

INDEX

- AdaBoost, 94–95, 97, 99, 100, 101, 102, 103, 104
- Adaptive Neuro Fuzzy Inference System (ANFIS), 5
- Agent-based queuing model, for
 - call center forecasting and management optimization, 121
 - bisection method, 128–131
 - forecasting, 127
 - model construction, 125–127
 - model formulation, 122–124
 - input data, 122–123
 - programming functions, modeling, 123
 - working variables in program, modeling, 123–124
 - optimization criteria, 127–128
 - results, 130–131, 132
 - stepwise method, 131
- ARIMA, 4, 5
- Artificial neural networks (ANNs), 5
- Asymmetric loss function, 55, 57–58
- Bankruptcy prediction, dimension reduction in, 83
 - computational results, 86–89
 - evaluation metrics, 87
 - experiment setup, 86–87
 - model performances, 88–89, 90, 91
 - dimension estimation, 89–90, 91
 - dimension reduction techniques, 84–86
- Big Data, 94
- Bisection method, 128–131
- Bonobos, 26
- Boosting technique, 84
- Borderline-SMOTE, 94
- Box & Jenkins model, 4, 5–6
- Brick-and-mortar store, 30, 31
- Bureau of Economic Analysis (BEA), 68–69
- Business cycle, 67, 71, 72, 73, 74–75, 76–79, 81
- Business forecasting, 121, 127, 132
- Buy-online-and-pick-up-in-store (BOPS), 25
 - literature review, 28–30
 - basic model, 30–37
- Call center forecasting and management optimization, agent-based queuing model for, 121
 - bisection method, 128–131
 - forecasting, 127
 - model construction, 125–127
 - model formulation, 122–124
 - input data, 122–123
 - programming functions, modeling, 123
 - working variables in program, modeling, 123–124
 - optimization criteria, 127–128
 - results, 130–131, 132
 - stepwise method, 131
- CEO compensation, regression modeling of
 - peer group, at AT&T, 115, 116, 117
 - analysis of results, 119, 120
 - clustering analysis, 118–119
 - process, 116–118
- Verizon, 109

- corporation's performance,
 - evaluation of, 111
 - peer groups, 112
 - process, 112, 113
- Classification and regression tree (CART), 97
- Clustering analysis, 118–119
- Correlation matrix, 84
- Cumulative mean estimation (CUME), 91–92
- Customer retention, impact of a service failure on, 54
- Cyclic pricing, 30
- Data-level methods, for bankruptcy prediction, 87
- Decision tree, 94–95, 97, 101, 102, 103, 104
- Delays in delivery, service contracts for, 51
 - model development, 55–60
 - delivery time, 56–57
 - loss function and due dates, 57–58
 - optimal price, 58–60
 - price function, 56
 - product value distribution, 55–56
 - results, 60–62
- Delivery time, 56–57
 - truncated exponential distribution for, 59–60
 - uniform distribution for, 59
- Dimension reduction, in bankruptcy prediction, 83
 - computational results, 86–89
 - evaluation metrics, 87
 - experiment setup, 86–87
 - model performances, 88–89, 90, 91
 - dimension estimation, 89–90, 91
 - techniques, 84–86
- Discount pricing, 28–29
- Due dates, loss function and, 57–58
- Equal pricing, 28–29
- Erlang C model, 122
- Estimation error, 122–123
- Expected loss (EL), 58
- Expected payout, 54, 60–61, 62
- Expected revenue (ER), 54–55, 56, 58–59, 60
- Exponential smoothing, 4, 5, 16–17, 18–19, 20
- Factor analysis (FA), 84, 85, 86, 88, 90–91
- Fatality analysis reporting system (FARS), 95
- Feature extraction, 84–85
- Feature selection approach, 84–85
- Financial compensation, 109
- Forecasting
 - business, 121, 127, 132
 - sales. *See* Sales forecasting
- Genetic algorithm (GA), 5–6
- Great Recession, 67, 71, 72–73, 74
- Growth over time, 69–70, 71
- HGAI (hybrid of a genetic algorithm and an artificial immune system) algorithm, 5–6
- Holt-Winters model, 4, 5
- Imbalanced data, 87, 88
 - classification, 93
- Individual county integrative models, 76–79, 81
- Inventory order quantity, 28
- k-nearest neighbor (KNN), 94–95, 97, 98, 100, 101–102, 103, 104
- Least squares, 69–70, 72
- Leave-one-out cross-validation (LOOCV), 8, 9, 12
- Linear regression, 69, 70
- Liquidity, 111

- Logistic regression, 94–95, 97, 98, 101, 102, 103, 104
- Loss function and due dates, 57–58
- Machine learning, 4, 5, 6, 12, 15–20, 18–19, 21–22
 - methods, for forecasting, 6–9
- Market segmentation
 - of online channel, 33, 34
 - in showroom strategy, 38–39
 - of store channel, 33, 34
 - in showroom strategy, 37, 38
- Mean absolute percentage error (MAPE), 12, 13–14, 15–22, 16–17, 18–19
- Mixed integer programming model, 54–55
- M/M/1 queue, 52–53
- M/M/s queue, 122
- Model-building approach, 84
- Monte Carlo simulation, 123
- Moving average (MA), 5, 7–8, 12, 15–20, 16–17, 18–19, 21–22
- Moving linear regression (MLR), 7–8, 12, 15–20, 21–22
- Moving quadratic regression (MQR), 12, 15–20, 21–22
- Multivariate intelligent decision-making model, 5
- Nash equilibrium, 35, 46
- Non-injured passengers and drivers in car accidents, detection of, 93
 - data, 95–96, 97
 - method, 96–100
 - AdaBoost, 99
 - decision tree, 97
 - k-nearest neighbor, 98
 - logistic regression, 98
 - Random Forest, 98
 - resampling method, 99–100
 - support vector machine, 98–99
 - results, 100–104
- Nonstationarity, 122–123
- North Carolina
 - Great Recession, 72–73, 74
 - growth over time, 69–70, 71
 - individual county integrative models, 76–79, 81
 - integrative model, 74–76
 - residuals, modeling, 71–72
 - unemployment costs per capita, 68–70, 72, 74–76, 78, 79–80, 81
- Omnichannel retailing, BOPS and showroom strategy in, 25
 - basic model, 30–37
 - literature review, 28–30
 - showroom strategy, 37–41
- Online-to-store channel, 29–30
- Optimal price, 58–60
- Oversampling, 87
- Peer group regression modeling
 - of AT&T CEO compensation, 115, 116, 117
 - analysis of results, 119, 120
 - clustering analysis, 118–119
 - process, 116–118
 - of Verizon CEO compensation, 112
- Personalized pricing, 28–29
- Price function, 56
- Principal component analysis (PCA), 84, 85, 86, 88–89, 90–92
- Principal Hessian directions, 91–92
- Product value distribution, 60–62
- Profitability, 111
- Profit margin, 111
- Purchase decision tree of customers, 31
 - in showroom strategy, 37
- Qualitative attributes, impact on customer satisfaction, 52
- Quantitative attributes, impact on customer satisfaction, 52

- Queueing model, 52–53
 - agent-based, for call center
 - forecasting and management
 - optimization, 121
 - bisection method, 128–131
 - forecasting, 127
 - model construction, 125–127
 - model formulation, 122–124
 - optimization criteria, 127–128
 - results, 130–131, 132
 - stepwise method, 131
- Radial basis function (RBF), 4, 5–6, 12, 13–14, 15–22
 - interpolation, 8–9
- Random arrival rate, 122–123
- Random Forest, 94–95, 96–97, 98, 100, 101, 102, 103, 104
- Random over-resampling (ROS), 99, 101, 104
- Random oversampling examples (ROSE), 87, 94–95, 99–100, 101, 102, 104
- Random under-resampling (RUS), 94–95, 99, 101, 104
- Rare events, 87
- Regression modelling, of CEO compensation
 - peer group, at AT&T, 115, 116, 117
 - analysis of results, 119, 120
 - clustering analysis, 118–119
 - process, 116–118
 - of Verizon CEO compensation, 109, 110, 111
 - corporation's performance, evaluation of, 111
 - peer groups, 112
 - process, 112, 113
- Resampling method, 94–95, 99–100
- Residuals, modeling, 71–72
- Retailer's newsvendor problem, 45
- Retailer System Research, 27
- Sales forecasting, 5–6, 7–8, 9, 12, 15–20, 21–22
 - computational results, 12–21
 - comparison of performance of sales forecasting methods, 15–21
 - experimental setup, 12–14
 - seasonal adjustment effect on performance of sales forecasting methods, 13–14, 15, 16–17
 - literature review, 5–6
 - machine learning methods, 6–9
 - radial basis function interpolation, 8–9
 - support vector regression, 6–8
 - seasonal adjustment, 9–11
- Sales, 111
- SARIMAX with multiple linear regression (SARIMAX-MLR), 5
- Seasonal adjustment, 9–11
 - effect on performance of sales forecasting methods, 13–14, 15, 16–17
- Seasonal autoregressive integrated moving average with external variables (SARIMAX), 5
- Selective under-resampling (SUR), 100, 101
- Service contracts, for delays in delivery, 51
 - model development, 55–60
 - delivery time, 56–57
 - loss function and due dates, 57–58
 - optimal price, 58–60
 - price function, 56
 - product value distribution, 55–56
 - results, 60–62
- Showroom strategy, 37–41
 - market segmentation of store channel in, 37, 38

- purchase decision tree of customers
 - in, 37
- Single exponential smoothing (SES),
 - 12, 16–17, 18–19, 20–22
- Sliced average variance estimation (SAVE), 85, 86, 88, 89,
 - 90–91
- Sliced inversed regression (SIR), 85,
 - 86, 88, 90–91
- Solvency, 111
- Solving ratios, 111
- Stepwise method, 131
- Stepwise regression, 84
- Stock options, 109–110
- Strategic customer behavior, 30
- Sufficient dimension reduction (SDR),
 - 85, 86
- Support vector machine (SVM),
 - 94–95, 97, 98–99, 101,
 - 102, 103, 104
- Support vector regression (SVR), 4,
 - 5–8, 12, 13–14, 15–20,
 - 18–19, 21–22
- Synthetic minority oversampling technique (SMOTE),
 - 87, 94–95, 99–100, 101,
 - 102, 104
- Taguchi-type loss function,
 - 52, 53, 54
- Time series, 4, 5–6, 8,
 - 9, 11, 12, 15,
 - 21–22
- Trend regression models, 4, 5
- t*-test, 84
- Under-sampling, 99, 100
- Unemployment costs
 - per capita, 68–70,
 - 72, 74–76, 78,
 - 79–80, 81
- Waiting time, 122–123, 124,
 - 125, 126–127, 132
- Warby Parker, 26