

Subject Index

T^2 chart 331
 ε -loss function 1033
 3SCSALT, three-stress-level
 constant-stress accelerated life
 testing 431
 – contour plots 431
 – step-by-step description 431
A
 accelerated degradation test (ADT)
 427, 436
 – constant-stress 427
 – step-stress 427
 accelerated destructive degradation
 tests (ADDT) 399
 accelerated failure time model 348
 accelerated life model (ALM) 380
 accelerated life test (ALT) 355, 398,
 405, 427
 accelerated reliability testing (ART)
 427
 accelerated repeated measures
 degradation tests (ARMDT) 399
 accelerated tests 397–399
 – burn-in 422
 – continuous product operation 422
 – ESS 423
 – highly accelerated 422
 – other kinds of 421
 – practical considerations 421
 – STRIFE 422
 – types of 398, 422, 423
 acceleration
 – temperature–voltage 405
 acceleration factor 434
 – for inverse power model 405
 – with temperature–voltage 405
 acceleration methods 400
 – aging 400
 – stress 400
 – use rate 400, 401
 acceleration models 400
 – current-temperature 416
 – guidelines for using 407
 – issues 407
 – temperatur 401
 – temperature–current density 406
 – temperature–humidity 406
 – voltage 403
 – voltage–stress 403

acceptable quality level 264
 accuracy 567
 ACDATE (actor, condition, data,
 action, timing, and event) 446
 acknowledgement (ACK) 993
 active queue management (AQM)
 1015
 AdaBoost 566–568
 adaptive-response-rate
 single-exponential smoothing
 (ARRSES) 907
 adjusted Rand index (ARI) 614
 age 97
 age and periodic replacement 836,
 837, 839
 aging period 159
 AIC criterion 539
 algebraic algorithm 640
 ALT model
 – choosing 400
 ALT model and analysis
 – assessing fit 410
 – Box–Cox transformation 421
 – data analysis strategy 407
 – diagnostics 410
 – given activation energy 414
 – interval-censored data 413
 – ML fit 409
 – one accelerating variable 407
 – potential pitfalls 423
 – quantile estimates 411
 – residuals analysis 411
 – software for 424
 – statistical uncertainty 410
 – use conditions, estimation at
 411
 – use conditions, sensitivity to
 assumption 411, 420
 – with interaction 417
 – with three variables 419
 – with two or more explanatory
 variables 416
 ALT model and analysispotential
 pitfalls 424
 American Society for Quality (ASQ)
 959
 analysis of variance (ANOVA) 232,
 234, 236, 245, 469, 501, 505, 596,
 706, 969
 ANTLR (another tool for language
 recognition) 464

approximated bootstrap confidence
 (ABC) 676, 677
 arithmetic moving average 254
 arithmetic process (AP) 931, 933
 arithmetico-geometric process (AGP)
 931
 Arrhenius
 – acceleration factor 402, 405
 – application 403, 406, 413, 415,
 417
 – extended 405
 – relationship 402
 artificial neural networks (ANN)
 608, 615
 assembly yield 155
 association rule 651, 661–663
 assurance-based testing (ABT) 445
 asymptotic relative efficiency 583
 autocorrelated data 254
 automatic computation 673–677
 automatic process control 173
 autoregressive and moving average
 (ARMA) 795, 798
 autoregressive process AR(1) 341
 availability 836–838, 845, 847
 average run length (ARL) 175, 267,
 291, 328, 337
 average sample number 265
 average total inspection 265

B

backpropagation 659
 backward recurrence time 139
 bagging 560, 565, 567
 bathtub failure rate 159
 Bayesian 113–115, 122
 Bell–LaPadula (BLP) model 461
 best linear unbiased predictor
 (BLUP) 690
 beta distribution 14, 511
 bias-variance dilemma 641
 binomial distribution 7
 binomial model (BM) 907
 bin-packing number 760
 bivariate distribution 104
 bivariate exponential (BVE) 91
 bivariate hazard rates 104
 bivariate Weibull models 104
 black-box modeling 98
 Boltzmann constant 402

boosting 560, 565–567, 569
 boosting tree 563, 565, 567
 built-in reliability (BIR) 160
 burn-in board (BIB) 161

C

C4.5 553, 562–565
 cancer classification 647
 canonical maximum likelihood (CML) 982
 capacitated plant location problem (cPLP) 770
 case-based reasoning (CBR) 1034
 catastrophic failure 812
 Cauchy distribution 17
 Cauchy functional equation (CFE) 82
 CCC chart 283, 285
 censored data 20
 censored observations 348, 349, 351
 censoring 99, 109
 – interval 398, 413
 – interval-censored 412
 – right 398
 central composite design (CCD) 217
 central limit theorem (CLT) 10, 799
 Cesàro total variation convergence 140
 CHAID, chi-square automatic interaction detection 553, 564, 565, 657
 characteristic function (CF) 80
 characterizing function 79
 charts
 – Cusum 250
 – EWMA 250
 – Shewhart 250
 chi-squared test 25
 chromosome 750
 class-based queues (CBQ) 1016
 classical multivariate normal (MVN) 91
 classification 552, 553, 555–560, 564–569, 608, 651, 654–661, 665
 classification accuracy 567
 classification and regression tree (CART) 543, 553, 555–562, 564, 565, 567, 629, 1034
 classification error (CE) 640, 1024
 classifiers 1024
 cluster 775
 cluster analysis 662
 clustered data 688
 cluster-image map (CIM) 592
 clustering 608, 651, 654, 661–663
 coefficient of variation (CV) 186, 906
 collaborative verification and validation 472
 collision-induced dissociation (CID) 625
 combination warranty (CMW) 127
 combinatorial optimization 753
 competing processes 810
 completeness and consistency (C&C) analysis 444
 compound Poisson process 809
 computer experiment 229, 231, 234, 235, 245
 concordance measures 975
 – concordance function 976
 – Kendall's tau 976
 – Spearman's rho 976
 condition and event 452
 conditional distribution 108
 conditional intensity 148
 conditional models 103
 conditional single sampling 271
 conditional specification 90
 condition-based maintenance 793, 804
 condition-based maintenance maintenance 808
 confidence interval (CI) 21, 113, 357, 363, 517
 confidence limits 28
 constant-stress accelerated life test (CSALT) 428
 consumption capital asset pricing model (CCAPM) 862
 continuous-time Markov chain (CTMC) 997
 control 489
 Cook's statistic 526
 copula 974
 – Archimedean 979
 – Clayton 980
 – elliptical 977
 – Frank 980
 – generator 981
 – Gumbel 980
 – normal copula 978
 – t copula 978
 corner analysis 155
 corrective maintenance (CM) 792
 cost of poor quality (COPQ) 958
 cost-complexity pruning 557
 counting processes 37
 Cox model 390, 392, 393

Cramér-Rao inequality 17
 credit-based fair queueing (CBFQ) 992
 critical area 157
 critical value pruning (CVP) 558
 critical-to-quality (CTQ) 960
 Crosier's CUSUM 329
 Crosier's multivariate statistic 333
 CRUISE, classification rule with unbiased interaction selection and estimation 553, 561, 562, 564, 565
 cumulative damage model 836, 842
 cumulative distribution function (CDF) 4, 79, 114, 293, 371, 400, 974, 1000
 cumulative exposure model 355, 356
 cumulative hazard function 99
 cumulative quantity control chart (CQC chart) 286
 cumulative results criterion 263, 266
 cumulative score (CUSCORE) chart 249
 cumulative shock damage 826
 cumulative sum chart 250
 CUSCORE
 – chart 249
 – statistics 249
 customer needs mapping (CNM) 961
 CUSUM of T_n 333
 cycle crossover (CX) 762
 cycle stealing immediate dispatch (CS-ID) 1007
 cycle stealing with central queue (CS-CQ) 1007

D

data analysis 100
 data cube 654
 data mining (DM) 640, 651–653, 655, 657, 660, 661, 663–665, 667
 data modeling 1023
 data types 99
 data warehouse 654
 database 651, 652, 654, 655, 662–664
 DC motor 793, 794, 796, 797, 801–804
 dChip programs 612
 decoding 751
 decreasing failure rate (DFR) 370
 defect density distribution 156, 157

defects per million opportunities (DPMO) 195, 958
 deficit round-robin technique (DRR) 993
 define, customer concept, design, and implement (DCCDI) 965
 define, measure, analyze, design and verify (DMADV) 965
 define, measure, analyze, improve, and control (DMAIC) 960
 define, measure, analyze, improve, control and technology transfer [(D)MAIC(T)] 195
 degradation
 – linear 403
 – nonlinear 402
 degradation analysis 984
 degradation process 807
 degraded system 810
 degrees of freedom (df) 539, 988
 density 63
 density function 99
 dependency analysis 446
 dependent stage sampling plan 270
 description-design faults 504
 descriptive-design 498
 design effect 708
 design for manufacturability (DFM) 154
 design for reliability (DFR) 160
 design for Six Sigma (DFSS) 963, 965
 design for yield (DFY) 158
 design of experiment (DOE) 229, 469, 498, 961
 design parameter selection 213
 design parameters (DPs) 966
 design-review 498, 499, 502, 506
 deviance 539
 device under test (DUT) 161
 die-level burn-in and testing (DLBT) 161
 discounted warranty cost (DWC) 131
 discrepancy 230, 231, 236–240, 244, 245
 discrete state 814
 distribution function 63, 99
 Dobrushin's theorem 147
 double-exponential smoothing (DES) 907
 dual-queue (DQ) 992
 dual-queue length threshold (DQLT) 992
 dynamic burn-in (DBI) 161
 dynamic programming 1053

dynamic robust design (DRD) 186
 dynamic verification 451
 dynamic-priority RED queue (DPRQ) 1018

E

economic order quantity (EOQ) 922
 effort control 478
 electrical-over-stress (EOS) 159
 electrostatic discharge (ESD) 159
 ellipse format chart 332
 empirical modeling 63
 encoding 750
 end-to-end testing and evaluation 444
 ensemble 553, 565–567, 569
 ensemble tree method 565
 environmental factor 510, 511
 equivalent business days (EBD) 665
 Erdős-Rényi laws 782
 error-based pruning (EBP) 558
 estimating function (EF) 674, 678
 estimating function bootstrap 683, 684
 estimation 63, 100, 102, 107
 – L_1 574
 – least squares 574
 – M - 575
 event-space service (ESS) 456
 example
 – acceleration GAB insulation 404
 – adhesive bond 402
 – GAB insulation 403
 – IC device 413, 414
 – insulation 411
 – laminate panel 414–416
 – light emitting device (LED) 406, 416, 417
 – probability plot 418
 – spring fatigue data 418, 420
 expectation maximization (EM) 709
 expectation maximization (EM) algorithm 692
 expected cycle length 822, 828
 expected discounted warranty cost (EDWC) 131
 expected quality loss per unit (EQL) 199
 expected scrap cost per unit (ESC) 199
 expected total cost per produced unit (ETC) 199
 expected total maintenance cost 826
 expected warranty cost (EWC) 131

experimental design 173, 194
 experiments with mixtures 229, 231, 240
 exploratory data analysis 106
 exploratory plot 101
 exponential distribution 9, 49, 79, 84
 exponential smoothing (ES) methods 907
 exponentially weighted moving average (EWMA) 250, 289, 291, 330, 907, 1016
 expression sequence tag (EST) 719
 extrapolation 398, 400, 407, 421, 423, 424
 extreme-value distribution 17
 extrinsic failure 159
 Eyring model 406

F

F distribution 12
 FACT, fast algorithm for classification trees 561
 failure modes
 – competing 424
 – masked 424
 failure modes and effects analysis (FMEA) 961, 963
 failure prediction 793, 794, 796, 797, 804
 failure rate (FR) 7, 63, 81, 159
 failures 97, 98
 false discovery rate (FDR) 592, 609
 false-alarm probability 281–284, 287, 288
 family-wise error rate (FWER) 592, 609
 fast initial response 275
 FCFS (first-come first-served) 993
 field operation 510
 final test yield 155
 first failure 103
 first-in-first-out manner (FIFO) 143
 fitness 750
 fixed sampling interval (FSI) 291, 310
 flexible regression models 661
 forward recurrence time 139
 free repair warranty (FRPW) 127
 free replacement warranty (FRW) 127
 frequentist 113, 114, 122
 Fréchet–Hoeffding bounds 977
 full-service warranty (FSW) 127
 function approximation 640

functional requirements (FRs) 966
 functional yield 155
 fuzzy logic controller 752

G

gamma distribution 13, 87, 511
 Gaussian kernel 1030
 general linear model 184
 generalized additive model 657
 generalized estimating equation (GEE) 684, 701, 738
 generalized event-count method 667
 generalized likelihood ratio test 176
 generalized linear mixed model (GLMM) 690, 740
 generalized linear model (GLM) 657, 687, 738
 generalized Poisson distribution 286
 generalized random field environment 507
 generation 750
 generator armature bar (GAB) 403
 genetic algorithm (GA) 1052
 genetic algorithm optimization toolbox (GAOT) 211
 genomic data 592, 618
 geometric distribution 9, 90, 283
 geometric process (GP) 931, 933
 Gini index 556
 goodness of fit 25
 goodness-of-fit test 79, 359
 graphical 63
 graphical estimation methods 102
 graphical evaluation and review technique 265
 guarantee time 351
 GUIDE, generalized, unbiased interaction detection and estimation 543, 553, 562, 564, 565
 Gumbel distribution 87

H

hazard function 7, 99, 388–393
 hazard plot 63
 hazard rate plots 106, 107
 head injury criterion (hic) 545
 heterogeneous error model (HEM) 591, 596
 hierarchical clustering 599
 high dimensional 674, 678, 681, 682
 high-assurance systems 470

highest class first (HCF) 1000
 highly accelerated life test (HALT) 355, 422
 highly accelerated stress screens (HASS) 355
 historical 63
 homogeneous Poisson process (HPP) 932
 Hotelling's T^2 983
 hotspot 775
 human error 836, 843, 844
 human factor 497–499
 human resource (HR) 960
 hybrid evolutionary method (HEM) 770
 hybrid genetic algorithm 751
 hypergeometric distribution 9
 hypothesis testing 63

I

ID3, iterative dichotomizer 3rd 562
 identify, characterize, optimize, verify (ICOV) 965
 identify, design, optimize, validate (IDOV) 965
 imperfect repair 98, 100, 105, 106
 improvement maintenance (IM) 792
 incompatibility 162
 increasing failure rate (IFR) 370, 837
 independent and identically distributed (i.i.d.) 54, 142, 174, 292, 932
 inducer 498
 industrial 651, 664, 667
 infant mortality 159
 inference functions for margins (IFM) 982
 influence diagnostics
 – high leverage point 587
 – influence function 587
 – outlier 587
 – standardized influence function 587
 information technology (IT) 960
 innovation diffusion 480
 insertion mutation 762
 inspection 844
 – maintenance 807, 819
 – maintenance policy 826
 – model 836
 – paradox 142
 – policy 844
 inspection cost per unit (IC) 199
 insulation 411

integrated optimization model 194
 inter-demand interval (ADI) 906
 internal rate of return (IRR) 865
 internet engineering task force (IETF) 993
 interval parameter 27
 intra-class correlation coefficient 707
 intrinsic failure 159
 invariance 673–677, 679, 680
 inverse Gaussian distribution 88
 inverse power
 – acceleration factor 405
 – motivation 404
 – relationship 404
 inversion
 – formula 137, 144
 – mutation 762
 iterative generalized least squares (IGLS) 709

K

Kalman filter 793, 794, 798, 799, 801, 804
 Kalman prediction 799, 800
 Kelvin scale 402
 kernel function 660
 k -fold cross validation (KCV) 1025
 – error 1025
 Khintchine–Korolyuk theorem 147
 K -medioids 662
 k -nearest neighbors (KNN) 608
 knowledge discovery 651, 652, 665
 knowledge discovery in databases (KDD) 640, 652–655, 663, 667
 known good dies (KGD) 161
 Kolmogorov–Smirnov test 26
 k -within-consecutive- m -out-of- N systems 783

L

lack of anticipation condition (LAC) 149
 lack-of-fit criterion (LOF) 656
 lack-of-memory property (LMP) 82
 Laplace transform 511
 least median of squares (LMS) 528
 least squared estimation 26
 least-squares estimate (LSE) 524, 528, 721
 leave one out (LOO) 1025
 leverage of the observation 525
 LIFO (last in first out) 995
 likelihood function 22, 513

likelihood ratio (LR) 54
 limiting quality level 264
 linear
 – method 656, 660
 – mixed model 688, 689
 – model 651, 674, 681, 682
 – regression 26
 linear cumulative exposure model (LCEM) 433
 linear discriminant analysis (LDA) 562, 601, 602, 608, 615, 656
 linear transportation problem (LTP) 766
 LLF (least loaded first) 1006
 local pooled error (LPE) 591, 594
 location–allocation problem 769
 location-scale family 352
 logistic regression (LR) 537, 602
 log-linear process (LLP) 933
 lognormal distribution 11, 351, 400
 – CDF 400
 – PDF 400
 – quantiles 400
 logrank test 348
 LOTUS model 540, 541
 low turnaround index (LTI) 905
 lower control limit (LCL) 969
 lower specification limit (LSL) 195
 lowest class first (LCF) 1000
 LR discriminant analysis 601
 lymphoblastic leukemia (ALL) 601

M

Mahalanobis–Taguchi system (MTS) 665
 maintenance 807
 – action 826
 – cost 826
 – model 831
 – threshold 807
 manufacturing process modeling 665
 marginal testing effort function (MTEF) 492
 Mark space 138
 marked point process (MPP) 137
 Markov chain marginal bootstrap (MCMB) 674, 680, 681
 Markov processes 32
 MART, multiple additive regression tree 567
 matching word 782
 mathematical maintenance cost 808
 Matlab 663
 maximal margin 1024
 maximum likelihood (ML) 484, 527, 538, 709, 981
 – estimates 350, 355, 361, 513, 538
 – exact 981
 – for ALT 399
 – procedure 674
 – software for ATs 424
 maximum likelihood estimation (MLE) 3, 18, 49, 54, 84, 357, 513, 689
 maximum window size (MWS) 1013
 mean absolute deviation (MAD) 122, 913
 mean absolute percentage error (MAPE) 913
 mean logistic delay time (MLDT) 1051
 mean magnitude of relative error (MMRE) 1025
 mean residual life (MRL) 66, 81
 mean square error (MSE) 221, 559, 640, 730, 945
 mean time before failure (MTBF) 915
 mean time between failures 35
 mean time between replacement (MTBR) 907
 mean time to failure (MTTF) 6, 792, 836, 837, 1045, 1051
 mean time to repair (MTTR) 916, 1051
 mean time to system failure 841
 mean value function 510, 517
 means squares (MS) 708
 measurement system analysis (MSA) 961, 963
 median of the absolute deviation (MAD) 533, 593
 memoryless property 9
 method of moment 19, 362
 microarray 719
 microarray and GeneChip™ gene expression 591
 minimal maintenance 807
 minimal repair 98, 99, 101, 105, 838, 840, 842, 843
 minimum
 – cardinality (MinCard) 662
 – cost flow (MCF) 759
 – cut sets (MCS) 57
 – error pruning (MEP) 558
 – mean squared error 176
 – path sets (MPS) 57
 – spanning tree (MST) 754

misclassification penalized posterior (MiPP) 600
 mixed integer linear programming model (MILP) 768
 Miyazawa's rate conservation law (RCL) 148
 model checking 444
 model selection 101
 model validation 102
 modeling 98
 modeling process 99
 modeling usage rates 108
 moment generating function (MGF) 80
 moments 63
 Monte Carlo analysis 155
 Monte Carlo Newton-Raphson (MCNR) 694
 Monte Carlo simulation (MCS) 793
 MTTF 837
 multi-collinearity 540, 549
 multidimensional mixed sampling plans 276
 multidimensional OLAP (MOLAP) 654
 multi-objective optimization problems 752
 multi-objective transportation problem (mTP) 767
 multiple-dependent state plan 270
 multiple-priority dual queues (MPDQ) 993
 multistage process planning (MPP) 760
 multi-state degraded system 807
 multivariate adaptive regression splines (MARS) 568
 multivariate cumulative sum (MCUSUM) 983
 multivariate EWMA 333
 multivariate exponentially weighted moving average (MEWMA) 983
 multi-way semilinear models (MW-SLM) 724
 MUMCUT 453
 mutation 750
 myeloid leukemia (AML) 601

N

Nelder–Mead downhill simplex method 807
 neural network 651, 658, 659, 661, 663, 666
 new, unique, and difficult (NUD) 966, 967

non-homogeneous Poisson process (NHPP) 41, 478, 481–483, 488, 490, 493, 507, 932
 nonlinear programming (NLP) 427
 nonoverlapping batch means 177
 nonparametric regression 657
 nonparametric tolerance limits 30
 normal distribution 10, 79, 85
 normal parameters 27
 nutritional prevention cancer (NPC) 743

O

offspring 750
 one-dimensional models 99
 online analytical processing (OLAP) 654
 operating characteristic 264
 operator 750
 opportunistic scheme 831
 optimal burn-in 162
 optimal hyperplane 1026
 optimal specification 194
 optimization 214, 479, 488, 493, 494, 828
 optimum test plan 359
 order crossover (OX) 762
 order statistics 82, 361
 orderly point process 146
 orthogonal array 498, 501
 orthogonal matrix 574
 orthogonal polynomials 194
 outlier 525
 out-of-bag (oob) observation 568
 overlapping batch means 177

P

package-level burn-in (PLBI) 161
 Page's CUSUM 329
 Palm distribution 137, 146
 Palm transformation 146
 PAR 845
 parallel redundant system 836, 839, 841
 parallel system 841
 parameter estimation 18
 parameter optimization 213
 parametric yield 155
 Pareto distribution 15, 88
 Pareto solution 752
 partial likelihood 388–391
 partial one-dimensional (POD) 540
 partial-mapped crossover (PMX) 762

penalized quasi-likelihood (PQL) method 696
 perfect repair 98, 100, 105, 106
 periodic replacement 836, 838–840
 pessimistic error pruning (PEP) 558
 Pham distribution 16
 phased array radar 836, 843, 845
 physics-of-failure (POF) 160
 pivotal vector 363
 planning multiple-step SSALT 435
 point estimation 18
 point-stationary 137
 Poisson arrivals see time averages (PASTA) 1004
 Poisson distribution 8, 79, 88, 282, 284
 Poisson process 37, 89
 policy specification and enforcement language (PSEL) 460
 population 750
 positive FDR (pFDR) 610
 prediction interval 113–116
 prediction method 553
 predictive data modeling 1023
 predisposition 498
 preventive maintenance (PM) 792, 793, 830, 836–840, 842, 844, 953
 principal components 338
 principle-component analysis (PCA) 608
 printed circuit board (PCB) 653, 970
 proactive technique 154
 probabilistic model-based clustering (PMC) 613
 probabilistic processes 809
 probabilistic rational model (PRM) 608
 probability density function (PDF) 4, 80, 197, 293, 361, 371, 400, 510, 975
 probability limit 282, 284, 288, 289
 probability plot 49, 399
 – application 406, 408, 410, 411, 413–415, 417, 419, 420
 probe yield 155
 process
 – capability indices (PCI) 961
 – improvement 194
 – variables (PV) 967
 – yield 155
 Procrustes model 574
 proportional hazard model 348
 proportional-integral-derivative 176
 pro-rata warranty (PRW) 127

Q

QoS (quality of service) 992
 quadratic discriminant analysis (QDA) 602
 quadratic programming (QP) 1028
 Quadratically constrained quadratic programming (QCQP) 223
 qualified manufacturing line (QML) 160
 quality engineering 214
 – approach 498
 quality function deployment (QFD) 961, 962, 967
 quality loss function 194
 quantile function 53
 quasi-renewal process 39
 QUEST, quick, unbiased and efficient statistical tree 553, 561, 564, 565, 663
 quick-switching sampling 272
 quota 781

R

radial basis function (RBF) 639, 660
 random
 – effect 688–691
 – forest 565, 567–569
 – shocks 809
 – variable (RV) 79, 138
 – yield 155
 random early-detection queue (RED) 1015
 random-coefficient degradation path 809
 randomized logistic degradation path 809
 rate conservation law 137
 Rayleigh distribution 15
 reactive technique 154
 reciprocity 401
 recursive partitioning 543
 RED in/out (RIO) 1016
 reduced error pruning (REP) 558
 regression 232, 234, 235, 552, 553, 555, 558, 559, 562, 564, 566–569, 651, 655–658, 660, 663, 667
 regression tree 553
 relational OLAP 654
 release time 478, 488
 reliability 63, 97, 792, 793, 804, 810
 – defect 156
 – for systems 49

- growth 113, 114, 119, 122
- measure 810
- measures 5
- model 444
- modeling 807
- optimization 763
- prediction 517
- renewal
 - function 105, 838
 - function plots 107
 - process 105
 - process (RP) 39, 142, 931, 932
- repair limit policy 836, 843, 844
- repairable degraded systems 819
- repair-cost-limit warranty (RCLW) 128
- repair-number-limit warranty (RNLW) 128
- repair-time-limit warranty (RTLW) 128
- repeating yield 155
- repetitive group sampling 270
- residual sum of squares (RSE) 534
- resource allocation 478, 479
- response surface method (RSM) 184, 194, 207, 213, 214, 216, 962
- restricted iterative generalized least squares (RIGLS) 709
- restricted maximum likelihood (REML) 709
- risk priority number (RPN) 963
- risk-neutral pricing (RNP) 857
- robust design 173
- robust optimization 213
- role-based access control (RBAC) model 462
- run 781

S

- Salford Systems 663
- SAS proc NLMIXED 740
- (SC) 453
- scale-accelerated failure-time (SAFT) 399, 401
- scan statistic 776
- scenario specification and analysis 444
- scheduling problem 761
- score test 697, 698
- SCSALT, two(three)-stress-level constant-stress accelerated life testing 429
- seasonal process 255
- seasonal regression model (SRM) 912

- second-order-accurate 674, 676, 679
- selection bias 543, 561, 562, 564
- self-clocked fair queueing (SCFQ) 992
- self-organization maps (SOM) 608, 613, 663
- semidefinite program (SDP) 223
- semilinear in-slide model (SLIM) 720
- semiparametric least squares estimator (SLSE) 722
- semiparametric regression model (SRM) 721
- sequential sampling 30
- service 451
- service-oriented architecture (SOA) 444, 451
- set-to-zero constraint 539
- SG algorithm 640
- Shewhart \bar{X} -bar chart 328
- significance analysis of microarray (SAM) 591, 593, 610
- simple step-stress ALT (SSALT) 355
- Simpson's paradox 545
- simulated annealing (SA) 1052
- simulated maximum likelihood estimation 693, 701
- simulation
 - Archimedean copula 981
 - copula 977
 - elliptical copula 979
 - extrapolation (SIMEX) 699
 - framework 454
- single-exponential smoothing (SES) 907
- singular value decomposition 576
- SIRO (service in random order) 995
- Six Sigma black belts (SSBB) 959
- Six Sigma process 194, 195
- size interval task assignment
 - with equal load (SITA-E) 1008
 - with unbalanced load (SITA-U) 1008
 - with variable load (SITA-V) 1008
- Sklar's theorem 975
- sliding window 775
- smallest extreme value (SEV) 400, 429
- SNR, signal-to-noise ratio 498, 501, 502, 504
- software 651–653, 663, 664, 667
 - development life cycle (SDLC) 477, 478

- engineering 1023
- engineering applications 1023
- failure data 507
- model 24
- reliability 477, 498
- reliability growth models (SRGMs) 478
- reliability model 509
- testing 452, 510
- spacing 778
- spatial stationarity 151
- special cause 249
- special orthogonal matrix 574
- special-cause charts 176
- spherical regression model 574
- SQL 654
- squared error 102
- SRGM 478, 479, 481–483, 485, 486, 488–493
- standard deviation (s.d.) 945
- standard error rate 501
- standard normal distribution 10
- standardized time series 177
- STATA module 739, 740
- state estimation 793, 794, 801, 804
- static analysis 451
- static burn-in (SBI) 161
- stationary process 137, 140
- stationary sequence 140
- Statistica 663
- statistical inference 673
- statistical learning theory (SLT) 1025
- statistical process control (SPC) 173, 249, 250, 274, 285, 289, 664, 962, 964
- step-stress accelerated life test 349
- stepwise cross-validated discriminant procedure (SCVD) 601
- stochastic approximation 694
- stochastic discount factor (SDF) 862
- stochastic process 32
- stress–response relationship (SRR) 356
- structural risk minimization (SRM) 1025
- Student's t distribution 12
- S–U algorithm 694
- subsequent failures 99, 103, 105
- sum of squared errors (SSE) 223
- supervised learning 592, 651, 655, 656, 659, 661
- suppliers, inputs, process, outputs and customer (SIPOC) 962

supply chain management (SCM) 768
 support vector classifier (SVC) 1024
 support vector machine (SVM) 568, 599, 602, 608, 615, 1023
 surface mount technology (SMT) 970
 survival analysis 387
 survival function (SF) 80
 survivor function 99
 SVM flow chart 1024
 Swiss cheese 453
 symbolical-design faults 498, 504
 system evaluation 451
 system maintenance 826
 systematic yield 155

T

Taguchi loss function 213
 Taguchi method 173
 Taguchi robust design methods 665
 TAPTE, task assignment based on prioritizing traffic flows 1009
 task assignment based on guessing size (TAGS) 1009
 temperature differential factor (TDF) 402
 test analyse and fix 113
 test during burn-in (TDBI) 161
 testing environment 511
 the method of moment estimates (MME) 361
 thin threads 445
 tile yield 155
 time-between-events 282, 286, 288, 289
 time-stationary 137
 total quality management (TQM) 958
 tracking signal (TS) 913

transmission control protocol (TCP) 993
 traveling salesman problem (TSP) 756
 tree 651, 657, 658, 661, 663, 666
 tree coefficient 658
 trees and forests 608
 trend-adjusted exponential smoothing (TAES) 907
 two-dimensional models 103
 twoing rule 557
 two-way semilinear model (TW-SLM) 719, 720
 type II censoring 361

U

unbiased linear estimating equation 678
 uniform design 229–231, 236–245
 uniform distribution 10, 87
 universal description, discovery, and integration (UDDI) technique 471
 unsupervised learning 592, 651, 655, 661, 663
 upper control limit (UCL) 969, 984
 upper specification limit (USL) 195
 usage 97
 usage rates 109
 useful life 159

V

validation 107
 value at risk (VaR) 133
 Vapnik–Chervonenkis (VC) dimension 1024
 variable sampling intervals (VSI) 310
 variance components 689
 variance inflation factor (VIF) 712

variance matrix 22
 voice of customer (VOC) 966
 vtub-shaped hazard rate 15

W

wafer-level burn-in (WLBI) 161
 wafer-level burn-in and testing (WLBT) 161
 wafer-level reliability (WLR) 160
 warranty 125
 weakest link pruning 557
 web services (WS) 444
 Weibull derived 63
 Weibull distribution 12, 49, 63, 87, 287, 350, 351, 400, 429
 – CDF 400
 – PDF 400
 – quantiles 400
 Weibull models 99
 Weibull probability plot 100, 109
 Weibull probability plot 63
 weighted cardinality 662
 weighted moving averages (WMA) 907
 weighted RED (WRED) 1016
 weighted round-robin (WRR) 992, 1016
 white-box modeling 98
 WPP Weibull probability plot 63

Y

Y2K (year 2000) testing 444
 yield defect 156
 yield modeling 666

Z

zero-defect process 281, 289
 zero-inflated Poisson distribution 284–286