

Index of Pajek and R Commands

Draw screen

- [Draw] Change the class number of vertices, 44, 390–1
- [Draw] Draw screen, 18–20
- [Draw] Export, 25, 404–11
- [Draw] Export > 2D >
 - > Bitmap, 26, 404–5
 - > EPS/PS, 26–7, 405
 - > JPEG, 26, 404–5
 - > SVG, 26–7, 406–8
 - > Current and all Subsequent, 407
 - > General, 406
 - > Labels/Arcs/Edges, 406
 - > Line Values
 - > Classes, 407
 - > Nested Classes, 131–2, 407
 - > Options, 407
 - > Partition, 406–7
 - > Classes, 406–7
 - > Classes with semi-lines, 406–7
 - > Nested Classes, 406–7
 - > VOSviewer, 408–9
- [Draw] Export > 3D
 - > Kinemages
 - > Current and all Subsequent, 410–11
 - > MDL MOLfile, 410
 - > VRML, 409
 - > X3D, 138–9
- [Draw] Export > Append to Pajek Project File
 - > Append, 407–8
 - > Select File, 407–8
- [Draw] Export > Options
 - > Arc Color, 417
 - > Arc Width, 417
 - > Arrow Position, 417
 - > Arrow Size, 417
 - > Bckg. Color 1, 419–20
 - > Bckg. Color 2, 419–20
 - > Bckg. Color 3, 419–20
 - > Bezier Curves
 - > Angle1, 418
 - > Angle2, 418
 - > Straight Lines, 418
 - > Velocity1, 418
 - > Velocity2, 418
 - > Border Color, 412–14, 420
 - > Border Radius, 420
 - > Border Width, 412–14, 420
 - > Bottom frame on the right, 420
 - > Edge Color, 417
 - > Edge Width, 417
 - > EPS, SVG: Lines finished at Vertex Border, 418–19
 - > EPS, SVG, X3D, VRML Size of Vertices, 418–19
 - > EPS Border, 420
 - > EPS: Use RGB colors instead of CMYK, 418–19
 - > Export options overwrite Shapes file, 415
 - > Font Size, 417
 - > Interior Color, 412–14
 - > Label Color, 417
 - > Label Position (on line), 417–18
 - > Label Position (polar)
 - > Angle, 418
 - > Radius, 418
 - > Middle frame on the right, 419–20
 - > Pattern, 417

440 *Index of Pajek and R Commands*

- [Draw] Export > Options (*cont.*)
 - > Shape, 412–14
 - > Shape Angle, 412–14
 - > Shapes file, 415
 - > SVG
 - > Opacity of Vertices, Lines, 418–19
 - > Tooltips: Vertices, Lines, Clusters, 418–19
 - > Vertices 3D Effect Linear, Radial, 418–19
 - > SVG Gradient, 419–20
 - > Symbol Size, 415–16
 - > Top frame on the left, 412–16
 - > Top frame on the right, 418–19
 - > X3D, VRML Width of Lines, 418–19
 - > x/y Ratio, 412–14
- [Draw] FishEye
 - > Cartesian, 58–9, 302
 - > Exit, 58–9
 - > Factor, 58–9
 - > Polar, 58–9, 302
- [Draw] GraphOnly, 23
- [Draw] Info
 - > All Properties, 24–5
 - > Closest Vertices, 24–5
 - > Correlation (Layout, Geodesics)*, 25
- [Draw] Layers
 - > Averaging x Coordinate, 273–4, 302
 - > In y Direction, 198, 273–4
 - > In z Direction, 137
 - > Optimize Layers in x Direction, 198–9, 273–4
 - > Type of Layout, 137
 - > 3D, 137
- [Draw] Layout > Circular > using Partition, 45
- [Draw] Layout > Energy, 20–1
 - > Fruchterman–Reingold, 21–2
 - > 2D, 21–2
 - > 3D, 21–2, 138–9, 409
 - > Factor, 21
 - > Kamada–Kawai
 - > Fix First and Last Vertex, 21
 - > Fix One Vertex in the Middle, 21
 - > Fix Selected Vertices, 45
 - > Free, 21, 42
 - > Separate Components, 21, 131
 - > Starting Positions, 20–1
 - > Circular, 20–1
 - > Given xy, 20–1
 - > Given z, 20–1
 - > Random, 20–1
- [Draw] Layout > Pivot MDS > Random Pivots > 2D, 3D, 22, 409
- [Draw] Layout > VOS Mapping > 2D, 3D, 22, 409
- [Draw] Move
 - > Circles, 23, 42
 - > Fix, 23
 - > Radius, 23
 - > y, 199
 - > Grid, 23
- [Draw] Next, 23
- [Draw] Options, 23–4
 - > Colors
 - > Arcs > Relation Number, 19–20
 - > Edges > Relation Number, 19–20
 - > Partition Colors > for Vertices, 42
 - > Relation Colors, 19–20
 - > Use Third Partition for Symbol Color, 44
 - > Layout, 23–4
 - > Real xy Proportions, 60
 - > Lines > Mark Lines
 - > No, 20
 - > with Labels, 20
 - > with Values, 20, 51
 - > Mark Vertices Using, 23–4
 - > Clusters of Second Partition, 43–4
 - > Cluster Symbols of Second Partition, 44, 415–16
 - > Labels Centered, 23–4
 - > Labels as Tooltips, 23–4
 - > Mark Cluster Only, 284
 - > Vector Values, 58
 - > Previous/Next
 - > Apply to, 23, 111–12, 407, 410–11
 - > Optimize Layouts, 111–12
 - > Scrollbar On/Off, 137
 - > Size
 - > of Symbols, 44
 - > of Vertices, 57
 - > Size > of Vertices, 57–8, 183
 - > Symbols for Partition Clusters
 - > Change, 44
 - > Transform, 45
 - > Fit Area, 60
 - > Fit Area > max(x), max(y), max(z), 45
 - > Rotate 2D, 199, 260
 - > Values of Lines > Similarities, 106, 182–3
- [Draw] Previous, 23
- [Draw] Redraw, 23

Index of Pajek and R Commands

441

- [Draw] Spin, 137
- [Draw] ZoomOut, 23
- Edit Hierarchy screen**
- [Editing Hierarchy] Editing Hierarchy Screen, 329
 - > Change Type, 330
 - > Show Subtree, 329–30
- Edit Network screen**
- [Editing Network] Editing Network Screen, 28–9
- [Editing Network] Newline, 28–9
- Edit Partition screen**
- [Editing Partition] Editing Partition Screen, 39–41
- Main screen**
- [Main] Cluster
 - > Create Complete Cluster, 326
 - > Create Empty Cluster, 210, 284
- [Main] Draw > Network, 11
- [Main] Draw > Network + Create Null Partition, 44
- [Main] Draw > Network + First Partition, 42
- [Main] Draw > Network + First Partition + First Vector, 57, 131
- [Main] Draw > Network + First Vector + Second Vector, 57–8
- [Main] File > Hierarchy > View/Edit, 89–90, 177, 284–5
- [Main] File > Ini File
 - > Load, 412
 - > Save, 412
- [Main] File > Network
 - > Dispose, 376–7
 - > Export as Matrix to EPS
 - > Options, 320–1
 - > Original, 320
 - > Using Permutation + Partition, 320–1, 330
 - > Read, 11–12, 387–9
 - > Save, 25, 30, 77–8, 391
 - > View/Edit, 28–9, 390
- [Main] File > Pajek Project File, 39–41
- [Main] File > Partition
 - > Dispose, 376–7
 - > Read, 39
 - > Save, 39, 391
 - > View/Edit, 39–41, 228–9, 284, 390–1
- [Main] File > Vector, 55
 - > Dispose, 376–7
 - > Read, 11–12, 59–60
 - > Save, 391
 - > View/Edit, 157, 237, 391, 398
- [Main] Hierarchy drop-down menu, 89–90
- [Main] Hierarchy
 - > Extract Cluster, 285
 - > Make Partition, 330
- [Main] Info > Memory, 376–7
- [Main] Info > Show Report Window, 16–17
- [Main] Macro
 - > Add Message, 208
 - > Play, 208, 278, 288
 - > Record, 208
 - > Repeat Last Command, 375, 376
 - > Fix (First) Partition, 376
 - > Fix (Second) Partition, 376
- [Main] Main Screen, 11–12
- [Main] Network drop-down menu, 11, 319
- [Main] Network > 2-Mode Network
 - > 2-Mode to 1-Mode, 125–6
 - > Columns, 125–6
 - > Include Loops, 126
 - > Multiple Lines, 126
 - > Rows, 125–6
 - > Partition into 2 Modes, 121
- [Main] Network > Acyclic Network
 - > Create (Sub)Network > Main Paths
 - > Global Search > Key-Route, 295
 - > Global Search > Standard, 295, 298–300
 - > Global Search > Through Vertices in Cluster, 298–300
 - > Local Search > Backward, 300
 - > Local Search > Forward, 298
 - > Local Search > Key-Route, 300
 - > Local Search > Through Vertices in Cluster, 298
 - > Create Partition > Depth Partition
 - > Acyclic, 259
 - > Genealogical, 273–4
 - > Create Weighted Network + Vector
 - > Traversal Weights, 296, 298
 - > Normalization of Weights, 297
 - > Info, 284, 285
 - > Transform > Preprint Transformation, 303
- [Main] Network > Create Hierarchy
 - > Clustering*, 329
 - > Symmetric-Acyclic, 259

442 *Index of Pajek and R Commands*

- [Main] Network > Create New Network
 - > Empty Network, 285, 389
 - > SubNetwork with Paths
 - > All Shortest Paths between Two Vertices, 156–7, 275
 - > Info on Diameter, 361
 - > Transform
 - > 1-Mode to 2-Mode, 278
 - > Arcs → Edges > All, 15, 77–8, 88, 207, 215–16, 275
 - > Arcs → Edges > Bidirected only, 260
 - > Edges → Arcs, 14, 155
 - > Line Values, 274–5
 - > Remove
 - > all Edges, 275, 277
 - > Lines with Value > lower than, 50, 52, 301–2
 - > Lines with Value > within interval, 112
 - > Loops, 155, 259, 302–3
 - > Multiple Lines, 155, 275, 372
 - > Transpose > 1-Mode, 228–9
 - > with Bi-Connected Components stored as Relation Numbers, 176–7, 284–5
 - [Main] Network > Create Partition
 - > Blockmodeling*
 - > Optimize Partition, 335
 - > Random Start, 337–8, 341–2
 - > Restricted Options, 335
 - > Short Report, 335
 - > Communities
 - > Louvain Method, 133
 - > VOS Clustering, 133
 - > Components
 - > Strong, 83, 86, 254, 260, 302–3
 - > Weak, 83, 301–2, 360
 - > Degree, 155
 - > All, 78, 361
 - > Input, 78, 127, 228
 - > Output, 78, 277
 - > Islands
 - > Generate Network with Islands, 131
 - > Line Weights, 129–31
 - > *k*-Core
 - > All, 86, 296
 - > Input, 86
 - > Output, 86
 - > *k*-Neighbours, 155–6, 276
 - > All, 183–4
 - > Input, 233–4
 - > Vertex Labels Matching Regular Expression, 53
 - [Main] Network > Create Random Network
 - > Bernoulli/Poisson, 362
 - > Extended Model, 372
 - > Scale Free, 371
 - > Adding > Free, 372
 - > Directed, 371
 - > Small World, 365–6
 - > Total No. of Arcs, 362
 - > Vertices Output Degree, 203, 362
 - [Main] Network > Create Vector
 - > Centrality
 - > Betweenness, 159, 215–16
 - > Closeness, 157–8
 - > Degree, 155
 - > All, 370
 - > Input, 210
 - > Hubs-Authorities, 161
 - > Proximity Prestige > Input, 234, 237
 - > Clustering Coefficients > CC1, 184, 361, 365, 376
 - > Distribution of Distances*, 157, 365
 - > Get Coordinate, 60, 137–8
 - > Structural Holes, 182
 - [Main] Network > Info
 - > Degree Assortativity, 163
 - > General, 16, 41–2, 77, 78, 183–4, 187, 260–1, 300
 - > Line → Rank of its Value, 300
 - > Line Values, 126, 297–8
 - > Triadic Census, 252
 - [Main] Network > Multiple Relations Network
 - > Change Relation Number – Label, 278
 - > Extract Relation(s) into Separate Network(s), 12–14, 278
 - > Info, 17
 - [Main] Network > Multiple Relations Network > Extract Relation(s) into Separate Network(s), 12–14
 - [Main] Network > Signed Network > Create Partition > Doreian–Mrvar Method*, 106–9
 - [Main] Network > Temporal Network > Generate in Time, 111, 407–8
 - [Main] Networks drop-down menu, 12

Index of Pajek and R Commands

443

- [Main] Networks > Cross-Intersection > First, 14
- [Main] Networks > Fragment (First in Second), 88–9, 90
 - > Check relation numbers, 286
 - > Check values of lines, 286
 - > Find, 285
 - > Induced, 285
- [Main] Networks > Multiply Networks, 278
- [Main] Networks > Union of Vertices, 60
- [Main] Operations drop-down menu, Ch2
- [Main] Operations > Network + Cluster
 - > Dissimilarity* > Network-based
 - > d1 > All, 326–7
 - > Options > Report Matrix, 326–7
 - > Extract SubNetwork, 285
- [Main] Operations > Network + Partition
 - > Brokerage Roles, 188–9
 - > Extract > SubNetworks Induced by Each Selected Cluster Separately, 135
 - > Extract > SubNetwork Induced by Union of Selected Clusters, 47, 86, 131, 134, 183–4, 287–8, 302, 325–6, 335
 - > Info > E–I Index, 134
 - > Shrink Network, 50, 52, 255, 302–3
 - > Transform
 - > Direction, 209–10
 - > Lower → Higher, 302
 - > Remove Lines
 - > Between Clusters, 187, 260–1
 - > Inside Clusters, 53
- [Main] Operations > Network + Permutation
 - > Reorder Network, 321
- [Main] Operations > Network + Vector
 - > +Cluster
 - > Diffusion Partition, 210
 - > Info > Assortativity, 163–4
 - > Neighbours > Sum
 - > All, 207–8
 - > Input, 207–8
 - > Output, 207–8
 - > Transform > Put Coordinate, 60
- [Main] Operations > Partition + Permutation
 - > Reorder Partition, 321
- [Main] Operations > Vector + Partition
 - > Extract Subvector, 59, 131, 288
 - > Shrink Vector, 59
- [Main] Options > Blockmodel – Shrink, 50–1
- [Main] Options > Read–Write
 - > 0/0, 208
 - > Bipartite Pgraph, 283–4
 - > GEDCOM – Pgraph, 273, 283–4
 - > Ignore Missing Values in menu Vector and Vectors, 216, 376
 - > Max. vertices to draw, 400
 - > Ore: Different relations for male and female links, 273, 274–5
 - > Pgraph + labels, 283–4
 - > Threshold, 393–4
- [Main] Partition drop-down menu, 39
- [Main] Partition, 45
 - > Binarize Partition, 207, 287–8
 - > Copy to Vector, 56, 231
 - > Count, Min–Max Vector, 361
 - > Create Constant Partition, 44, 390
 - > Create Random Partition > 1-Mode, 106
 - > Info, 41–2, 78, 90, 188–9, 203, 215, 233, 276, 277, 286–7, 361
 - > Make Cluster
 - > Vertices from selected Clusters, 210, 326
 - > Make Network
 - > Random Network, 362
 - > Make Permutation, 320
- [Main] Partitions drop-down menu, 45
- [Main] Partitions, 45
 - > Add (First + Second), 287–8
 - > Expand Partition
 - > First according to Second (Shrink), 260
 - > Extract SubPartition (Second from First), 48, 90–1, 127, 131, 133–4, 277, 302
 - > Info, 62–3
 - > Cramer’s V, Rajski, Adjusted Rand Index, 62–3, 133–4, 287, 337
 - > Spearman Rank, 230, 237–8, 240–1
 - > Make Random Network, 362
- [Main] Permutation drop-down menu, 320
- [Main] Tools > Excel, 138
- [Main] Tools > Export to Delimited File, 138
- [Main] Tools > R
 - > Locate R, 137–8
 - > Send to R

444 *Index of Pajek and R Commands*

- [Main] Tools > R (*cont.*)
 - > All Vectors, 137–8
 - > Current Vector, 370
- [Main] Vector drop-down menu, 55
- [Main] Vector > Create Constant Vector, 391, 398
- [Main] Vector > Info, 55, 57, 183, 215–16, 237, 273, 288, 376
- [Main] Vector > Make Partition
 - > by Intervals, 56–7
 - > First Threshold and Step, 56–7, 237–8, 240–1
 - > Selected Thresholds, 286
 - > Copy to Partition by Truncating (Abs), 56, 137, 176–7, 188–9
- [Main] Vector > Transform
 - > Multiply by, 183
 - > Normalize > Max, 57–8
- [Main] Vectors drop-down menu, 207–8
- [Main] Vectors
 - > Divide (First/Second), 207–8, 210
 - > Info, 231
- PajekXXL and Pajek3XL Main screen**
- [Main] Tools > Pajek
 - > Locate Pajek, 402
 - > Send Network to Pajek > + Add Vertex Labels from File(s), 402
- Report screen**
- [Report] File > Empty Report, 377
- R Commands**
- R: {igraph} power.law.fit(), 370–1
- R: Edit
 - > Run all, 370
 - > Run line or selection, 370–1
- R: File > Open Script, 370

Subject Index

Note: Italicized page numbers with f's or t's refer to figures or tables.

- Acrobat Distiller, 405
- active network, 11
- actors, 5
 - defined, 427*t*
 - input domain, 232
 - participation rate, 122
 - threshold of, 206
 - in two-mode networks, 121
- acyclic networks, 253–5, 284, 289, 293, 427*t*
- Adamic, L. A., 355–7, 381
- adjacency matrix, 317, 427*t*
- adjacent vertices, 427*t*
- Adjusted Rand Index (ARI), 63, 133–4, 287, 337
- Adobe Illustrator, 408
- adoption categories, 204, 427*t*
- adoption rate, 202–3, 215, 427*t*
- adoption time, 198
- affective relations, 99
- affiliation matrix, 317, 427*t*
- affiliations, 119–40
 - brokerage roles and, 184–9
 - communities, 132–5
 - islands, 127–32
 - one-mode networks, 121–7
 - overview, 119–20
 - partitions, 127
 - three-dimensional, 135–9
 - two-mode networks, 121–7
- aggregate constraints, 182, 183, 427*t*. *See also* dyadic constraint
- Albert, R., 366, 382
- Aldenderfer, Mark S., 348
- alpha, 366, 369, 371, 381
- Anatomy of Scottish Capital, The* (Scott and Hughes), 121
- ancestors, 276
 - closest common, 273
 - pedigree, 273
- angle, 418
- arc, 7, 9–10, 155, 362
 - bidirectional, 7, 155
 - colors, 417
 - defined, 427*t*
 - head of, 7
 - tail of, 7
 - traversal weight, 293–4
- articulation points, 173, 176–7, 427*t*
- assortative mixing, 162
- assortativity, 73, 162–4, 428
- assortativity coefficient, 162, 163–4, 428
- asymmetric dyads, 247, 428
- Attiro data, 73–5, 76, 78, 83, 88, 226–7
- attribute, 428
- attribution, 101
- automatic drawing, 20–2
- average degree, 76, 78
- BabelPad, 392
- background colors, 419–20
- backward local main path search, 294, 300
- balance model, 248, 428
- balance theory, 99–102. *See also* structural balance
 - clusterability, 103–9

- balance theory (*cont.*)
 development in time, 109–13
 structural balance, 103–9
 balanced (semi-) cycle, 428
 balanced network, 101, 102
 balanced signed graph, 101, 428
 balance-theoretic models, 250*t*
 Barabási, A.L., 366, 382
 Barabási–Albert model, 366, 367, 372
 Batagelj, Vladimir, 265, 307, 348, 382
 Bernoulli random graph, 358–60, 362
 betweenness, 155–6
 betweenness centrality, 159, 428. *See also*
 centrality
 betweenness centralization, 159, 428
 bi-components, 82–3, 172–7, 284–5, 428.
 See also components
 defined, 173–4
 bidirectional arc, 7, 14, 155, 186
 bipartite network. *See* two-mode networks
 bipartite parentage graph, 283–4
 birth cohorts, 287*t*
 bitmap, 26, 404–5
 Blashfield, Roger K., 348
 block, 331
 complete, 332, 339–40
 defined, 428
 null, 332, 339–40
 regular, 339–40, 434
 blockmodel, 332–3, 342*f*, 428
 blockmodeling, 50–1, 333–8
 defined, 428
 generalized, 341, 342
 matrices, 316–21
 overview, 315
 permutation, 316–21
 steps in, 333–4
 blogs, 355–7, 373–5
 Blondel, V. D., 142
 blood marriages, 280, 428. *See also*
 nonblood relinking; structural
 relinking
 blood relations, 271
 Bollobás, B., 382
 Bonacich, Phil, 167
 Boorman, S. A., 348
 border color, 420
 Borgatti, Stephen, 142
 Bornschieer, Volker, 66
 boundary specification, 6
 Brandes, U., 33, 382
 Breiger, Ronald L., 141, 348
 bridge
 bi-components and, 172–7
 defined, 173, 428
 ego-networks, 177–84
 finding in hierarchy of bi-components,
 177
 overview, 170
 brokerage role, 184–9. *See also* coordinator
 role; gatekeeper; itinerant broker;
 liaison
 defined, 185, 428
 in strike network, 186–7
 types of, 185–6
 Brothers Keeper, 306
 Burt, Ronald S., 193, 241
 calculation, in social network analysis,
 15–17
 Carlson, R.O., 219
 Carrington, P.J., 220
 Cartwright, Dorwin, 116
 cell (of a matrix), 428
 centrality
 betweenness, 159
 closeness, 154
 ego-centered approach to, 149
 eigenvector, 160–2
 network, 289–90
 number of neighbors and, 151
 centrality literature data, 289–90, 291–2,
 297*t*, 302, 303*f*
 centralization, 149
 betweenness, 159
 closeness, 154
 degree, 152, 155
 eigenvector, 161
 Cerinšek, M., 307
 Chime, 410
 chi-square statistic, 252
 Church of Jesus Christ of Latter-Day
 Saints, 306
 circles, 45
 citation, 291–304
 analysis, 291
 networks, 291–2, 296
 Clifford, Roy A., 96, 241
 Clip format, 405
 cliques, 86–91, 191–2
 defined, 428
 overlapping, 88
 closeness centrality, 154, 157–8, 428. *See*
 also centrality

Subject Index

447

- closeness centralization, 154, 429
 closest common ancestor, 273
 clusterability, 102, 248
 detecting, 103–9
 clusterability model, 429
 clusterable (semi-) cycle, 429
 clusterable signed graph, 429
 clustering, 361
 clustering coefficients, 184, 359, 361, 365, 376, 429
 clusters, 102, 187, 284, 326, 329
 creating, 326
 ranked, 248–9
 Unicode symbols, 415–16
 vertices, 326
 cohesion concept, 292–3
 cohesive subgroups, 73–93
 cliques, 86–91
 components of, 79–83
 cores of, 83–6
 degree of, 75–9
 density of, 75–9
 example of (Attiro neighborhood in Costa Rica), 73–5
 family–friendship groupings, 73–5
 overview, 73
 Coleman, James S., 219, 241
 colors, names of, 413*t*
 column (matrix), 316
Commodity Trade Statistics, 37
 communication network, 150–1
 betweenness in, 158–60
 distance, 151–8
 of striking employees, 171*f*
 communities, 132–5, 429
 community detection, 429
 complete block, 332, 339–40
 complete dyads, 246
 complete network, 429
 components, 79–83, 429
 bi-components, 82–3
 giant, 359, 360
 strong, 81–3
 weak, 81–3
 conditional uniform random graph models, 359–60
 connected network, 21, 22, 80
 connectedness, 80
 constraints
 aggregate, 182, 183, 427*t*
 dyadic, 180–1, 430
 contagion, 200–3
 contextual view, 429
 continuous property, 53–4
 continuous-time Markov process models, 355
 contours, 82–3, 176–7
 coordinates, 53–60
 coordinator role, 185–6, 189, 429. *See also*
 brokerage role; gatekeeper; itinerant broker; liaison
 CoreIDRAW, 406
 core-periphery structure, 325–6, 331, 333–4
 cores, 83–6
 correlation, 229–31
 correlation coefficients, 229
 Pearson's, 230
 Spearman, 229–30
 Cortona VRML Client, 409
 Cramer's V, Rajsiki, Adjusted Rand Index, 63, 133–4, 287, 337
 createpajek.exe, 391
 critical mass, 211–16, 429
 critical path method, 295
 cross-sectional networks, 111
 cut-vertex, 173, 429
 cycle, 101, 429

 data collection techniques, 27
 free recall, 27
 paired comparison, 27
 ranking, 27
 roster, 27
 unrestricted choices, 27
 data objects, 9
 Davis, J. A., 116
 De Nooy, Wouter, 266
 De Solla Price, D., 367, 382
 De Solla Price's model, 367–8, 371
 Degenne, Alain, 167, 193, 348
 degree, 429
 degree assortativity, 162, 163
 degree centrality, 429
 degree centralization, 152, 155, 429
 degree sequence, 361, 429
 degrees of network, 75–9
 dendrogram, 324*f*, 324–5, 429. *See also*
 hierarchical clustering
 density, 429
 descendants, 276
 diffusion
 adoption rate, 202–3
 from central and marginal vertex, 202*f*

- diffusion (*cont.*)
 by contacts, 201*f*
 contagion, 200–3
 critical mass, 211–16
 curve, 201*f*, 200–1
 exposure, 204–10
 modern math diffusion data, 197–8
 overview, 197
 thresholds, 204–10
 diffusion curve, 430
 dining-table partners data, 4*f*, 4–5, 6, 7–8, 9, 11–12, 15
 directed graph (digraph), 7, 8, 430
 disassortativity, 162
 dissimilarity, 324*t*, 326–7
 distance, 430
 distance distribution, 157
divide et impera (divide-and-rule) strategy, 178
 domain, 231–5, 430
 input, 232
 restricted input, 233
 Doreian, Patrick, 115, 116, 265, 307, 348
 Doreian–Mrvar Method, 106, 111–12
 Dutch literary criticism data, 265
 dyad, 245–6, 253, 430
 asymmetric, 247, 428
 complete, 246
 null, 247
 symmetric, 247, 250*t*
 dyadic constraint, 180–1, 430. *See also*
 aggregate constraints
- edge, 7, 155, 417, 430
 ego-centered approach, 178, 430
 egocentric density, 182, 183–4, 430
 ego-networks, 177–84
 defined, 430
 density of, 182
 dyadic constraint, 180
 proportional strength of ties, 180
 eigenvector centrality, 160–2, 430. *See also*
 centrality
 eigenvector centralization, 161, 430
 Encapsulated PostScript, 405–6, 412–18, 420
 endogamy, 279, 430
 equivalence, 322–31
 class, 322
 defined, 430
 regular, 338–43, 434
 structural, 323–4, 435
- Erdős, P., 358, 381
 Erdős–Rényi random graph model, 358, 362
 error matrix, 340*f*
 error scores, 105, 111–12, 112*t*
 events, 121, 430
 size of, 122, 435
 Everett, Martin, 142
 Excel, 138
 exponential random graph models
 (ERGM), 355
 exposure, 204–10, 430
 Extensible 3D (X3D), 409–10
 External-Internal Index, 132–3, 135, 430
- family of child or orientation (FAMC), 271, 431
 family of spouse or procreation (FAMS), 271, 431
 family trees, 270–8
 family–friendship groupings, 73–5
 Faulkner, Robert R., 142
 Faust, Katherine, 32, 96, 115, 142, 167, 241, 265, 348
 Fennema, Meindert, 142
 Ferligoj, Anuška, 265, 266, 348
 Fernandez, Roberto M., 193
 first-order inflection point, 212
FishEye mode, 58–9, 431
 fixed choices, 27
 Flament, Claude, 265, 298–300, 302
 Flux Player, 410
 flying teams data, 115
 forest, 431
 Forsé, Michel, 167, 193, 348
 forward local main path, 294
 fragments, 88–9, 286
 free choices, 27
 free recall method, 27
 Freeman, Linton, 32, 167, 289, 298–300, 302, 307
 Fruchterman–Reingold, 21–2, 138–9
- Galesburg drug study data, 219, 237–8, 240–1
 Garfield, Eugene, 307, 381
 gatekeeper, 185–6, 431. *See also* brokerage
 role; coordinator role; itinerant
 broker; liaison
 GDP per capita, 53–4, 55, 56, 57, 61
 Gecko package, 423

Subject Index

449

- GEDCOM (genealogical data format), 271, 273, 274–5, 277, 283–4, 306, 388
 genealogical generation, 272, 431
 genealogy, 269–70
 family trees, 270–8
 social research, 278–88
 generalized blockmodeling, 341, 342, 431
 generalized random graph models, 359–60
 generation jump, 273, 288, 431
 geodesic, 153–4, 157*f*, 156–7, 275–6, 431
 GhostScript, 405
 GhostView, 405
 giant component, 359, 360. *See also*
 components
 Gilbert, E. N., 382
 Gil-Mendieta, Jorge, 348
 Glance, N., 355–7
 global main path, 431
 key-route, 295
 standard, 295, 298–300
 global main path methods, 295
 global view, 431
 Gondola family tree, 270–3, 274*f*
 Gornik, Miha, 421
 Gould, Roger V., 193
 Granovetter, Mark, 193, 219
 graph, 7, 9–10, 431
 directed (digraph), 7, 8, 430
 Ore, 272*f*, 272, 274–5, 276, 280*f*, 433
 parentage (P-graph), 282*f*, 281–3, 434
 signed, 100, 101, 102, 428, 429, 435
 simple, 435
 undirected, 7, 8, 436
 graph drawing esthetics, 18
 graph theory, 6
 Guillaume, J.-L., 142

 Hage, Per, 115
 Harary, Frank, 115, 116
 head (of an arc), 7
 Heider, Fritz, 99, 101, 116
 hierarchical clustering, 324, 328*f*, 329*f*, 431
 hierarchical clusters model, 249, 431
 hierarchy, 89–90, 431
 hi-tech unionization data, 192–3
 Hlebec, Valentina, 266
 Holland, Paul W., 265, 382
 Hollywood composers data, 141
 homophily, 73, 432
 Hughes, Michael, 121, 142
 Hummon, Norman P., 307

 image matrix, 332, 340*f*, 432
 immediacy index, 291, 432
 impact factor, 291, 432
 incident, 432
 indegree, 227–9, 432
 independence, 76
 induced subnetwork, 46–8, 89, 432
 Inkscape, 406, 408
 innovativeness, 206
 input domain, 231–5
 Instant Player, 410
 Institute for Scientific Information (ISI), 291
 interactive innovation, 213
 interlocking directorates, 120–1, 399–400
 intermarriage, 279
 islands, 130*f*, 127–32
 defined, 432
 landscape of, 138*f*
 in three dimensions, 136*f*
 Isle of Man genealogical data, 306
 isomorphic network, 318, 432
 itinerant broker, 185–6, 187, 432. *See also*
 brokerage role; gatekeeper; liaison

 Johnsen, Eugene C., 265
 joint stock companies, 120–1
 Jorion, Paul, 306
 JPEG, 26, 404–5

 Kadushin, Charles, 141
 Kalish, Y., 382
 Kamada, T., 33
 Kamada-Kawai, 21, 25, 42, 45, 90–1, 106, 131
 Katz, Elihu, 219, 241
 Katz, L., 382
 Kawai, S., 33
k-connected component, 432
k-core, 83, 296, 432
 key-route global main path, 295
 key-route local main path search, 294–5, 300
 key-routes, 432
 Kick, E., 66
 Kincaid, D. Lawrence, 166, 167
 Kinemages, 410–11
 KiNG, 411
k-Neighbors, 155, 276
 Knoke, David, 241
 Kolaczyk, E. D., 381
 Korea family planning data, 166

- Krackhardt, David, 193
 Kramberger, A., 266
- labels, 415
 landscape, 136*f*, 138*f*, 137–8
 LaTeX, 405
 Lefebvre, E., 142
 Leinhardt, Samuel, 265, 382
 Leonard, Olen E., 96, 241
 liaison, 185–6, 187, 432. *See also*
 brokerage role; coordinator role;
 gatekeeper; itinerant broker
 Lin, Nan, 193, 241
 line (network), 7, 45. *See also* arc; edge;
 loop
 defined, 432
 labels, 417–18
 removing, 50
 line multiplicity, 124, 126
 line values, 8, 126
 similarities, 182–3
 line-network, 152*f*, 151–2
 Liu, J. S., 307
 local clustering coefficient, 361. *See also*
 clustering coefficients
 local main path methods, 295, 300, 432
 local view, 432
 longitudinal networks, 109–11
 Loomis, Charles P., 96, 241
 loop, 7, 432
 Louvain method, 132, 133
 Lu, L. Y. Y., 307
 Luce, R. D., 96
 Lusher, D., 382
- macros, 208, 288
 Mage, 410–11
 Mahnken, Irmgard, 306
 main path, 294
 analysis, 292–3
 backward local, 294, 300
 component, 296, 303*f*, 433
 defined, 432
 forward local, 294
 global, 295
 key-route local, 294–5
 local, 295
 as multirelational network, 301
 manipulation, in social network analysis,
 12–15
 manual drawing, 22–5
 marriages, 269–70
 blood, 280
 family trees and, 270–8
 intermarriage, 279
 multiple, 283
 nonblood relinking, 280
 polygamy, 283
 remarriages, 276, 280–1, 283
 structural relinking and, 280–1
- Massey, J. G., 167
 matrilineal lines, 286
 matrix, 316–21, 433
 adjacency, 317, 427*t*
 affiliation, 427*t*
 cell, 428
 column, 316
 error, 340*f*
 image, 332, 340*f*, 432
 row, 316
 matrix format, 388, 393–4
 matrix multiplication, 277
 M-clusters model, 249
 MDL file, 342–3
 MDL MOL, 410–11
 Menzel, Herbert, 219, 241
 Mexican political elite data, 347
 Michael, Judd H., 167, 193
 Microsoft Access, 395, 398
 Microsoft Word, 398, 405
 Milgram, Stanley, 32
 missing values, 376
 modern math diffusion data, 197–8
 adopters, 211–12
 adoption rate and acceleration, 211–12
 early adopters, 204
 exposure of vertices, 204–5
 threshold, 206
 modularity, 132, 433
 Monte Carlo simulation, 373–7
 Morales, Julio O., 96, 241
 Moreno, J. L., 3, 32, 115
 Mrvar, A., 115, 116
 multiple lines, 7–8, 372, 433
 multiple relations network, 9, 433
 multiplex network, 433
 multiplicity, 433
- neighbor, 433
 nested subnetwork, 433
 network, 6–8, 45
 active, 11
 acyclic, 253–5, 284, 289
 centrality, 289–90
 combining, 60
 complete, 429

Subject Index

451

- creating, 28
- cross-sectional, 111
- defined, 433
- degree centralization of, 152
- degree sequence of, 361
- diameter of, 361
- editing, 28–9
- extracting, 46–7
- extracting subnetwork from, 46–7
- extracting vector values from, 59
- line-network, 151–2
- longitudinal, 109–11
- manipulation of, 12–15
- motifs, 375, 433
- multiple relations, 9, 433
- multiplex, 433
- one-mode, 121–7, 433
- optimal layout of, 18
- parts of, 8
- reduction of, 45–53
 - contextual view, 51–3
 - global view, 48–51
 - local view, 46–8
- relations, 8
- shrinking, 48, 255, 435
- star-network, 151, 152*f*, 154
- strongly connected, 80–1
- symmetrizing, 77–8, 436
- transposed, 436
- two-mode, 121–7, 436
- unconnected directed, 79*f*
- valued, 124, 436
- weakly connected, 80–1
- network data formats, 387–9
- network format, 388
- network growth models, 366
- Newman, M. E., 167, 381, 382
- NoClip* export, 405
- nonblood relinking, 280, 433. *See also*
 - blood marriages; structural,
 - relinking
- Norman, Robert Z., 116
- NotePad++, 392
- null block, 332, 339–40
- null dyads, 247, 433
- one-mode networks, 121–7, 433
- optimization technique, 105, 433
- Ore graph, 272*f*, 272, 274–5, 276, 280*f*, 433
- outdegree, 433
- paired comparison, 27
- Pajek
 - automatic drawing methods, 22
 - blockmodeling commands in, 335–8
 - coordinate system of, 136*f*
 - creating network files for, 389–400
 - helper software, 391
 - within Pajek, 389–91
 - relational database, 394–400
 - word processor, 392–4
 - data objects, 9
 - dialog box, 14*f*
 - Draw screen, 18–20, 25, 54–5, 136–9, 425–6
 - export formats, 404–11
 - bitmap, 404–5
 - Encapsulated PostScript, 405–6
 - Extensible 3D (X3D), 409–10
 - JPEG, 404–5
 - Kinemages, 410–11
 - MDL MOL, 410–11
 - Scalable Vector Graphics, 406–8
 - VOSviewer, 408–9
 - VRML, 409–10
 - installing, 387
 - limitations of, 400
 - Mac OS X, installing on, 421–3
 - Main screen, 11–12, 424
 - menu structure in, 13*f*
 - names of colors in, 413*t*
 - network data formats, 387–9
 - Options screen, 411*f*
 - project file, 39–41
 - Report screen, 16–17, 77
 - scrollbar, 137
 - shortcut key combinations, 424–6
 - updates of, 402–3
- Pajek3XL, 387, 400–2
- PajekToSvgAnim.exe, 407–8
- PajekXXXL, 387, 400–2
- parentage graph (P-graph), 282*f*, 281–3, 434
- partial order, 258, 433
- participation rate, 434
- partitions, 38–45, 90–1, 286–7
 - affiliation, 127
 - binarized, 287–8
 - creating, 44
 - cross-tabulation of, 61–3
 - defined, 433
 - definition of, 38
 - dimensions of, 430
 - editing, 39

- partitions (*cont.*)
 - exporting, 398–9
 - optimizing, 335
 - order of class numbers in, 39
 - removing, 376–7
 - saving, 39
 - as storage of discrete characteristics of vertices, 38
 - translating vectors into, 56
- path, 80, 153, 434
- patrilineal genealogy, 270–8
- patrilineal lines, 286
- Pattison, P., 382
- Pearson's correlation coefficient, 230
- pedigree, 276, 434
- permutation, 316–21, 434
- Perry, A., 96
- Personal Ancestral File, 306
- Pfeffer, Jürgen, 391
- Ph.D. students in computer science data, 306
- Pich, Ch., 33
- Pivot MDS, 22
- Poisson distribution, 359
- polarization, 112
- polygamy, 280, 283
- popularity of vertex, 227–9, 434
- position, 434
- PostScript format, 320–1, 327, 405
- POVRay, 409–10
- Powell, J.H., 382
- power-law distributions, 367
- preferential attachment models, 366–72
- preprint transformation, 434
- preprints, 303
- prestige
 - correlation, 229–31
 - domains, 231–5
 - overview, 225–6
 - proximity, 235–8
 - social, 225
- prevalence, 434
- probability distribution, 354–5, 359–60
- proportional strength, 180, 434
- proximity prestige, 235–8, 434
- Qiew, 409
- R (software), 137–8, 370
- radius, 418
- Ragusan nobility data, 269–70, 279, 283
- random graph models
 - Bernoulli, 358–60, 362
 - classic uniform models, 358–62
 - Erdős-Rényi, 358
 - Monte Carlo simulation, 373–7
 - overview, 353–5
 - Poisson, 359
 - preferential attachment models, 366–72
 - small-world models, 362–6
- ranked clusters, 248–9, 434
- ranked structure (blockmodel), 340–1
- ranking, 27
 - acyclic networks, 253–5
 - overview, 244–5
 - triadic analysis, 245–53
- ray-tracing, 409–10
- reachable, 434
- Read, K., 115
- receiver (head of arc), 7
- regular block, 339–40, 434
- regular equivalence, 338–43, 434
- relational database, 394–400
- relaxed balanced, 106
- relinking index, 282, 284–5, 434
- relocation techniques, 20–1
- remarriages, 276, 280–1, 283
- Rényi, A., 358, 381
- representative role, 434
- resolution parameter, 133
- restricted domain, 435
- restricted input domain, 233
- rewiring, 364, 372, 373–5
- Riordan, O., 382
- Roberts, F. S., 116
- Robins, G., 382
- Rogers, Everett M., 167, 219
- rotation, 137
- row (matrix), 316
- Sabidussi, G., 167, 298–300
- Sampson, Samuel F., 103, 115
- Sampson monastery data, 103
 - clusters, 103–9
 - structural balance, 103–9
- San Juan Sur data, 96, 226–7, 237
- sawmill communication data, 150–1, 155, 157, 159, 272
- Scalable Vector Graphics (SVG), 406–8, 412–19
- Schijf, Huibert, 142
- Schmidt, Samuel, 348
- Schweitzer, Thomas, 306
- Scientometrics data, 381

Subject Index

453

- Scott, John, 32, 96, 121, 142, 167, 220, 348
 Scottish capital data, 120–1
 islands in network of Scottish firms, 130*f*
 one-mode networks, 121–7
 two-mode networks, 121–7
 Search Path Count, 296
 Search Path Link Count, 296
 Search Path Node Pair, 296
 secondary structural hole, 184–5, 187–8, 435
 second-order inflection of S-curve, 211
 Seidman, S. B., 96
 semicycle, 101, 435
 semipath, 80, 435
 semiwalk, 79–80, 435
 sender (tail of arc), 7
 shortcut key combinations, 424–6
 sibling, 273
 sibling group, 276, 279
 signed graph, 100, 435
 balanced, 101, 428
 clusterability, 102
 clusterable, 429
 signed network, 106
 Simmel, Georg, 119, 141, 178, 193
 simple graph, 435
 sink vertex, 293, 435
 Small World problem, 6
 small-world models, 362–6, 373–5
 Smith, David H. A., 66
 Sneath, Peter, 348
 Snijders, T.A.B., 382
 Snyder, D., 66
 sociability, 147
 social atom, 3
 social capital, 147, 151, 435
 social circles, 119
 social generation, 273, 435
 social network analysis, 5–17, 30
 assembling a social network, 27–30
 estimation techniques in, 6
 main goal of, 5
 manipulation, 12–15
 network definition, 6–8
 statistics and, 61–3
 visualization, 17–27
 automatic drawing, 20–2
 manual drawing, 22–5
 saving a drawing, 25–7
 social prestige, 225
 society, 3
 sociocentered perspective, 149, 435
 sociogram, 4*f*, 3–5
 sociometric choice, 4
 sociometry, 3–5
 Sokal, Robert R., 348
 source vertex, 293, 435
 Spearman's rank correlation, 229–30
 Spencer, J., 382
 spring embedders, 20
 standard global main path, 295, 298–300
 star-network, 151, 152*f*, 154
 betweenness centrality, 159
 defined, 435
 statistical network model, 355, 435
 statistics, 61–3
 Steglich, C. E. G., 382
 strength-of-weak-ties hypothesis, 176
 strike network data, 171–2, 174–5, 186–7
 binary matrix, 320*f*
 communication lines, 316*f*
 coordinator roles in, 188*t*
 matrix, 318*f*
 Strogatz, S.H., 382
 strong component, 435
 strongly connected, 435
 structural balance, 101
 detecting, 103–9
 structural equivalence, 323–4, 435
 structural hole, 178, 182, 436
 secondary, 184–5, 187–8
 structural prestige, 225
 structural property, 39, 436
 structural relinking, 279, 280–1, 282*f*, 436.
 See also blood marriages; nonblood relinking
 student government data, 245
 error matrix, 340*f*
 image matrix, 340*f*
 matrix, 339*f*
 subnetwork
 complete, 86–91
 extracting, 431
 induced, 46, 89, 302, 325–6, 335
 nested, 433
 subtree, 329–30
 SVG file, 131–2
 symbiosis, 163
 symbols, 415–16
 symmetric clusters, 256–61
 symmetric dyads, 247, 250*t*
 symmetric-acyclic decomposition, 256–61, 436

- tab delimited file, 138
- tertus gaudens* strategy, 178, 182
- Textpad, 392
- threshold, 204–10, 436
- threshold category, 436
- threshold lag, 214, 215–16, 436
- ties
 - asymmetric, 245, 258, 260
 - strong, 175, 325–6
 - weak, 170, 175
- transaction networks, 185–6
- transitive triad, 436
- transitivity model, 249, 436
- transposed network, 436
- traversal weight, 293*f*, 293–4, 297*t*, 436
- tree, 282, 436
- Trezzini, Bruno, 66
- triad, 178*f*, 178, 245–53, 436
- triad census, 251*t*, 252*t*, 250–2, 436
- Tusnady, G., 382
- two-mode networks, 121–7, 394, 399–400, 436
- txt2Pajek3.exe, 391
- txt2Pajek.exe, 391
- UCINET DL files, 389
- undirected graph, 7, 8, 436
- Unicode symbols, 415–16
- Unicode UTF-8 with BOM format, 392
- Valente, Tom W., 220
- valued network, 124, 436
- Van de Bunt, G.G., 382
- vector graphics, 26–7
- vectors, 53–60
 - defined, 437
 - drawing, 57–8
 - exporting, 398–9
 - removing, 376–7
 - shrinking, 59
 - size of vertices and, 57
 - translation into partitions, 56
- velocity, 418
- vertex/vertices, 7, 9, 10
 - adjacent, 76
 - attributes of, 39
 - average degree of, 76
 - class numbers, 43–5, 156
 - closeness centrality of, 154
 - colors, 42–3, 156, 156*f*
 - coordinates, 59–60
 - cut-vertex, 173
 - defined, 437
 - degree centrality of, 152–5, 167
 - degree of, 76
 - deleting, 173, 429
 - discrete characteristics of, 38
 - distance between, 153–4
 - distribution of distances between, 157
 - exposure of, 204
 - geodesics between, 157*f*, 156–7
 - indegree of, 76
 - input domain, 232
 - labels, 58, 415
 - labels, editing, 390
 - layout of, 412*f*
 - movement of, 23
 - outdegree of, 76
 - popularity or indegree of, 227–9
 - proximity prestige of, 236
 - shapes of, 412–14, 415
 - sink, 293, 435
 - source, 293, 435
 - symbols, 44
 - threshold of, 208–9
 - traversal weight, 293–4
 - uniting, 60
- Virtual Reality Modeling Language (VRML), 409–10
- visiting ties, 73–5
- visualization, 17–27
 - automatic drawing, 22–5
 - manual drawing, 22–5
 - saving a drawing, 25–7
- VOS Clustering, 132, 133
- VOS Mapping, 22
- VOSviewer, 408–9
- vrml2pov.exe, 410
- walk, 79–80, 437
- Wallerstein, Immanuel, 36, 66
- Wasserman, Stanley, 32, 96, 115, 142, 167, 220, 241, 265, 348, 382
- Watts, D. W., 382
- Watts–Strogatz clustering coefficient, 361, 364. *See also* clustering coefficients
- weakly connected network, 437
- Web of Science*, 291
- White, Douglas R., 306
- White, Harrison C., 348
- Wolff, Kurt H., 141
- word processor, 392–4
- WordPad, 392
- world system, 36–8

Subject Index

455

- in South America, *48f*
- world trade of manufactures of metal,
39
- world trade data, 39–41, 325–6, *328f*, 335,
337–8, 395
- WYSIWYG export, 405
- X3D models, 138–9,
409–10
- XQuartz, 421
- z-axis, 135
- Zeleny, Leslie D., 115