References

[1] Cdc flu vaccine effectiveness http://www.cdc.gov/flu/professionals/vaccination/effectivenessqa.h 13, 96

[2] Consumers dont relate bot infections to risky behavior as millions continue to click on spam http://www.maawg.org/consumers-donavior-millions-continue-click-spam. 14

[3] Enron email network http://snap.stanford.edu/data/email-enron.html. 94

[4] Gnutella peer-to-peer network http://snap.stanford.edu/data/p2p-gnutella04.html. 94

[5] I. Abraham and D. Dolev. Asynchronous resource discovery. *Computer Networks*, 50:1616–1629, July 2006. 3, 6

[6] M. Adler, E. Halperin, R. M. Karp, and V. V. Vazirani. A stochastic process on the hypercube with applications to peer-to-peer networks. In *STOC*, pages 575–584, 2003. 7

[7] Y. Afek, B. Awerbuch, and E. Gafni. Applying static network protocols to dynamic networks. In *FOCS*, pages 358–370, 1987. 39

[8] Y. Afek, E. Gafni, and A. Rosen. The slide mechanism with applications in dynamic networks. In *ACM PODC*, pages 35–46, 1992. 40

[9] A. Agarwal and M. Charikar. On the advantage of network coding for improving network throughput. In *Information Theory Workshop*, 2004. 41

[10] R. Ahlswede, N. Cai, S. Li, and R. Yeung. Network information flow. *Transactions on Information Theory*, 46(4):1204–1216, 2000. 40

REFERENCES

[11] N. Alon. Problems and results in extremal combinatorics – ii. *DISCRETE MATH-EMATICS*, 2003. 7

[12] N. Alon, A. Bar-Noy, N. Linial, and D. Peleg. A lower bound for radio broadcast. *Journal of Computer and System Sciences*, 43:290–298, 1991. 39

[13] K. Andersson, D. Owens, E. Vardas, G. Gray, J. McIntyre, and A. Paltiel. Predicting the impact of a partially effective HIV vaccine and subsequent risk behavior change on the heterosexual HIV epidemic in low- and middle-income countries: A South African example. *J Acquir Immune Defic Syndr.*, 46(1):78–90, 2007. 13

[14] S. Arora, S. Rao, and U. Vazirani. Expander flows, geometric embeddings and graph partitioning. In *Proceedings of ACM STOC*, pages 222–231, 2004. 58

[15] J. Aspnes, K. L. Chang, and A. Yampolskiy. Inoculation strategies for victims of viruses and the sum-of-squares partition problem. *J. Comput. Syst. Sci.*, 72(6):1077–1093, 2006. 10, 11, 12, 57, 58, 60, 61, 64, 65, 70

[16] J. Aspnes, N. Rustagi, and J. Saia. Worm versus alert: Who wins in a battle for control of a large-scale network? In *Principles of Distributed Systems: 11th International Conference, OPODIS 2007*, volume 4878 of *Lecture Notes in Computer Science*, pages 443–456. Springer, Dec 2007. 10, 58

[17] H. Attiya and J. Welch. *Distributed Computing: Fundamentals, Simulations and Advanced Topics (2nd edition)*. John Wiley Interscience, March 2004. 39

[18] J. Augustine, G. Pandurangan, P. Robinson, and E. Upfal. Towards robust and efficient computation in dynamic peer-to-peer networks. In *ACM-SIAM SODA*, 2012. 40

[19] C. Avin, M. Borokhovich, K. Censor-Hillel, and Z. Lotker. Order optimal information spreading using algebraic gossip. In *ACM PODC*, pages 363–372, 2011. 40

[20] C. Avin, M. Koucký, and Z. Lotker. How to explore a fast-changing world (cover time of a simple random walk on evolving graphs). In *ICALP*, pages 121–132, 2008. 41

[21] B. Awerbuch, P. Berenbrink, A. Brinkmann, and C. Scheideler. Simple routing strategies for adversarial systems. In *IEEE FOCS*, pages 158–167, 2001. 40

[22] B. Awerbuch and T. Leighton. Improved approximation algorithms for the multicommodity flow problem and local competitive routing in dynamic networks. In *ACM STOC*, pages 487–496, May 1994. 40

[23] B. Awerbuch, B. Patt-Shamir, D. Peleg, and M. Saks. Adapting to asynchronous dynamic networks. In *STOC*, pages 557–570, 1992. 40

[24] Baruch Awerbuch, Andr Brinkmann, and Christian Scheideler. Anycasting in adversarial systems: Routing and admission control. In *ICALP*, pages 1153–1168, 2003. 40

[25] A. Bar-Noy, S. Guha, J. Naor, and B. Schieber. Message multicasting in heterogeneous networks. *SIAM J. Comput.*, pages 347–358, 2000. 39

[26] R. Bar-Yehuda, O. Goldreich, and A. Itai. On the time-complexity of broadcast in radio networks: an exponential gap between determinism and randomization. In *ACM PODC*, pages 98–108, 1987. 39

[27] A. L. Barabási and R. Albert. Emergence of scaling in random networks. In *Science*, volume 286, 1999. 75

[28] A.L. Barabási and R. Albert. Emergence of scaling in random networks. *Science*, 1999. 84, 94

[29] C. Barrett, D. Beckman, M. Khan, V.S. Anil Kumar, M. Marathe, P. Stretz, T. Dutta, and B. Lewis. Generation and analysis of large synthetic social contact networks. In *Winter Simulation Conference*. 94

[30] M. Barthelemy, A. Barrat, R. Pastor-Satorras, and A.Vespignani. Dynamical patterns of epidemic outbreaks in complex heterogeneous networks. *Journal of Theoretical Biology*, pages 275–288, 2005. 59

[31] C. Bauch. Imitation dynamics predict vaccinating behaviour. In *Proceeding of The Royal Society*, 2005. 59

REFERENCES

[32] C. Bauch and D. Earn. Vaccination and the theory of games. *PNAS*, 101:13391–13394, September 2004. 59

[33] C. Bauch, A. Galvani, and D. Earn. Group interest versus self-interest in smallpox vaccination policy. *PNAS*, 2003. 59

[34] P. Berenbrink, J. Czyzowicz, R. Elsässer, and L. Gasieniec. Efficient information exchange in the random phone-call model. In *ICALP*, pages 127–138, 2010. 41

[35] N. Berger, C. Borgs, J. T. Chayes, and A. Saberi. On the spread of viruses on the internet. In *Proceedings of SODA*, 2005. 10, 58, 93

[36] D. Bezemer, F. Wolf, M.C. Boerlijst, A. Sighem, T.D. Hollingsworth, M. Prins, R.B. Geskus, L. Gras, R. Goutinho, and C. Fraser. A resurgent HIV-1 epidemic among men who have sex with men in the era of potent antiretroviral therapy. *AIDS*, 2008. 13

[37] S.M. Blower and A.R. McLean. Prophylactic vaccination, risk behavior change, and the probability of eradicating HIV in San Francisco. *Science*, 1994. 13, 16

[38] B. Bollobás. *Percolation Theory*. Cambridge University Press, 2006. 89

[39] B. Bollobás, S. Janson, and O. Riordan. The phase transition in inhomogeneous random graphs. *Random Structures Algorithms*, 2007. 88

[40] S. Bornholdt and H. Schuster (Editors). *Handbook of Graphs and Networks*. Wiley-VCH, 2003. 2

[41] O. V. Borodin, A. V. Kostochka, and B. Toft. Variable degeneracy: Extensions of Brooks' and Gallai's theorems. *Discrete Mathematics*, 214(1-3):101–112, 2000. 61

[42] M. Borokhovich, C. Avin, and Z. Lotker. Tight bounds for algebraic gossip on graphs. In *IEEE ISIT*, 2010. 40

[43] S. Boyd, A. Ghosh, B. Prabhakar, and D. Shah. Randomized gossip algorithms. *IEEE Trans. on Infor. Theory*, 52(6):2508–2530, 2006. 3, 41

[44] N. Brewer, C. Cuite, J. Herrington, and N. Weinstein. Risk compensation and vaccination: can getting vaccinated cause people to engage in risky behaviors? *Ann. Behav. Med.*, 34(1):95–9, 2007. 13

[45] S. Chakrabarti, A. Frieze, and J. Vera. The influence of search engines on preferential attachment. In *SODA*, 2005. 3

[46] M. Charikar, C. Chekuri, T. Cheung, Z. Dai, A. Goel, and S. Guha. Approximation algorithms for directed steiner problems. *Journal of Algorithms*, 1998. 41

[47] J. Chen and G. Pandurangan. Optimal gossip-based aggregate computation. In *SPAA*, pages 124–133, 2010. 3, 41

[48] J. Cheriyan and M. Salavatipour. Hardness and approximation results for packing steiner trees. *Algorithmica*, 2006. 41, 53, 54, 55

[49] G. Chowell, H. Nishiura, and L. Bettencourt. Comparative estimation of the reproduction number for pandemic influenza from daily case notification data. *The Royal Society*, 2006. 96

[50] Andrea E. F. Clementi, Angelo Monti, and Riccardo Silvestri. Distributed multi-broadcast in unknown radio networks. In *PODC*, pages 255–264, 2001. 39

[51] C. Cooper and A. Frieze. Crawling on web graphs. In *STOC*, 2002. 3

[52] R. Crosby and D. Holtgrave. Will sexual risk behaviour increase after being vaccinated for AIDS? *Int J STD AIDS*, 17(3):180–4, 2006. 13

[53] S. Deb, M. Médard, and C. Choute. Algebraic gossip: a network coding approach to optimal multiple rumor mongering. *IEEE/ACM Trans. Netw.*, 14:2486–2507, June 2006. 40

[54] A. Demers, D. Greene, C. Hauser, W. Irish, J. Larson, S. Shenker, H. Sturgis, D. Swinehart, and D. Terry. Epidemic algorithms for replicated database maintenance. In *PODC*, pages 1–12, 1987. 3, 41

[55] Z. Dezso and A.L. Barabási. Halting viruses in scale-free networks. *Physical Review E*, 2002. 14, 93

REFERENCES

[56] N. B. Dimitrov and C. Greg Plaxton. Optimal cover time for a graph-based coupon collector process. In *ICALP*, pages 702–716, 2005. 7

[57] S. Dolev. *Self-stabilization*. MIT Press, Cambridge, MA, USA, 2000. 39

[58] H. Ebel, L. Mielsch, and S. Bornholdt. Scale-free topology of e-mail networks. *Phys. Rev. E*, 66, 2002. 75

[59] S. Eidenbenz, A. Kumar, and S. Zust. Equilibria in topology control games for ad hoc networks. *MONET*, 11(2):143–159, 2006. 58

[60] P. Erdös and A. Rényi. On the evolution of random graphs. *Publ. Math.*, 1960. 90, 91, 94

[61] Q.A. Karim et al. Effectiveness and safety of tenofovir gel, an antiretroviral microbicide, for the prevention of HIV infection in women. *Science*, 329 (5996):1168–1174, 2010. 13, 96, 105

[62] M. Faloutsos, P. Faloutsos, and C. Faloutsos. On power-law relationships of the internet topology. In *Proceedings of SIGCOMM*, pages 251–262, 1999. 75

[63] U. Feige. Vertex cover is hardest to approximate on regular graphs. Technical Report MCS03-15, The Weizmann Institute of Science, 2003. 70

[64] A. Forster, J. Wardle, J. Stephenson, and J. Waller. Passport to promiscuity or lifesaver: press coverage of hpv vaccination and risky sexual behavior. *J. Health Commun.*, 15(2):205–17, 2010. 13

[65] C. Fraser, C. Donnelly, S. Cauchemez, and et al. Pandemic potential of a strain of influenza a (h1n1): Early findings. *Science*, 2009. 96

[66] E. Gafni and B. Bertsekas. Distributed algorithms for generating loop-free routes in networks with frequently changing topology. *IEEE Trans. Comm.*, 29(1), 1981. 39

[67] A. Ganesh, L. Massoulie, and D. Towsley. The effect of network topology on the spread of epidemics. In *Proceeding of INFOCOM 2005*, 2005. 10, 14, 58

[68] N. Garg, V. Vazirani, and M Yannakakis. Approximate max-flow min-(multi)cut theorems and their applications. *SIAM Journal on Computing*, 25:698–707, 1993. 75

[69] N.C. Grassly and C. Fraser. Mathematical models of infectious disease transmission. *Nature*, 2008. 14

[70] R. Gray, X. Li, M. Wawer, S. Gange, D. Serwadda, N. Sewankambo, R. Moore, F. Wabwire-Mangen, T. Lutalo, and T. Quinn. Stochastic simulation of the impact of antiretroviral therapy and HIV vaccines on HIV transmission; Rakai, Uganda. *AIDS*, 17(13):1941–51, 2003. 13, 96

[71] J. Grossklags, N. Christin, and J. Chuang. Secure or insure? a game-theoretic analysis of information security games. In *World Wide Web Conference (WWW)*, 2008. 10, 58

[72] B. Haeupler. Analyzing network coding gossip made easy. In *ACM STOC*, pages 293–302, 2011. 9, 40

[73] B. Haeupler and D. Karger. Faster information dissemination in dynamic networks via network coding. In *ACM PODC*, pages 381–390, 2011. 9, 40, 55

[74] M. Halloran, I. Longini, M. Haber, C. Struchiner, and R. Brunet. Exposure efficacy and change in contact rates in evaluating prophylactic HIV vaccines in the field. *Stat Med.*, 13(4):357–77, 1994. 13

[75] M. Harchol-balter, T. Leighton, and D. Lewin. Resource discovery in distributed networks. In *Symposium on Principles of Distributed Computing*, pages 229–237, 1999. 3, 6

[76] M. Jackson and L. Yariv. Diffusion, strategic interaction, and social structure. In *The Handbook of Social Economics*, 2010. 14

[77] L. Jia, R. Rajaraman, and C. Scheideler. On local algorithms for topology control and routing in ad hoc networks. In *ACM SPAA*, pages 220–229, June 2003. 40

[78] R. Kannan, S. Vempala, and A. Vetta. On clusterings: Good, bad and spectral. *J. ACM*, 51(3):497–515, 2004. 81

REFERENCES

[79] E.H. Kaplan, D.L. Craft, and L.M. Wein. Emergency response to a smallpox attack: The case for mass vaccination. *PNAS*, 2002. 14

[80] R. Karp, C. Schindelhauer, S. Shenker, and B. Vöcking. Randomized rumor spreading. In *FOCS*, pages 565–574, 2000. 3, 41

[81] M. Kearns and L. Ortiz. Algorithms for interdependent security games. In *Advances in Neural Information Processing Systems, MIT Press*, 2004. 11, 59

[82] D. Kempe, A. Dobra, and J. Gehrke. Gossip-based computation of aggregate information. In *FOCS*, pages 482–491, 2003. 3, 41

[83] D. Kempe and J. Kleinberg. Protocols and impossibility results for gossip-based communication mechanisms. In *Proceedings of FOCS*, 2002. 3

[84] D. Kempe, J. Kleinberg, and A. Demers. Spatial gossip and resource location protocols. In *STOC*, 2001. 3

[85] D. A. Kessler. Epidemic size in the SIS model of endemic infections. *J. Appl. Probab.*, 43:757–778, 2008. 59

[86] S. Klein. Parasite manipulation of the proximate mechanisms that mediate social behavior in vertebrates. *Physiol Behav.*, 79:441–9, 2003. 13

[87] B. Klimt and Y. Yang. Introducing the enron corpus. *CEAS*, 2004. 94

[88] E. Koutsoupias and C. H. Papadimitriou. Worst-case equilibria. In *Proceedings of STACS*, 1999. 61

[89] F. Kuhn, N. Lynch, and R. Oshman. Distributed computation in dynamic networks. In *ACM STOC*, pages 513–522, 2010. 8, 9, 37, 38, 40, 41

[90] F. Kuhn and R. Oshman. Dynamic networks: Models and algorithms. *SIGACT News*, 42(1):82–96, 2011. 40

[91] S. Kutten, D. Peleg, and U. Vishkin. Deterministic resource discovery in distributed networks. In *SPAA*, 2001. 6

[92] C. Law and K. Siu. An $o(\log n)$ randomized resource discovery algorithm. In *14th International Symposium on Distributed Computing (Brief Announcement), Technical Report, Technical University of Madrid*, pages 5–8, 2000. 3, 6

[93] T. Leighton. *Introduction to Parallel Algorithms and Architectures: Arrays, Trees, and Hypercubes*. Morgan-Kaufmann, San Mateo, CA, 1991. 39

[94] M. Lelarge and J. Bolot. Economic incentives to increase security in the internet: The case for insurance. In *IEEE Infocom*, 2009. 10, 58

[95] A. L. Lloyd and R. M. May. Epidemiology. how viruses spread among computers and people. *Science*, page 1316, 2001. 14

[96] N. Lynch. *Distributed Algorithms*. Morgan Kaufmann, San Francisco, CA, 1996. 39

[97] C.F. Manski. Vaccination with partial knowledge of external effectiveness. *PNAS*, 2010. 14

[98] A.R. McLean and S.M. Blower. Imperfect vaccines and herd immunity to HIV. *Proceedings of the Royal Society of London*, 1993. 13, 14, 16

[99] J. Medlock and A.P. Galvani. Optimizing influenza vaccine distribution. *Science*, 2009. 14

[100] S. Mei, R. Quax, D. van de Vijver, Y. Zhu, and P. Sloot. Increasing risk behaviour can outweigh the benefits of antiretroviral drug treatment on the HIV incidence among men-having-sex-with-men in Amsterdam. *BMC Infectious Diseases 2011*, 11:118, 2011. 13

[101] L.A. Meyers. Contact network epidemiology: Bond percolation applied to infectious disease prediction and control. *American Mathematical Society*, 2006. 14

[102] L.A. Meyers, B. Pourbohloul, M.E.J. Newman, D.M. Skowronski, and R.C. Brunham. Network theory and SARS: Predicting outbreak diversity. *Theoretical Biology*, 2005. 14

REFERENCES

[103] J. A. Mirrlees. The theory of moral hazard and unobservable behaviour: Part i. *Review of Economic Studies*, 66:321, 1999. 13

[104] M. Mitzenmacher and E. Upfal. *Probability and Computing: Randomized Algorithms and Probabilistic Analysis*. Cambridge University Press, 2004. 19

[105] J. Moore. *Parasites and the behavior of animals*. Oxford University Press, New York, 2002. 13

[106] D. Mosk-Aoyama and D. Shah. Computing separable functions via gossip. In *PODC*, pages 113–122, 2006. 3, 40, 41

[107] A. Nahir and A. Orda. Topology design and control: A game-theoretic perspective. In *IEEE INFOCOM*, 2009. 58

[108] M. Newman. The structure and function of complex networks. *SIAM Review*, 45, 2003. 14, 85

[109] M. J. Newman, A. Barabasi, and D. J. Watts. *Structure and Dynamics of Networks*. Princeton University Press, 2006. 2

[110] M.E. Newman. Spread of epidemic disease on networks. *Phys. Rev. E*, 2002. 14

[111] N. Nisan, T. Roughgarden, E. Tardos, and V. Vazirani. *Algorithmic Game Theory*. Cambridge University Press, 2008. 58, 81

[112] J. Omic, A. Orda, and P. Mieghem. Protecting against network infections: A game theoretic perspective. In *IEEE Infocom*, 2009. 58, 59

[113] R. Pastor-Satorras and A. Vespignani. Epidemic spreading in scale-free networks. *Phys. Rev. Lett.*, 2000. 14

[114] J. Petrie, S. Ohmit, E. Johnson, R. Cross, and A. Monto. Efficacy studies of influenza vaccines: Effect of end points used and characteristics of vaccine failures. *Journal of Infectious Diseases*, 2011. 13

[115] C. Reiber, E. Shattuck, S. Fiore, P. Alperin, V. Davis, and J. Moore. Change in human social behavior in response to a common vaccine. *Ann. Epidemiol.*, 20(10):729–33, 2010. 13

[116] M. Ripeanu, I. Foster, and A. Iamnitchi. Mapping the gnutella network: Properties of large-scale peer-to-peer systems and implications for system design. *IEEE Internet Computing Journal*, 2002. 94

[117] T. Roughgarden and E. Tardos. How bad is selfish routing? *J. ACM*, page 236259, 2002. 58

[118] P. Sanders, S. Egner, and L. Tolhuizen. Polynomial time algorithms for network information flow. In *ACM SPAA*, pages 286–294, 2003. 41

[119] R. Smith and S. Blower. Could disease-modifying HIV vaccines cause population-level perversity? *Lancet Infect Dis.*, 4(10):636–9, 2004. 13

[120] B. Söderberg. A general formalism for inhomogeneous random graphs. *Phys. Rev. E*, 2002. 88, 90, 92

[121] A. Straten, C. Gómez, J. Saul, J. Quan, and N. Padian. Sexual risk behaviors among heterosexual HIV serodiscordant couples in the era of post-exposure prevention and viral suppressive therapy. *AIDS*, 14(4):F47–54, 2000. 13

[122] D. Topkis. Concurrent broadcast for information dissemination. *IEEE Trans. Softw. Eng.*, 11:1107–1112, October 1985. 39

[123] F. Vega-Redondo. *Complex Social Networks*. Cambridge University Press, 2007. 2

[124] J.X. Velasco-Hernandez, H.B. Gershengorn, and S.M. Blower. Could widespread use of combination antiretroviral therapy eradicate HIV epidemics? *Infectious Diseases*, 2002. 13

[125] E. Vynnycky, A. Trindall, and P. Mangtani. Estimates of the reproduction numbers of spanish influenza using morbidity data. *International Journal of Epidemiology*, 2007. 96

[126] Y. Wang, D. Chakrabarti, C. Wang, and C. Faloutsos. Epidemic spreading in real networks: An eigenvalue viewpoint. In *In SRDS*, pages 25–34, 2003. 10, 58

[127] Y. Wang, G. Xiao, J. Hu, T.H. Cheng, and L. Wang. Imperfect targeted immunization in scale-free networks. *Physica A*, 2009. 14, 93

REFERENCES

[128] D.P. Wilson, P.M. Coplan, M.A. Wainberg, and S.M. Blower. The paradoxical effects of using antiretroviral-based microbicides to control HIV epidemics. *PNAS*, 2008. 13

[129] Y. Yang, J.D. Sugimoto, M.E. Halloran, N.E. Basta, D.L. Chao, L. Matrajt, G. Potter, E. Kenah, and I.M. Longini. The transmissibility and control of pandemic influenza A (H1N1) virus. *Science*, 2009. 14

[130] L. Zosin and S. Khuller. On directed Steiner trees. In *Proceedings of the 13th Annual ACM-SIAM Symposium on Discrete Algorithms*, January 2002. 41