally-optimal solutions 44
long-term memory (LTM) 28
low-rank approximation 168-169, 171-172, 179

M

magnetic resonance image (MRI) 211
Matlab 180, 182-183, 185
maximum cut (max-cut) problem 42-43
metaheuristics 23
middle-term memory (MTM) 28
mini-robots 261
MinLA 3-5, 8-10, 13, 20
mixed-integer program 43
mobile robots (mobots) 194
multiagent genetic algorithm (MAGA) 224
multimodal problem 97
multi-objective differential evolution (MODE) 74
multiobjective particle swarm optimization algorithms (MOPSOs) 72
multiplicative update (MU) algorithm 170, 174, 177
multi-robot system 260-262, 272
multistart tabu search (MS-TS) 55, 58
mutation behavior 143, 229
mutation operation 73, 81, 92

N

node-degree policy 226
nondominated particles 78
nonlinear control 237, 259
non-negative double singular value decomposition (NNDSDV) 170
non-negative matrix factorization (NMF) 168-169, 172
non-visited cuts list (NVCL) 199
nuclear reactor 237, 240, 246-247, 254

P

Pareto descent repair (PDR) 74
partial cost matrix 56
particle restarting 30
particle swarm optimization (PSO) 2, 22-24, 54, 72, 96-97, 169, 174, 188
particle swarm topology 96, 98
path relinking (PR) 1-2, 17, 22-23, 29, 54
performance metrics 84
personal best updating procedure 2-3, 25, 29, 54, 71-72, 77-78, 80, 82, 91-92
Philadelphia benchmark 223-224, 231
piggyback 140, 142
population diversity 74, 96-97, 100, 107-108, 121-124, 165
population initialization 142
position diversity 96-97, 100, 108-114, 119, 121-122
premature convergence 77, 96-98, 122, 126, 142, 242
principal component analysis (PCA) 171
prohibited solutions 44, 46
pseudo-code 44

Q

quadratic assignment problem (QAP) 52
Index

R
radio broadcasting 224, 235
random initialization 172-173, 183-184, 186-188
randomness reduction 128-129
Rastrigin function 147, 149, 155, 161, 163
reference set update 3, 54, 59
restricted candidate list (RCL) 8
robot team 262-264, 267, 274-276, 283
robust tabu search (RTS) 58
runtime behavior 182

S
sampling period 243, 254
scatter search (SS) 1-2, 22-23
seed solution 5, 59
self-learning behavior 227-229
short-term memory (STM) 28
simplex method 242-244
simulated annealing (SA) 5, 23
single-team flocking 264
singular value decomposition (SVD) 169-171
sociocognition model 24
solution pair 43
solution stream 54
space fill 204
span 225
spectral sequencing (SSQ) 4
speed-up 182-183
Sphere function 131, 147, 149, 153, 159, 162
state feedback 239-240, 244-245, 248, 250, 258
stochastic hybrid 238
stochastic star topology 25
stochastic strategy 97, 101, 106, 109, 121
subset-generation method 6-7
successive augmentation (SAG) 5
swarm shrinking 30, 32

T
tabu ball 28-30, 32
tabu search (TS) 22-23, 35
tabu tenure 28-30, 32, 57-59
T-coloring problems (TCPs) 224
team reconfiguration 266
timestep 263
tournament selection 79
transformation 43
trivial combination 34, 39
two-stage simulated annealing (TSSA) 5

U
unimodal problem 97
unmanned aerial vehicles (UAVs) 261

V
vector space model (VSM) 179
visibility polygon (VP) 199
visited cuts list (VCL) 199

W
Watchman Route Problem (WRP) 193, 195
Webots 260, 262, 272-273, 277, 280, 285
welded beam 84, 87-88, 90-91, 133-135
wheel slip noise 260, 262, 264, 272, 275-280, 283, 286