

Glossary of Notation

Graph Notation

$G = (V, E)$	A graph G , with vertex set V and edge set E .
N_v, N_e	Number of vertices; number of edges.
\mathcal{G}	A collection of graphs.
$V^m, V^{(m)}$	Set of ordered/unordered vertex m -tuples.
$V_{\setminus \{i, j\}}^{(m)}$	Set of unordered vertex m -tuples from $V \setminus \{i, j\}$.
$\mathbf{A} = [A_{ij}]_{i, j=1}^{N_v}$	Adjacency matrix.
\mathbf{B}	Routing matrix (more generally, incidence matrix).
$\mathbf{L}, \tilde{\mathbf{L}}$	Laplacian and normalized Laplacian matrices.
$\{d_v\}_{v \in V}$	Degree sequence.
$\text{dist}(v, u)$	Geodesic distance between v and u .
$\bar{l}(G)$	Average geodesic distance on G .
$c_{Cl}(v), c_B(v), c_{Ei}(v)$	Closeness, betweenness, and eigenvector centrality of v .
$\text{den}(G)$	Density of G .
$\tau_3(G)$	Number of connected triples of vertices in G .
$\tau_\Delta(G)$	Number of triangles in G .
$\text{cl}(G), \text{cl}_T(G)$	Clustering and clustering-transitivity coefficient of G .
$\mathcal{C} = \{C_1, \dots, C_K\}$	A partition (e.g., of a set of vertices).
$\text{mod}(\mathcal{C})$	Modularity of the partition \mathcal{C} .
$\mathcal{N}(S)$	Neighborhood of vertices in S .
$\mathcal{N}_v = \mathcal{N}(\{v\})$	Neighborhood of vertex v .
$\mathcal{N}_v^+ = \mathcal{N}_v \cup \{v\}$	Union of vertex v with its neighborhood.
$\eta(G)$	Characteristic of G (e.g., average degree, clustering coefficient, etc.).
$G^* = (V^*, E^*)$	Graph obtained by sampling G .
$T = (V_T, E_T)$	A tree.

Probability and Statistics Notation

$\mathbb{P}(B)$	Probability of the event B .
X, \mathbf{X}	Random variable; random vector or matrix.
x, \mathbf{x}	Observation of X or \mathbf{X} .
$\mathbf{X}_{(-i)}, \mathbf{X}^{(-i)}$	Random vector \mathbf{X} without its i -th entry.
I_B	Indicator random variable for the event B .
F_X	Cumulative distribution function (CDF), i.e., $F_X(x) = \mathbb{P}(X \leq x)$.
f_X	Probability density (or mass) function.
$\mathbb{E}(X)$	Expected value (mean) of X ; sometimes written \bar{x} .
$\mathbb{V}(X)$	Variance of X i.e., $\mathbb{E}((X - \bar{x})^2)$
$\text{Cov}(X, Y)$	Covariance of X and Y i.e., $\mathbb{E}((X - \bar{x})(Y - \bar{y}))$
$\text{corr}(X, Y)$	Correlation of X and Y i.e., $\text{Cov}(X, Y) / (\mathbb{V}(X)\mathbb{V}(Y))^{1/2}$.
\bar{X}, \bar{x}	Sample mean; observed sample mean.
$\theta, \hat{\theta}$	Parameter; estimate of parameter.
$\text{se}(\hat{\theta})$	Standard error of $\hat{\theta}$ i.e., $\text{se}(\hat{\theta}) = \sqrt{\mathbb{V}(\hat{\theta})}$.
$\text{MSE}(\hat{\theta})$	Mean squared error of $\hat{\theta}$ i.e., $\text{MSE}(\hat{\theta}) = \mathbb{E}((\hat{\theta} - \theta)^2)$.
$\mathcal{L}(\theta)$	Likelihood function.
$\ell(\theta)$	Log-likelihood function i.e., $\ell(\theta) = \log \mathcal{L}(\theta)$.
RSS	Residual sum of squares.
FDR	False discovery rate.

Other Notation

$n!$	$n \times (n-1) \times \cdots \times 2 \times 1$
$\binom{n}{k}$	$n! / (k!(n-k)!)$
\mathbb{R}	The real numbers.
$ S $	Number of elements in the set S .
$h_n = O(g_n)$	$ h_n/g_n $ is bounded for large n .
NP	A formal characterization in computer science of the difficulty of a problem, effectively indicating that it may be solved only in a number of computations growing exponentially with the size of the problem.
\mathbf{x}^T	Transpose of the vector \mathbf{x} .

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Author Index

- Abbeel, P. 200, 201
Achlioptas, D. 150
Adamic, L.A. 201
Adar, E. 201
Agarwal, D.K. 75, 118
Aiello, W. 158
Albert, R. 173–175
Alderson, D. 193
Almaas, E. 95
Alon, U. 151, 165, 166, 168
Altaf-Ul-Amin, M. 95
Alvarez-Hamelin, J.I. 69, 73
Amenta, N. 235
Anderson, R.M. 112, 272
Anderson, T.W. 213
Andersson, H. 275, 276, 278, 279
Argyriou, A. 266

Bader, G.D. 95
Bader, J.S. 200
Ball, F. 276
Bandyopadhyay, S. 161
Barabási, A.L. 173–175
Barford, P. 328
Barrat, A. 69, 73, 96, 171, 271, 276, 280
Barthélemy, J.-P. 236
Barthélemy, M. 93, 271, 276, 280
Batagelj, V. 13, 73, 95, 104, 111, 159,
160, 172, 175, 196
Baur, M. 73

Becker, N.G. 275, 276
Belkin, M. 262, 282
Bell, M.G.H. 297, 301, 317
Bell, R. 75, 118
Bender-deMoll, S. 118
Benjamini, Y. 35, 211, 212
Berger, J.O. 232
Besag, J. 181, 187, 250, 251, 253, 254,
340
Bickel, P. 329
Bindel, D. 322, 323, 326
Bing, N. 216, 241
Bishop, C.M. 343
Blum, A. 269
Boccaletti, S. 114, 119, 171, 175, 194
Bollback, J.P. 234
Bollobás, B. 45, 96, 97, 156, 169, 174,
175, 193
Bonacich, P. 90
Boorman, S.A. 111
Borgatti, S.P. 88, 92, 93
Börner, K. 65
Bourque, M. 235
Boyack, K.W. 65, 67, 77
Brameier, M. 178
Brandes, U. 62, 73, 75, 76, 88–90, 93,
95, 97, 99, 106, 108, 111, 119, 120,
151, 159, 160, 172, 175, 196
Breiger, R.L. 111
Breiman, L. 218

- Brin, S. 92
 Britton, T. 275, 276, 278, 279
 Brockwell, P.J. 281, 313
 Broder, A. 100, 101
 Bryant, D. 224, 235
 Bühlmann, P. 216, 219
 Bunge, J. 151
 Burk, W.J. 281, 282
 Byers, J.W. 150

 Caceres, R. 230, 232, 320, 321
 Caldarelli, G. 97
 Campbell, D. 281
 Cao, J. 281, 307, 310
 Carey, H.C. 288
 Cascetta, E. 298, 299, 301, 305–307
 Casella, G. 45, 255
 Castro, R.M. 224, 225, 236, 237, 239, 240, 318
 Chant, J. 200
 Chaudhuri, A. 200
 Chawla, S. 269
 Chen, G. 309
 Chen, T. 271
 Chen, Y. 160, 161, 164, 322, 323, 326
 Chor, B. 233
 Christensen, R. 295, 326
 Chua, D.B. 93, 323, 324, 326, 327
 Chui, C.K. 309
 Chung, F.R.K. 106, 158, 176–179, 193
 Clarke, F. 235
 Clauset, A. 106, 150
 Cleveland, W.S. 76
 Clifford, P.E. 339
 Coates, M.J. 224, 236–240, 318–320, 327
 Conroy, J.M. 118, 119
 Cooper, C. 177
 Cormen, T.H. 24, 45, 98
 Cover, T.M. 305
 Cressie, N.A.C. 55, 250, 254, 256, 282, 317
 Cristianini, N. 265, 266, 271
 Crovella, M. 4, 69, 72, 150, 298, 312, 323, 324, 326, 327, 329

 Daley, D.J. 272, 274
 Dall'Asta, L. 69, 73, 136
 Darroch, J. N. 131
 Davidson, G.S. 67
 Davis, D. 307, 310
 Davis, G.A. 308, 310
 Davis, R.A. 281, 313
 de Haan, L. 84
 de la Fuente, A. 216, 241
 de Nooy, W. 13
 de Solla Price, D.J.D. 65, 173
 Deming, W.E. 294
 Demiris, N. 276
 Dempster, A.P. 217
 Deng, M. 271
 Dewey, T.G. 176–179
 di Battista, G. 58, 59, 76
 Diaconis, P. 160, 161, 164
 Diestel, R. 45
 Diot, C. 329
 Dobra, A. 220
 Dolev, S. 93
 Donoho, D.L. 282, 306, 311–313
 Doreian, P. 111, 118
 Dorogovtsev, S.N. 194
 Doyle, J.C. 86, 87, 193
 Drees, H. 84
 Drton, M. 217
 Duffield, N.G. 225, 229, 230, 232, 234, 244, 319–321, 328

 Eades, P. 58, 59, 76
 Eames, K.T.D. 279, 282
 Edwards, D. 333
 Efron, B. 37, 212, 218, 219, 234
 Elisseeff, A. 265, 266
 Elliott, P. 256, 342
 Elovici, Y. 93
 Eppstein, D. 151
 Erdős, P. 156
 Erlebach, T. 88, 93, 95, 97, 99, 106, 108, 111, 119
 Erramilli, V. 312
 Esty, W.W. 131
 Everett, M.G. 88, 92, 93

- Faith, J.J. 208, 220, 222, 223, 241
 Faloutsos, C. 118
 Faust, K. 76, 92, 111, 120, 156, 167
 Felsenstein, J. 225, 228, 230, 233–236, 241
 Ferligoj, A. 111
 Fiedler, M. 108
 Figueiredo, M. 241
 Fischer, M.M. 289
 Fitzpatrick, M. 151
 Fleischer, D. 93
 Flynn, P.J. 103, 228
 Ford, L.R. 100
 Forster, J.J. 161
 Fotheringham, A.S. 289
 Foulds, L.R. 235
 Frank, O. 135, 139, 140, 142, 145–147, 150, 151, 162, 163, 182, 184, 341
 Freeman, L.C. 49, 88, 89, 93
 Friedman, J.H. 203, 204, 218, 220, 247, 269, 282, 283, 293, 309
 Friedman, N. 241, 282
 Frieze, A. 177
 Fronczak, A. 97
 Fruchterman, T.M.J. 62
 Fulkerson, D.R. 100
- Gaertler, M. 73
 Galas, D.J. 176–179
 Gani, J. 272, 274
 Gansner, E.R. 62
 Garcia-Diaz, A. 285
 Gardner, T.S. 208
 Ge, Z. 329
 Geman, D. 252, 256
 Geman, S. 252, 256
 Gentleman, R. 241
 Getoor, L. 281, 282, 344
 Geyer, C.J. 185
 Ghahramani, Z. 266, 309
 Gibson, D. 111
 Gilbert, E.N. 156
 Girvan, M. 102, 105, 110
 Gkantsidis, C. 106–108
 Godsil, C.D. 108
- Goldberg, A.V. 100
 Goldberg, D.S. 200
 Goldstein, M.L. 83
 Golightly, A. 281
 Golub, G.H. 90, 110, 323
 Gomory, R.E. 100
 Good, I.J. 130
 Gopal, S. 10, 289
 Gordon, A.D. 228
 Greenberg, A. 329
 Grimes, C. 282
 Gross, J.L. 45, 58
 Gu, C. 262
 Guare, J. 1, 98
 Gupta, S. 112
- Hagberg, O. 178
 Hage, P. 92
 Hammersley, J.M. 339
 Han, J.D.J. 126, 150
 Handcock, M.S. 183, 184, 186, 188–190, 194, 204
 Harary, H. 92
 Harrison, J. 281
 Hastie, T. 203, 204, 218–220, 247, 261, 269, 282, 283, 293, 309
 Heckerman, D. 333
 Heesterbeek, J.A.P. 275
 Held, L. 252
 Herbster, M. 266
 Hernández-Campos, F. 85
 Hero, A.O. 224, 318
 Hill, S.B. 75, 118
 Hinton, G.E. 309
 Hochberg, Y. 35, 211
 Hoeschele, I. 216, 241
 Hoff, P.D. 194, 200, 204, 205, 207
 Hogue, C.W.V. 95
 Holland, P.W. 184
 Holmes, S.P. 160, 161, 164, 225, 236, 242
 Hołyst, J.A. 97
 Hooker, G. 281
 Horowitz, J. 225, 229, 230, 232, 234, 244, 319–321

- Hotelling, H. 210, 214, 218
 Hu, T.C. 100
 Huelsenbeck, J.P. 234
 Hunter, D.R. 184, 186, 188–190
 Huson, D.H. 224

 Iida, Y. 317
 Ikeda, M. 187
 Ising, E. 249
 Itzkovitz, S. 151, 165, 166, 168

 Jackson, M.O. 193
 Jain, A.K. 103, 228
 Jana, R. 161
 Jedynak, M. 97
 Jeong, H. 126
 Jernigan, R.L. 102, 107
 Johnson, R.A. 219
 Johnstone, I. 219
 Jordan, M.I. 271, 333, 342–344

 Kahng, B. 177
 Kamada, T. 62
 Kandola, J. 265, 266
 Kashtan, N. 151, 165, 166, 168
 Kasif, S. 266, 271
 Kasturirangan, R. 172
 Katz, L. 90
 Katz, R.H. 322, 323, 326
 Kaufmann, M. 59, 75, 76
 Kaur, J. 329
 Kawai, S. 62
 Keeling, M. 279, 282
 Kempe, D. 118, 150
 Kermack, W.O. 272
 Kim, J. 177
 Kim, P.J. 126
 Kimeldorf, G. 259
 Kirsch, H.E. 114–116
 Klavans, R. 65, 77
 Kleinberg, J.M. 92, 111, 118, 172, 176, 200–202
 Kloczkowski, A. 102, 107
 Kolaczyk, E.D. 93, 114–116, 271, 323, 324, 326, 327
 Koller, D. 200, 201, 282

 Kondor, R.I. 263
 König, D. 2
 Koren, Y. 62
 Koskinen, J.H. 194
 Kossinets, G. 56, 118, 119
 Kramer, M.A. 114–116
 Krapivsky, P.L. 177
 Krishnamurthy, B. 4, 69, 72, 298, 329
 Kumar, A. 118
 Kumar, R. 118, 119, 176, 177

 Lafferty, J.D. 220, 263, 266
 Lakhina, A. 150, 311, 329
 Lanckriet, G.R.G. 266, 271
 Langford, J.C. 282
 Lauritzen, S.L. 217, 219, 333, 335, 339, 341, 343
 Lawrence, E. 319, 321
 Lazega, E. 188
 Lee, S.H. 126
 Leinhardt, S. 184
 Leiserson, C.E. 24, 45, 98
 Leland, W.E. 328
 Leskovec, J. 118
 Leyvraz, F. 174
 Li, L. 193
 Li, M. 235
 Li, S.Z. 250, 252, 254
 Liang, F. 266
 Liang, G. 319, 321
 Liben-Nowell, D. 200–202
 Liljeros, F. 279
 Lin, Y. 220, 266
 Linial, M. 241
 Liseo, B. 232
 Little, R.J.A. 55, 200
 Liu, J.S. 45, 120, 160, 161, 164, 255
 Lo Presti, F. 225, 229, 230, 232, 234, 244, 319–321
 Lonardi, S. 110
 Lu, L. 158, 176–179, 193
 Lund, C. 306, 311–313

 MacDonald, I.L. 337
 Maher, M.J. 301

- Marchette, D.J. 118, 119
 Margush, T. 235
 Marron, J.S. 85
 Marsden, P.V. 76
 Maslov, S. 86, 87
 Matveeva, I. 262
 May, R.M. 112, 150, 272
 McCanne, S. 229
 McCullagh, P. 257, 292, 293
 McDonald, J.W. 161
 McFarland, D. 118
 McKay, B.D. 157
 McKendrick, A.G. 272
 McMorris, F.R. 235, 236
 Meinshausen, N. 219
 Mendes, J.F.F. 194
 Mendes, P. 216, 241
 Michailidis, G. 302, 319, 321
 Michener, C.D. 240
 Mihail, M. 106–108
 Milgram, S. 1, 98, 169
 Milo, R. 151, 160, 161, 165, 166, 168
 Mitzenmacher, M. 85, 173
 Mohar, B. 108
 Mollison, D. 276
 Mollory, M. 158, 160
 Molloy, M. 158
 Monasson, R. 172
 Monro, S. 186
 Moody, J. 118
 Moore, C. 106, 150
 Moors, T. 327
 Morris, M. 180
 Morris, S.A. 83
 Motwani, R. 92
 Mrvar, A. 13, 73, 95
 Murali, T.M. 266
 Murty, M.N. 103, 228
- Nachman, I. 241
 Nair, V.N. 319, 321
 Nariai, N. 271
 Nelder, J.A. 257, 292, 293
- Newman, M.E.J. 3, 83, 87, 93, 97, 102, 105, 106, 110, 112, 113, 119, 159, 171, 172, 175, 194, 278
 Nguyen, H.X. 322, 328
 Nguyen, S. 301, 305, 306
 Ni, J. 242
 Nielsen, R. 234
 Nihan, N.L. 308, 310
 Niyogi, P. 262, 282
 Nobel, W.S. 271
 Nordvik, M.K. 279
 North, S. 62
 Novak, J. 118, 119
 Nowak, R.D. 224, 236, 237, 239–241, 318–320
 Nowicki, K. 194, 204
 Nucci, A. 308, 313, 314
- Ohno, S. 176
 O’Kelly, M.E. 289
 O’Neill, P.D. 276, 279
 Ortúzar, J.D. 298, 317
- Page, L. 92
 Park, K. 329
 Park, T. 307
 Park, Y. 118, 119
 Pastor-Satorras, R. 83, 87, 97
 Pattison, P.E. 180, 183, 184, 188–190, 256, 342
 Pearl, J. 343
 Pe’er, D. 241
 Perlman, M.D. 217
 Pettitt, A.N. 256, 257
 Phillips, D.T. 285
 Pich, C. 62, 151
 Pointurier, Y. 327
 Pontil, M. 266
 Popescul, A. 200
 Priebe, C.E. 118, 119
 Puzi, R. 93
- Qazi, S. 327
- Rabbat, M.G. 224, 241, 320, 327
 Raftery, A.E. 194, 204

- Raghavan, P. 111, 118, 119
 Ramsay, J.O. 281
 Rao, A.R. 161
 Ratcliff, D. 131
 Ratnasamy, S. 229
 Ravikumar, P. 220
 Redner, S. 174, 177
 Reed, B.A. 158, 160
 Reingold, E.M. 62
 Rényi, A. 156
 Resnick, S. 84
 Riordan, O.M. 96, 97, 169, 174, 175
 Rivest, R.L. 24, 45, 98
 Robbins, H. 186
 Robert, C.P. 45, 255
 Roberts, J.M. 161
 Robillard, P. 297, 299
 Robins, G.L. 180, 183, 184, 187–190, 256, 342
 Robinson, D.F. 235
 Ron, A. 328
 Ronquist, F. 234
 Ross, S.M. 45, 273
 Roth, F.P. 200
 Rothberg, J.M. 200
 Roughan, M. 306, 311–313, 329
 Roweis, S.T. 282
 Royle, G. 108
 Rubin, D.B. 55, 200
 Rue, H. 252

 Sabidussi, G. 88
 Sachs, K. 241
 Salamatian, K. 308, 313, 314
 Salgado, H. 220
 Samorodnitsky, G. 85
 Samukhin, AN 174
 Särndal, C.E. 155
 Saul, L.K. 282
 Scalia-Tomba, G. 276
 Schäfer, J. 218
 Schölkopf, B. 261
 Scholtens, D. 241
 Schweinberger, M. 281, 282
 Scott, J. 76, 111, 119

 Sen, A.K. 288, 289, 292–294, 296, 297
 Sen, T.Z. 102, 107
 Shamir, R. 267, 281
 Sharan, R. 267, 281
 Shavitt, Y. 322
 Shawe-Taylor, J. 265, 266
 Sherali, H.D. 307
 Shipley, B. 241
 Shriram, A. 329
 Shumway, R.H. 309
 Sienkiewicz, J. 97
 Silva, V. 282
 Simon, H.A. 173
 Singhal, H. 302
 Smith, F.D. 85
 Smith, P.W.F. 161
 Smith, T.E. 288, 289, 292–294, 296, 297
 Smith, V.A. 241
 Smola, A.J. 261, 263
 Smyth, P. 92, 93, 111
 Sneppen, K. 86, 87
 Snijders, T.A.B. 145–147, 161–164, 183, 184, 186–190, 194, 204, 281, 282
 Sokal, R.R. 240
 Sommers, J. 328
 Song, H. 322, 323, 326
 Soule, A. 307, 308, 311, 313, 314
 Spencer, J. 174
 Spiegelhalter, D.J. 343
 Spielman, D.A. 109
 St. John, K. 235
 Stark, C. 81
 Steglich, C.E.G. 281, 282
 Stein, C. 24, 45, 98
 Stephan, F.F. 294
 Stewart, J.Q. 288
 Stoer, M. 100
 Stoffer, D.S. 309
 Stokman, F.N. 118
 Storey, J.D. 35, 211, 218
 Strauss, D.J. 182, 184, 187, 252, 341
 Strimmer, K. 218
 Strogatz, S.H. 96, 98, 159, 169

- Stumpf, M.P.H. 150, 178
Sugiyama, K. 63
Sun, F. 271
Sun, X. 322
Swensson, B. 155
- Taft, N. 308, 312–314
Tagawa, S. 63
Tamassia, R. 58, 59, 76
Tarjan, R.E. 100
Taskar, B. 200, 201, 281, 282, 344
Tatikonda, S. 242
Tebaldi, C. 303, 304
Tenenbaum, J.B. 282
Teng, S.H. 109
Thiran, P. 322, 328
Thomas, J.A. 305
Thompson, E.A. 185
Thompson, S. 151
Tibshirani, R.J. 37, 203, 204, 218–220, 234, 247, 282, 283, 293, 309
Toda, M. 63
Tollis, I.G. 58, 59, 76
Tomkins, A. 118, 119
Towsley, D.F. 225, 229, 230, 232, 234, 244, 319–321
Tsang, Y. 319
Tufte, E.R. 50, 76
Tukey, J.W. 76
Tuller, T. 233
Turán, P. 94
Tusnady, G. 174
- Ulitsky, I. 267, 281
Ungar, L.H. 200
- van Loan, C.F. 90, 110, 323
van Zuylen, H.J. 297, 305
Vardi, Y. 224, 298, 302, 303, 307, 311
Vázquez, A. 87
Vespignani, A. 69, 73, 83, 87, 97, 271, 276, 280
Viger, F. 147, 148
Volinsky, C. 75, 118
- Wagner, D. 59, 73, 75, 76
Wagner, F. 100
Wahba, G. 259, 262
Wainwright, M.J. 220
Wang, J. 151
Ward, J.H. 104
Wasserman, L. 12, 39, 45
Wasserman, S. 76, 92, 111, 120, 156, 167, 180
Watts, D.J. 96, 98, 118, 119, 159, 169, 172
Weigt, M. 96, 171
Weir, I.S. 256, 257
Weisberg, S. 297
West, M. 281, 303, 304
White, D.R. 93
White, H.C. 111
White, S. 92, 93, 111
Whittaker, J. 217, 333
Whittle, P. 275
Wichern, D.W. 219
Wiel, S.V. 307, 310
Wilkinson, D.J. 281
Wille, A. 215, 216
Willinger, W. 193, 329
Willumsen, L.G. 297, 298, 305, 317
Winograd, T. 92
Wiuf, C. 150, 178
Wolpert, R.L. 232
Wong, M.F. 200, 201
Wool, A. 322
Wormald, N.C. 157
Wretman, J. 155
Wu, C.J. 266
Wuchty, S. 95
Wylie, B.N. 67
- Xie, H. 242
Xie, P. 150
- Yang, Q. 110
Yang, Y.R. 242
Yekutieli, D. 212
Yellen, J. 45, 58
Yen, G.G. 83
Yener, B. 322

Yu, B. 224, 307, 310, 318, 319, 321

Yuan, M. 220

Zachary, W.W. 6

Zaliznyak, A. 86, 87

Zaversnik, M. 73, 95

Zegura, E. 106–108

Zhang, C-H. 149

Zhang, H.H. 266

Zhang, L. 235

Zhang, Y. 306, 311–313, 329

Zhu, J. 261, 269

Zhu, X. 266

Zucchini, W. 337

Subject Index

A

- acyclic 17
- adjacency matrix 20
- adjacent 16
- alignment 265
- anomaly
 - in graph structure 119
 - in network traffic 316, 327, 329
- anomography 329
- arc 16
 - head 16
 - mutual 16
 - tail 16
- association network 207
- assortativity coefficient 112
- auto-probit model 256
- autonomous system 52, 70, 310

B

- bagging *see* bootstrap aggregation
- Barabási-Albert model 173, 277
- Bayes rule 25
- Bayesian network 344
- bipartite *see* graph
- bisection
 - spectral 108–109
- block modeling 111
- Bonferonni correction 35
- bootstrap 37, 234
 - aggregation 218
- bowtie 100–101
- breadth first search 23

C

- capture-recapture 129–130, 145

- cascade process 229–233
- centrality 88–93, 151, 187
 - centralization index 93
 - edge 93, 137, 324
 - group centrality 93
 - vertex 80
 - betweenness 89–90, 137, 151
 - closeness 88–89
 - eigenvector 90
- chain graph 344
- circuit 17
- clique 18
- clustering coefficient 96–97, 137, 142, 157, 159, 164–165, 169–171
 - higher order 97
 - local 96
- community detection 102
- complete graph *see* graph
- component 17
 - giant 94, 98, 157–158
- computational complexity 23–24
- consensus tree 235
- concentration graph *see* conditional independence graph
- concentration matrix *see* precision matrix
- conditional
 - expectation 26
 - probability 25
 - probability density function 26
- conditional independence graph 216
- conditionally independent
 - events 25
 - random variables 26
- connected 17
 - strongly 17
 - weakly 17
- connected triple 96

consensus tree 235
 copying 176–178
 core 95
 k-core 73, 95
 correlation 26, 42
 empirical 210
 partial 212–213
 Pearson product moment 209
 cost
 generalized 286
 covariance 26
 coverage estimator 131
 cross-validation 203, 205, 219, 267
 cumulative distribution function 25
 joint 26
 cut 100
 minimum 100
 cycle 17

D

datasets
 traceroute 147–148
 Abilene 4
 delay 327
 routing 310–316, 324–325, 327
 topology 112
 traffic 310–316
 AIDS blog 10, 101, 166–167
 Austrian telephone call 289–290, 293–294
 circadian clock, in *Drosophila melanogaster* 8, 51–52, 81
 epileptic seizure 114–116
 karate club 6, 96, 104, 107, 108, 164–165
 lawyer collaboration 188–191, 205–206, 246–247, 264–266
 microarray, in *Escherichia coli* 210–211, 214–215, 220–223
 packet delay, sandwich probing 236–241
 protein function, in *Saccharomyces cerevisiae* 266–271
 protein interactions, in *Saccharomyces cerevisiae* 81–82, 86, 125, 140, 142, 266–271
 router-level Internet 69–74, 81–82, 86
 scientific citation 65–68
 decorated graph 17
 degree 16, 80
 average, estimation of 124–125, 137, 144–145, 148
 centrality *see* centrality
 correlation 86–88, 113
 distribution 81–85, 184, 191, 192
 fitting 83–85, 149–150, 178–179

power law 82, 158–159, 163, 173–178, 195
 skewed 81, 160
 in-degree 16
 out-degree 16
 sequence 16, 133, 158, 160
 dendrogram 103
 density 95, 118
 depth first search 23
 diameter 17, 118, 157, 158, 169, 170, 175
 diffusion kernel *see* kernel
 digraph *see* graph, directed
 Dijkstra's algorithm 24, 89
 dissimilarity 104, 230
 distance
 between graphs 75
 between vertices 17
 average 98, 158, 159, 170
 geodesic 17, 89, 121, 191, 201
 drawing, graph 58–63
 aesthetics 59, 78
 conventions 59
 duplication *see* copying
 dyad 184
 dynamic process 246, 271–281

E

eccentricity 92
 edge 16
 betweenness *see* centrality, edge
 directed 16
 proper 16
 weight 17
 ensemble 153
 entropy 305–306
 maximum 289, 306
 relative 305
 epidemic 272–279
 basic reproduction number 274, 277, 284
 general epidemic model 272
 inference for 275–276, 279
 network-based models of 276–279
 Erdős-Rényi model 156, 277
 ERGM *see* network graph model,
 exponential random graph model
 estimable 299, 330
 estimation 31, 154–155
 Bayesian 36, 204, 234, 279, 301, 303–306
 least squares 38, 83, 296, 299–301
 complexity penalized 41, 218–220, 259, 306, 307

maximum likelihood 33, 37, 39, 41, 84,
120, 179, 185–187, 202, 231–234, 253,
275, 292, 302–303
maximum pseudo-likelihood 187, 253,
321
method of moments 33, 37, 162–163
of group size 129–131
profile maximum likelihood 231
unbiased 34, 127–129, 137, 142
expectation 25
conditional *see* conditional expectation
exponential family 180, 181, 186, 341

F

factor graph 344
factorization 335, 339, 341
false discovery rate 35, 116, 211–212, 216,
223
positive 35, 218
Fiedler
value 108
vector 108, 121
Fisher's transformation 210, 214, 217
flow 285
and centrality based on 93
max-flow problem 100
forest 18
Frobenius
inner-product 266
norm 324

G

Gaussian distribution 28
multivariate 39
Gaussian graphical model 216–220,
340–341
geodesic distance *see* distance, between
vertices, geodesic
Gibbs random field 250
Gibbs sampling 186, 255, 282, 304
global Markov property 339
graph 16
acyclic 17
barbell 99
bipartite 19
complete 18
directed 16
directed acyclic 19
dual 93
planar 19
regular 18
simple 16

graphical model
directed 335
Gaussian *see* Gaussian graphical model
gravity model 287–297, 299, 306, 311

H

Hammersley-Clifford theorem 181, 182,
194, 250, 339–342
hidden Markov model 337
hidden population
estimating the size of 145–147, 162–163
hierarchical clustering 103–106, 110,
228–237
linkage, single- and complete- 104
Ward's method 104
Hill estimator 84
homophily 43, 190, 204
hubs and authorities 92, 111
hypothesis testing 32
 p -value 35
alternative hypothesis 32
multiple testing problem 35
null hypothesis 32
power 35
significance level 35

I

incidence matrix 21
incident 16
incident subgraph sampling 132–133
independent
conditionally *see* conditionally indepen-
dent
events 25
random variables 26
induced subgraph sampling 57, 131–132,
168
irreducible
graph 178
Markov chain *see* Markov chain
Ising model 251
isomorphic 16, 179
isoperimetric number 108
iterative proportional fitting 294
iteratively reweighted least squares 202, 293

J

Jaccard coefficient 66, 201

K

k -core *see* core

Kalman filtering 281, 308–310, 337
 kernel
 diffusion 263
 function 258
 Laplacian 262
 regression 257–266
 Königsberg bridge problem 2
 kriging 317
 network 326
 Kullback-Liebler divergence 305

L

Lanczos algorithm 110
 Laplacian
 normalized 46
 Laplacian, graph 21, 108, 111, 121, 262
 LARS 219
 Lasso 219
 layout, graph
 directed 63
 egocentric 62
 energy-placement 62
 Fruchterman-Reingold 62
 Kamada-Kawai 62
 large graphs 62
 planar 60
 spring-embedder 61
 trees 60
 length 17
 link 16
 link prediction 199–206
 link tracing 136
 loop 16

M

manifold learning 120, 281
 Markov chain 27
 ergodic 27, 161
 irreducible 27, 161
 stationary distribution 27
 Markov chain Monte Carlo 30, 159,
 161–162, 186, 255
 Markov condition 335
 Markov random field 249–256
 auto-logistic 251, 253
 auto-models 251–252
 parameter inference 253–254
 prediction 255–256
 max-sum algorithm 343
 maximum entropy *see* entropy
 maximum likelihood *see* estimation
 mean-squared error 34

Menger's theorem 99, 118
 message-passing algorithm 343
 method of moments *see* estimation
 min-cut *see* cut
 minimum spanning tree 24
 missingness 200, 202, 203, 242, 256
 mixing 111–113
 modularity 105, 110, 112, 113
 moral graph 343
 motif, network 151, 165–168
 multi-edge 16
 multi-graph 16

N

nearest neighbor 246–249
 network 1
 network cohesion 94
 network graph 2
 network graph model 153
 agent-based modeling 193
 copying model 176–178
 exponential random graph model
 180–191, 341–342
 degeneracy 188
 fitting 185–187
 preferential attachment model 173–175
 random graph model 154–168
 classical 156–157
 generalized 158–159
 simulation of 159–162
 small world 169–172
 network kriging *see* kriging
 network tomography *see* tomography,
 network
 node 16
 nonparametric 31
n-plex *see* plex

O

order 16

P

PageRank algorithm 92
 pairwise Markov property 339
 parametric 31
 Pareto distribution 120
 partition 102
 partitioning, graph 102–111
 hierarchical *see* hierarchical clustering
 spectral 106–110
 path 17

percolation 276
 phylogenetic inference 225
 hierarchical clustering for 231
 likelihood-based methods for 233–234
 maximum parsimony 228
 planar *see* graph
 plex
 n -plex 95
 potential function 339
 precision 222
 precision matrix 217, 340
 preferential attachment 173–175
 Prim's algorithm 24
 probability 25
 density (mass) function 25
 marginal 26
 probe, computer packet
 bicast 319
 flexicast 319
 multicast 226
 sandwich 236, 319
 unicast 319
 probit model 256

Q

q -value 35, 212

R

random graph model *see* network graph
 model
 random variable 25
 reachable 17
 recall 222
 receiver operating characteristic (ROC) curve
 206
 reducible *see* irreducible, graph
 regular *see* graph
 Representer theorem 259
 reproducing kernel Hilbert space 259
 rewiring 161, 169

S

sampling
 network 131–137
 probability proportional to size 128
 unequal probability 127
 with replacement 126
 without replacement 128
 sampling distribution 34
 shortest-path distance *see* distance, between
 vertices, geodesic

simple *see* graph
 simulation
 acceptance-rejection 30
 importance sampling 30
 inverse transform 29, 120
 Markov chain Monte Carlo *see* Markov
 chain Monte Carlo
 Metropolis-Hastings 30, 240
 singular value decomposition 323
 size 16
 small-world model *see* network graph
 model, small world
 snowball sampling 134–135, 145, 162
 species problem 130, 148–149
 under traceroute sampling 147
 spectral
 bisection *see* bisection
 partitioning *see* partitioning, graph
 standard error 34
 star sampling 133–134
 subgraph 16
 induced 16
 sum-product algorithm 343
 susceptible-infected-removed (SIR) model
 272

T

tomography 223
 network 224, 298, 311
 active versus passive 317
 tomography method 311
 traceroute sampling 70, 136–137, 147
 trail 17
 transitive triple 96
 transitivity *see* clustering coefficient
 tree 18
 ancestor 19
 children 19
 descendant 19
 directed 18
 leaf 19
 parent 19
 root 19
 triad 79
 census 167
 triadic closure 119
 triangle 96

V

validation 50, 66, 76–77, 197–198, 242
 variance 26
 variational method 343

vertex 16

visualization, graph *see* drawing, graph

W

Wald statistic 34

walk 17

directed 17

Watts-Strogatz model 169–171, 277

weighted network 194

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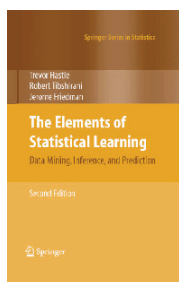
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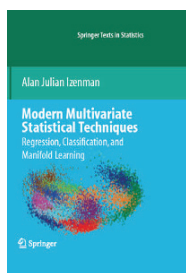
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This book should be a valuable resource for statisticians and anyone interested in data mining in science or industry. The book's coverage is broad, from supervised learning (prediction) to unsupervised learning. The many topics include neural networks, support vector machines, classification trees and boosting—the first comprehensive treatment of this topic in any book. This major new edition features many topics not covered in the original, including graphical models, random forests, ensemble methods, least angle regression & path algorithms for the lasso, non-negative matrix factorization, and spectral clustering.

2009. 768 pp. (Springer Series in Statistics) Hardcover

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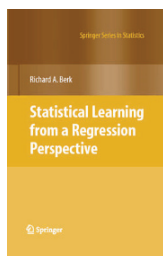
Modern Multivariate Statistical Techniques Regression, Classification, and Manifold Learning

Alan Julian Izenman

This book is appropriate for advanced undergraduate and graduate students, researchers in statistics, computer science, artificial intelligence, psychology, cognitive sciences, business, medicine, bioinformatics, and engineering. Familiarity with multivariable calculus, linear algebra, and probability and statistics is required. The book presents a carefully-integrated mixture of theory and applications, and of classical and modern multivariate statistical techniques, including Bayesian methods. There are over 60 interesting data sets used as examples in the book, over 200 exercises, and many color illustrations and photographs.

2008. XXVI, 734 pp. (Springer Texts in Statistics) Hardcover

ISBN 978-0-387-78188-4



Statistical Learning from a Regression Perspective

Richard A. Berk

This book considers statistical learning applications when interest centers on the conditional distribution of the response variable, given a set of predictors, and when it is important to characterize how the predictors are related to the response. Among the statistical learning procedures examined are bagging, random forests, boosting, and support vector machines. Intuitive explanations and visual representations are prominent. All of the analyses included are done in R.

2008. 360 pp. (Springer Series in Statistics) Hardcover

ISBN 978-0-387-77500-5