

Index

- $G(n, m)$ model, 85
- $G(n, p)$ model, 84
- k -clan, 152
- k -clique, 151
- k -club, 152
- k -means, 128
- k -plex, 149
- actor, *see* node
- Adamic and Adar measure, 280
- adjacency list, 19
- adjacency matrix, 18
- adopter types, 193
- adoption of hybrid seed corn, 193
- affiliation network, 30
- Anderson, Lisa R., 183
- Asch conformity experiment, 182
- Asch, Solomon, 182
- assortativity, 217
 - measuring, 218
 - nominal attributes, 219
 - ordinal attributes, 222
 - significance, 220
- attribute, *see* feature
- average path length, 81, 84
- behavior analysis methodology, 276
- betweenness centrality, 59
- BFS, *see* breadth-first search
- big data, 2
- big data paradox, 2
- bipartite graph, 29
- botnet, 141
- breadth-first search, 34
- bridge, 31
- bridge detection, 45
- cascade maximization, 189
- causality testing, 277
- centrality, 51
 - betweenness centrality, 59
 - computing, 60
 - closeness centrality, 61
 - degree centrality, 52
 - gregariousness, 52
 - normalized, 52
 - prestige, 52
 - eigenvector centrality, 53
 - group centrality, 63
 - betweenness, 63
 - closeness, 64
 - degree, 63
 - Katz centrality, 56
 - divergence in computation, 57
 - PageRank, 58
- citizen journalist, 1
- class, *see* class attribute
- class attribute, 107
- clique identification, 148
- clique percolation method, 149
- closeness centrality, 61
- cluster centroid, 127
- clustering, 127, 128
 - k -means, 128
 - hierarchical, 160
 - agglomerative, 160
 - divisive, 160

- clustering (*cont.*)
 - partitional, 128
 - spectral, 155
- clustering coefficient, 65, 81
 - global, 66
 - local, 67
- cohesive subgroup, *see* community
- cold-start problem, 246
- collaborative filtering, 248, 278
 - memory-based, 248
 - item-based, 251
 - user-based, 250
 - model-based, 249, 252
- collective behavior, 283
- collective behavior modeling, 288
- common neighbors, 279
- community, 141
 - detection, 144
 - emit, *see* explicit
 - etic, *see* implicit
 - evolution, 161
 - explicit, 143
 - implicit, 143
- community detection, 144
 - group-based, 145, 153
 - member-based, 145
 - node degree, 147
 - node reachability, 150
 - node similarity, 152
- community evaluation, 168
- community membership behavior, 273
- commute time, 282
- confounding, 217
- contact network, 201
- content data, 272
- content-based recommendation, 247
- cosine similarity, 72, 152, 250
- covariance, 74, 222
- data point, *see* instance
- data preprocessing, 111
 - aggregation, 111
 - discretization, 111
 - feature extraction, 112
 - feature selection, 112
 - sampling, 112
 - random, 112
 - stratified, 112
 - with/without replacement, 112
- data quality, 110
 - duplicate data, 111
 - missing values, 111
 - noise, 110
 - outliers, 110
- data scientist, 2
- data sparsity, 246
- decision tree learning, 115
- degree, 13, 15
 - distribution, 16
- degree centrality, 52, 225
 - gregariousness, 52
 - prestige, 52
- degree distribution, 16, 81
- dendrogram, 160
- densification, 163
- depth-first search, 32
- DFS, *see* depth-first search
- diameter, 26
 - shrinkage, 164
- diffusion of innovations, 180, 193
- Dijkstra, Edsger, 35
- Dijkstra's algorithm, 35
- diminishing returns, 274
- directed graph, 15, 20
- distinguishing influence and homophily, 236
 - edge-reversal test, 237
 - randomization test, 238
 - shuffle test, 236
- early adopters, 194
- early majority, 194
- Eckart-Young-Mirsky theorem, 253
- edge, 14
 - betweenness, 160
 - directed, 15
 - incident, 22
 - loop, 15, 19
 - self-link, 19
 - signed, 22
 - traverse, *see* visit
 - undirected, 15
 - visit, 23
- edge list, 20
- edge-reversal test, 237

- eigenvector centrality, 53
- entropy, 116
- epidemics, 180, 200
 - infected, 202
 - recovered, 202
 - removed, 202
 - SI model, 202
 - SIR model, 204
 - SIRS model, 207
 - SIS model, 206
 - susceptible, 202
- Erdős, Paul, 85
- Euclidean distance, 127
- evaluation dilemma, 3
- evolutionary clustering, 166
- external-influence model, 197
- F-measure, 170, 265
- false negative, 169
- false positive, 169
- feature, 107
 - categorical, *see* nominal
 - continuous, 107
 - discrete, 107
 - interval, 108
 - nominal, 107
 - ordinal, 108
 - ratio, 108
- feature selection, 274
- Ford-Fulkerson algorithm, 41
- Frobenius norm, 253
- fully mixed technique, 201
- giant component, 86, 162
- Gilbert, Edgar, 85
- Girvan-Newman algorithm, 160
- global clustering coefficient, 66
- Granger causality, 277
- Granger, Clive W. J., 277
- graph
 - k*-connected, 157
 - bipartite graph, 29
 - bridge, 31
 - detection, 45
 - complete graph, 28
 - component, 25
 - connected, 25
 - connectivity, 22
 - circuit, *see* tour
 - cycle, 23
 - path, 23
 - tour, 23
 - trail, 23
 - walk, 23
 - cut, 153
 - densification, 163
 - density, 159
 - diameter, 26
 - directed graph, 15, 20
 - edge, 13, 14
 - empty graph, 20
 - forest, 27
 - minimum cut, 153
 - mixed graph, 20
 - multigraph, 21
 - node, 13, 14
 - null graph, 20
 - partition, 29
 - planar graph, 29
 - regular graph, 31
 - representation
 - adjacency list, 19
 - adjacency matrix, 18
 - edge list, 20
 - shortest path, 26
 - Dijkstra's algorithm, 35
 - signed graph, 22
 - simple graph, 21
 - strongly connected, 25
 - subgraph, 18
 - minimum spanning tree, 27
 - spanning tree, 27
 - Steiner tree, 28
 - traversal, 32
 - breadth-first search, 34
 - depth-first search, 32
 - tree, 27
 - undirected graph, 20
 - weakly connected, 25
 - weighted graph, 21
- graph Laplacian, 155
- graph traversal, 32
 - breadth-first search, 34
 - depth-first search, 32

- group, *see* community
- group centrality, 63
 - betweenness, 63
 - closeness, 64
 - degree, 63
- herd behavior, 180
- hitting time, 282
- Holt, Charles A., 183
- homophily, 217, 234
 - measuring, 234
 - modeling, 235
- ICM, *see* independent cascade model
- in-degree, 16
- independent cascade model, 187
- individual behavior, 271
 - user-community behavior, 272
 - user-entity behavior, 272
 - user-user behavior, 271
- individual behavior modeling, 277
- influence, 217, 225
 - measuring, 225
 - observation-based, 225
 - prediction-based, 225
 - modeling, 229
- influence flow, 227
- influence modeling, 229
 - explicit networks, 230
 - implicit networks, 231
- information cascade, 180, 186, 278
- information pathways, 59
- information provenance, 212
- innovation characteristics, 193
- innovators, 194
- instance, 106
 - labeled, 107
 - unlabeled, 107
- internal-influence model, 197
- intervention, 180, 186, 192, 200, 208
- Jaccard similarity, 72, 152, 279
- Katz centrality, 56
 - divergence in computation, 57
- Katz model, 194
- Katz, Elihu, 194
- KDD process, *see* knowledge discovery in databases
- Kendall's tau, 266
- knowledge discovery in databases, 105
- Kronecker delta function, 219
- labeled data, 113
- laggards, 194
- Laplacian, 155
- largest connected component, 86
- late majority, 194
- levels of measurement, 107
- LIM, *see* linear influence model
- linear influence model, 230, 288
- linear threshold model, 230, 277
- link data, 272
- link prediction, 258, 278
 - node neighborhood-based methods, 279
 - path-based methods, 281
- local clustering coefficient, 67
- logistic function, 236
- logistic growth function, 203
- logistic regression, 287
- logit function, 125
- loop, 15, 19
- low-rank matrix approximation, 253
- LTM, *see* linear threshold model
- MAE, *see* mean absolute error
- Mahalanobis distance, 127
- matrix factorization, 259
- maximum bipartite matching, 44
- mean absolute error, 263
- measurement, *see* feature
- measuring homophily, 234
- Milgram, Stanley, 84
- minimum spanning tree, 27
 - Prim's algorithm, 38
- mixed graph, 20
- mixed-influence model, 197
- modeling homophily, 235
- modularity, 157, 220
- multistep flow model, 195
- mutual information, 171
- naive Bayes classifier, 117
- nearest neighbor classifier, 119

- neighborhood, 15
- network flow, 38
 - augmenting path, 42
 - capacity, 40
 - capacity constraint, 40
 - flow, 40
 - flow conservation constraint, 40
 - flow network, 40
 - Ford-Fulkerson algorithm, 41
 - residual capacity, 41
 - residual network, 41
 - source and sink, 40
- network measure, 51
- network segmentation, 162
- NMI, *see* normalized mutual information
- node, 14
 - adjacent, 22
 - connected, 25
 - degree, 13, 15
 - in-degree, 16
 - neighborhood, 15
 - out-degree, 16
 - reachable, 25
- noise removal fallacy, 3
- normalized cut, 154
- normalized mean absolute error, 264
- normalized mutual information, 171
- nuke attack, 247
- observation, *see* instance
- obtaining sufficient samples, 3
- out-degree, 16
- overfitting, 260
- PageRank, 58, 225
- parametric estimation, 233
- Pearson correlation coefficient, 74, 224, 249
- Perron-Frobenius theorem, 54
- Poisson distribution, 90
- power iteration method, 77
- power-law distribution, 17, 81, 232, 288, 297
- precision, 168, 265
- preferential attachment measure, 280
- preferential attachment model, 288
- prestige, 52
- prominence, *see* prestige
- purity, 170
- push attack, 247
- quasi-clique, 159
- random graph, 84
 - average path length, 91
 - clustering coefficient, 90
 - degree distribution, 89
 - evolution, 86
 - phase transition, 87
- random walk, 23
- randomization test, 238, 276
- rank correlation, 229
- Rapoport, Anatol, 85
- ratio cut, 154
- raw data, 105
- recall, 168, 265
- reciprocity, 68
- recommendation to groups, 256
 - least misery, 256
 - maximizing average satisfaction, 256
 - most pleasure, 257
- recommender systems, 245
- regression, 277
- regular equivalence, 74, 153
- regular graph, 31
 - ring lattice, 93
- regular ring lattice, 93
- regularization term, 260
- relationships, *see* edge
- relaxing cliques, 149
 - k*-plex, 149
- RMSE, *see* root mean squared error
- Rogers, Everett M., 193
- root mean squared error, 264
- rooted PageRank, 282
- Rényi, Alfred, 85
- scale-free network, 82
- self-link, *see* loop, 19
- sender-centric model, 187
- sentiment analysis, 135
- shortest path, 26
 - Dijkstra's algorithm, 35
- shuffle test, 236
- SI model, 202

- similarity, 71
 - cosine similarity, 72
 - Jaccard similarity, 72, 74
 - regular equivalence, 74
 - structural equivalence, 72
 - SimRank, 282
 - singleton, 163
 - singular value decomposition, 124, 252
 - SIR model, 204
 - SIRS model, 207
 - SIS model, 206
 - six degrees of separation, 84
 - small-world model, 84, 93, 288
 - average path length, 96
 - clustering coefficient, 95
 - degree distribution, 95
 - social atom, 1
 - social balance, 70
 - social correlation, 236
 - social media, 1
 - social media mining, 2
 - social molecule, 2
 - social network, 13
 - social similarity, 217
 - social status, 22, 71
 - social tie, *see* edge
 - sociomatrix, *see* adjacency matrix
 - Solomonoff, Ray, 85
 - sparse matrix, 19
 - Spearman's rank correlation coefficient, 229, 266
 - spectral clustering, 155
 - star, 162
 - Stevens, Stanley Smith, 107
 - Strogatz, Steven, 93
 - structural equivalence, 72
 - submodular function, 190
 - supervised learning, 113
 - classification, 114
 - decision tree learning, 115
 - naive Bayes classifier, 117
 - nearest neighbor classifier, 119
 - with network information, 119, 120
 - evaluation, 126
 - k*-fold cross validation, 126
 - accuracy, 126
 - leave-one-out, 126
 - regression, 114, 122
 - linear, 123
 - logistic, 124, 125
- SVD, *see* singular value decomposition
- tabular data, 106
- tag clouds, 173
- target data, 105
- term frequency-inverse document frequency, 109
- test data, 114
- TF-IDF, *see* term frequency-inverse document frequency
- theory of scales, 107
- training data, *see* labeled data
- transitivity, 65
 - clustering coefficient, 65
 - global, 66
 - local, 67
- Trotter, Wilfred, 181
- true negative, 169
- true positive, 169
- undirected graph, 20
- unsupervised learning, 127
 - evaluation, 130
 - cohesiveness, 130
 - separateness, 131
 - silhouette index, 131
- user migration, 284
- user-item matrix, 248
- vector-space model, 108
- vectorization, 108
- vertex, *see* node
- Watts, Duncan J., 93
- Zachary's karate club, 142