

# INDEX

## A

Additive weighting 6, 7, 187  
Advanced manufacturing systems 200, 215  
Analytic hierarchy process 7, 53, 55, 85, 87, 91, 119  
Analytic network process 9, 209  
ANFIS 304, 316  
Ant colony optimization 27, 41  
Approximation algorithm 325, 332, 508  
Artificial intelligence 19, 26  
Artificial neural networks 26  
Attainment problem 436, 437, 439  
Auxiliary variable 24, 329, 382  
Axiomatic design 209, 210

## B

Black system 456

## C

Capital investment 6  
Common range 212  
Compensatory 3, 5  
Complete optimal solution 380, 487  
Compromise approach 15, 330  
Concordance index 124, 125  
Conjunctive 4  
Consistency ratio 92  
Constrained optimization 32, 36, 524, 529  
Contrary index 285  
Convex 26, 71, 78, 134

## D

Data envelopment analysis 13, 162  
Data mining 281, 290  
Decision making 1, 2, 9, 16, 19, 24, 166  
Decision matrix 249, 285

Decision support system 29, 320, 520  
Decision tree models 288  
Degree of satisfaction 12, 78, 247  
Descriptive analysis 237  
Design range 211, 229  
Difference measures 171  
Discordance index 124  
Disjunctive 4  
Distance from target 7  
Distillation chain 126  
Dominance 3, 8  
Dual problem 551  
Dynamic programming 10, 410, 413

## E

Economical attributes 179  
E-government 85, 86, 87  
Eigenvalue technique 92  
ELECTRE III 119, 120, 123  
Elimination by aspects 5  
Entropy value 53, 79  
Environmental engineering 453, 480  
EOQ problem 553  
E-transformation 88, 108  
Euclidean distance 534  
Evolutionary algorithm 40, 523, 524  
Expectation optimization model 375, 379  
Expert system 14, 27, 28  
Extent analysis 53, 94, 105

## F

Feasible region 281, 399  
Flexible manufacturing 42, 216, 264  
Fractile criterion model 379, 396  
Functional requirements 210  
Fuzziness patterns 247, 258  
Fuzzy conversion scale 72

Fuzzy geometric programming 539, 546  
 Fuzzy if-then rules 302  
 Fuzzy inference system 302  
 Fuzzy multi-criteria decision making 263  
 Fuzzy optimization 455, 459  
 Fuzzy Sensitivity 523, 524

## G

Gaussian random variable 397  
 Genetic algorithm 28, 36  
 Geometric programming 567  
 Global criterion 556  
 Global priority 249, 263  
 Goal based interaction 508  
 Goal fulfillment level 455  
 Goal programming 10, 21, 29, 283, 432  
 Gomory's cutting-plane method 446  
 Gravel box problem 583  
 Grey fuzzy 453  
 Grey number 454  
 Grey parameters 453  
 Grey related analysis 281, 283  
 Grey systems theory 456

## H

Hierarchical TOPSIS 172  
 Hierarchy 7, 239  
 Hybrid method 544

## I

Ideal objective value 556  
 Inconsistency 92  
 Independence axiom 210  
 Index of optimism 78  
 Indifference threshold 123  
 Information axiom 209  
 Intangible factors 266, 268  
 Integer multicriteria decision-making 433  
 Intelligent fuzzy MCDM 263  
 Intelligent optimization 26  
 Intelligent techniques 45  
 Interactive multi-objective decision making 39, 483  
 Interactive programming 375  
 Interactive 376  
 Interval numbers 281, 457  
 Inventory 561

Inventory model 561  
 Investment costs 180  
 Iterative goal programming approach 431

## J

Judgement matrix 78

## K

Kuhn-tucker necessity theorem 394

## L

Lagrange function 393  
 Level of satisfaction 258  
 Lexicographic 4  
 Lexicographic goal programming 432  
 Lexicographic semi-order 5  
 Linear assignment 5  
 Linear convex combination 78  
 Linear programming 327  
 Linguistic terms 485, 505  
 Locally Pareto optimal solution 543  
 Logarithmic least square 56  
 Logistic function 252  
 L-R type trapezoidal fuzzy number 200

## M

Mapping point 352  
 Max-additive operator 575  
 Maximax 4  
 Maximin 4  
 Max–min operator 326  
 Max–product operator 581  
 Monte Carlo simulation 281  
 M-pareto optimal solution 381  
 Multi-attribute 3  
 Multi-criteria 10  
 Multi-criteria decision aid 119  
 Multi-objective 10  
 Multi-objective linear programming 325  
 Multi-objective optimization 453  
 Multiplicative weighting 187

## N

Negative ideal solution 7, 165  
 Neuro-fuzzy 258  
 Nondominated solution 532  
 Noncompensatory 3, 5

Nonconcave 342  
 Non-pareto techniques 37  
 Normality condition 570  
 Normalized fuzzy weights 197  
 Normative analysis 237  
 NSGA-II 523

## O

Operating costs 162, 180  
 Opportunities 85, 95  
 ORESTE 8  
 Orthogonal conditions 551, 565  
 Outranking method 8, 119

## P

Pairwise comparison 8, 12  
 Pairwise comparison matrix 54, 65  
 Pareto based techniques 38  
 Pareto optimal 37, 381, 392  
 Pareto optimality 409, 541  
 Pareto optimal solution 542, 543  
 Particle swarm optimization 27, 42  
 Positive ideal solution 165, 170  
 Positive index 285  
 Posynomial 539  
 Posynomial function 539  
 Preference threshold 123  
 Primal problem 565  
 Probability maximization model 375  
 PROMETHEE 8, 119

## Q

QFD 301  
 Quasi-concave 339

## R

Ranking method 5, 145  
 Real fuzzy number 411  
 Research directions 44, 45  
 Robotic systems 159

## S

Scoring methods 187  
 S-curve 245, 251  
 Semi-ill structured problems 25  
 Sensitivity analysis 28, 103  
 Separation measures 171

Shannon entropy 212  
 Signomial 567  
 Signomial GP problem 557  
 Simple Additive Weighting 187  
 Simplex algorithm 335  
 Simulated annealing 35  
 Simulation 281  
 Stochastic programming 375  
 Strategic planning 86, 90  
 Strengths 91, 95  
 Strict nondomination 145  
 Strict preorder 147  
 Subjective factor measures 263  
 SWOT 85  
 System range 211, 215

## T

Tabu search 34  
 Tchebycheff problem 545  
 Technical attributes 163  
 Threats 85  
 TOPSIS 159  
 Trapezoidal fuzzy number 176  
 Triangular fuzzy number 190

## U

Utility models 8, 209  
 Utopia maximum 532  
 Utopia minimum 532

## V

Vector maximization problem 574  
 Vector minimization problem 574  
 Vector normalization 165

## W

Waste load allocation 453  
 Weak domination 143  
 Weak preorder 146  
 Weakly Pareto optimal solution 543  
 Weaknesses 85, 96  
 Weighted normalized decision matrix 169  
 Weighted product 6  
 Well-structured problem 25  
 White system 456

$\alpha$ -Pareto optimality 409