

Appendix A

List of Publications

A.1 Journal Papers

- **A. K. Singh** and L. Kailasam, "Link Prediction-Based Influence Maximization in Online Social Networks" in **Neurocomputing**, 453, 2021, 151-163. (Published) (**SCI, IF: 5.719**) (<https://doi.org/10.1016/j.neucom.2021.04.084>)
- **A. K. Singh** and L. Kailasam, "PILHNB: Popularity, Interests, Location used Hidden Naive Bayesian-based model for Link Prediction in Dynamic Social Networks" in **Neurocomputing**, 2021, Elsevier. (<https://doi.org/10.1016/j.neucom.2021.02.101>) (Published) (**SCI, IF: 5.719**)
- **A. K. Singh**, L. Kailasam, Tribikram Pradhan and Deepti Gupta, "Multifeature Analysis Based Influential Nodes Tracking in Dynamic Social Networks" in **Neurocomputing**, 2021, Elsevier. (Revision Submitted) (**SCI, IF: 5.719**)

A.2 Conference Papers

- **A. K. Singh**, L. Kailasam, Tribikram Pradhan and Deepti Gupta, "Context-aware Influential Nodes Tracking in Dynamic Social Networks" in 25th Pacific Asia Conference on Information Systems (PACIS-2021), Dubai, July 2021. (Published) (<https://aisel.aisnet.org/pacis2021/177>)

Appendix B

Sample Datasets

TABLE B.1: Example of check-in information in Gowalla dataset.

[user]	[check-in time]	[latitude]	[longitude]	[location id]
196514	2010-07-24T13:45:06Z	53.3648119	-2.2723465833	145064
196514	2010-07-24T13:44:58Z	53.360511233	-2.276369017	1275991
196514	2010-07-24T13:44:46Z	53.3653895945	-2.2754087046	376497
196514	2010-07-24T13:44:38Z	53.3663709833	-2.2700764333	98503
196514	2010-07-24T13:44:26Z	53.3674087524	-2.2783813477	1043431
196514	2010-07-24T13:44:08Z	53.3675663377	-2.278631763	881734
196514	2010-07-24T13:43:18Z	53.3679640626	-2.2792943689	207763
196514	2010-07-24T13:41:10Z	53.364905	-2.270824	1042822

TABLE B.2: Example of check-in information in Brightkite dataset.

[user]	[check-in time]	[latitude]	[longitude]	[location id]
58186	2008-12-03T21:09:14Z	39.633321	-105.317215	ee8b88dea22411
58186	2008-11-30T22:30:12Z	39.633321	-105.317215	ee8b88dea22411
58186	2008-11-28T17:55:04Z	-13.158333	-72.531389	e6e86be2a22411
58186	2008-11-26T17:08:25Z	39.633321	-105.317215	ee8b88dea22411
58187	2008-08-14T21:23:55Z	41.257924	-95.938081	4c2af967eb5df8
58187	2008-08-14T07:09:38Z	41.257924	-95.938081	4c2af967eb5df8
58187	2008-08-14T07:08:59Z	41.295474	-95.999814	f3bb9560a2532e
58187	2008-08-14T06:54:21Z	41.295474	-95.999814	f3bb9560a2532e
58188	2010-04-06T06:45:19Z	46.521389	14.854444	ddaa40aaa22411
58188	2008-12-30T15:30:08Z	46.522621	14.849618	58e12bc0d67e11
58189	2009-04-08T07:36:46Z	46.554722	15.646667	ddaf9c4ea22411
58190	2009-04-08T07:01:28Z	46.421389	15.869722	dd793f96a22411

Bibliography

- [1] D. B. West, et al., Introduction to graph theory, volume 2, Prentice hall Upper Saddle River, 2001.
- [2] E. T. Jaynes, Information theory and statistical mechanics, Physical review 106 (1957) 620.
- [3] D. J. Hand, N. M. Adams, Data mining, Wiley StatsRef: Statistics Reference Online (2014) 1–7.
- [4] R. Spence, Information visualization, volume 1, Springer, 2001.
- [5] S. J. Cranmer, B. A. Desmarais, Inferential network analysis with exponential random graph models, Political analysis 19 (2011) 66–86.
- [6] G. P. Murdock, Social structure. (1949).
- [7] T. G. Lewis, Network science: Theory and applications, John Wiley & Sons, 2011.
- [8] M. E. Newman, The structure and function of complex networks, SIAM review 45 (2003) 167–256.
- [9] M. E. Newman, Networks: an introduction, Oxford university press, 2010.
- [10] B. A. Huberman, The laws of the Web: Patterns in the ecology of information, mit Press, 2001.
- [11] A. Iamnitchi, M. Ripeanu, I. Foster, Locating data in (small-world?) peer-to-peer scientific collaborations, International Workshop on Peer-to-Peer Systems (2002) 232–241.

- [12] L. Egghe, R. Rousseau, *Introduction to informetrics: Quantitative methods in library, documentation and information science*, Elsevier Science Publishers, 1990.
- [13] J. Stelling, S. Klamt, K. Bettenbrock, S. Schuster, E. D. Gilles, Metabolic network structure determines key aspects of functionality and regulation, *Nature* 420 (2002) 190–193.
- [14] T. Ito, T. Chiba, R. Ozawa, M. Yoshida, M. Hattori, Y. Sakaki, A comprehensive two-hybrid analysis to explore the yeast protein interactome, *Proceedings of the National Academy of Sciences* 98 (2001) 4569–4574.
- [15] N. Guelzim, S. Bottani, P. Bourgine, F. Képès, Topological and causal structure of the yeast transcriptional regulatory network, *Nature genetics* 31 (2002) 60–63.
- [16] D. J. Watts, S. H. Strogatz, Collective dynamics of ‘small-world’ networks, *nature* 393 (1998) 440–442.
- [17] L. A. N. Amaral, A. Scala, M. Barthelemy, H. E. Stanley, Classes of small-world networks, *Proceedings of the national academy of sciences* 97 (2000) 11149–11152.
- [18] V. Kalapala, V. Sanwalani, C. Moore, The structure of the united states road network, Preprint, University of New Mexico (2003).
- [19] M. Faloutsos, P. Faloutsos, C. Faloutsos, On power-law relationships of the internet topology, *ACM SIGCOMM computer communication review* 29 (1999) 251–262.
- [20] M. Newman, *Networks*, Oxford university press, 2018.
- [21] F. Karinthy, M. Newman, A.-L. Barabási, D. J. Watts, *Chain-links*, Princeton University Press, 2011, pp. 21–26.
- [22] A.-L. Barabási, E. Bonabeau, Scale-free networks, *Scientific american* 288 (2003) 60–69.
- [23] A. Clauset, C. R. Shalizi, M. E. Newman, Power-law distributions in empirical data, *SIAM review* 51 (2009) 661–703.
- [24] M. McPherson, L. Smith-Lovin, J. M. Cook, Birds of a feather: Homophily in social networks, *Annual review of sociology* 27 (2001) 415–444.

- [25] J. Scott, Social network analysis, *Sociology* 22 (1988) 109–127.
- [26] L. C. Freeman, Centrality in social networks conceptual clarification, *Social networks* 1 (1978) 215–239.
- [27] D. Liben-Nowell, J. Kleinberg, The link-prediction problem for social networks, *Journal of the American society for information science and technology* 58 (2007) 1019–1031.
- [28] D. Camacho, A. Panizo-LLedot, G. Bello-Orgaz, A. Gonzalez-Pardo, E. Cambria, The four dimensions of social network analysis: An overview of research methods, applications, and software tools, *Information Fusion* (2020) 1–58.
- [29] S. Ji, S. Pan, E. Cambria, P. Marttinen, P. S. Yu, A survey on knowledge graphs: Representation, acquisition and applications, arXiv preprint arXiv:2002.00388 (2020).
- [30] N. N. Daud, S. H. Ab Hamid, M. Saadoon, F. Sahran, N. B. Anuar, Applications of link prediction in social networks: A review, *Journal of Network and Computer Applications* 166 (2020) 102716.
- [31] L. A. Adamic, E. Adar, Friends and neighbours on the web, *Social networks* 25 (2003) 211–230.
- [32] L. Lü, T. Zhou, Link prediction in complex networks: A survey, *Physica A: statistical mechanics and its applications* 390 (2011) 1150–1170.
- [33] T. Pradhan, S. Pal, Cnaver: A content and network-based academic venue recommender system, *Knowledge-Based Systems* 189 (2020) 105092.
- [34] T. Pradhan, S. Pal, A hybrid personalized scholarly venue recommender system integrating social network analysis and contextual similarity, *Future Generation Computer Systems* 110 (2020) 1139–1166.
- [35] J. Gao, Y. Xiao, J. Liu, W. Liang, C. P. Chen, A survey of communication/networking in smart grids, *Future generation computer systems* 28 (2012) 391–404.

- [36] I. A. Kovács, K. Luck, K. Spirohn, Y. Wang, C. Pollis, S. Schlabach, W. Bian, D.-K. Kim, N. Kishore, T. Hao, et al., Network-based prediction of protein interactions, *Nature communications* 10 (2019) 1–8.
- [37] G. Crichton, Y. Guo, S. Pyysalo, A. Korhonen, Neural networks for link prediction in realistic biomedical graphs: a multi-dimensional evaluation of graph embedding-based approaches, *BMC bioinformatics* 19 (2018) 176–186.
- [38] M. Nickel, K. Murphy, V. Tresp, E. Gabrilovich, A review of relational machine learning for knowledge graphs, *Proceedings of the IEEE* 104 (2015) 11–33.
- [39] A.-L. Barabási, R. Albert, Emergence of scaling in random networks, *science* 286 (1999) 509–512.
- [40] L. Katz, A new status index derived from sociometric analysis, *Psychometrika* 18 (1953) 39–43.
- [41] S. Brin, L. Page, Reprint of: The anatomy of a large-scale hypertextual web search engine, *Computer networks* 56 (2012) 3825–3833.
- [42] Z. Yin, M. Gupta, T. Weninger, J. Han, A unified framework for link recommendation using random walks, *Proceedings of the International Conference on Advances in Social Networks Analysis and Mining* (2010) 152–159.
- [43] S. Haghani, M. R. Keyvanpour, A systemic analysis of link prediction in social network, *Artificial Intelligence Review* 52 (2019) 1961–1995.
- [44] P. Wang, B. Xu, Y. Wu, X. Zhou, Link prediction in social networks: the state-of-the-art, *Science China Information Sciences* 58 (2015) 1–38.
- [45] R. Salakhutdinov, A. Mnih, Bayesian probabilistic matrix factorization using markov chain monte carlo, *Proceedings of the 25th international conference on Machine learning* (2008) 880–887.
- [46] Y. Koren, R. Bell, C. Volinsky, Matrix factorization techniques for recommender systems, *Computer* (2009) 30–37.

- [47] P. Goyal, S. R. Chhetri, A. Canedo, dyngraph2vec: Capturing network dynamics using dynamic graph representation learning, *Knowledge-Based Systems* 187 (2020) 104816.
- [48] S. Cavallari, E. Cambria, H. Cai, K. C.-C. Chang, V. W. Zheng, Embedding both finite and infinite communities on graphs [application notes], *IEEE Computational Intelligence Magazine* 14 (2019) 39–50.
- [49] M. Zhang, Y. Chen, Link prediction based on graph neural networks, *Advances in Neural Information Processing Systems* (2018) 5165–5175.
- [50] E. M. Airoldi, D. M. Blei, S. E. Fienberg, E. P. Xing, Mixed membership stochastic blockmodels, *Journal of machine learning research* 9 (2008) 1981–2014.
- [51] T. La Fond, J. Neville, Randomization tests for distinguishing social influence and homophily effects, *Proceedings of the 19th international conference on World wide web* (2010) 601–610.
- [52] J. Li, H. Dani, X. Hu, H. Liu, Radar: Residual analysis for anomaly detection in attributed networks., *IJCAI* (2017) 2152–2158.
- [53] J. Li, L. Wu, O. R. Zaïane, H. Liu, Toward personalized relational learning, *Proceedings of the SIAM International Conference on Data Mining* (2017) 444–452.
- [54] J. Li, K. Cheng, L. Wu, H. Liu, Streaming link prediction on dynamic attributed networks, *Proceedings of the Eleventh ACM International Conference on Web Search and Data Mining* (2018) 369–377.
- [55] J. Li, H. Dani, X. Hu, J. Tang, Y. Chang, H. Liu, Attributed network embedding for learning in a dynamic environment, *Proceedings of the ACM Conference on Information and Knowledge Management* (2017) 387–396.
- [56] J. Li, X. Hu, L. Jian, H. Liu, Toward time-evolving feature selection on dynamic networks, *IEEE 16th International Conference on Data Mining (ICDM)* (2016) 1003–1008.
- [57] S. Aral, D. Walker, Identifying influential and susceptible members of social networks, *Science* 337 (2012) 337–341.

- [58] S. Aral, P. S. Dhillon, Social influence maximization under empirical influence models, *Nature human behaviour* 2 (2018) 375–382.
- [59] D. Kempe, J. Kleinberg, É. Tardos, Maximizing the spread of influence through a social network, *Proceedings of the ninth ACM SIGKDD international conference on Knowledge discovery and data mining* (2003) 137–146.
- [60] J. Leskovec, Social media analytics: tracking, modelling and predicting the flow of information through networks, *Proceedings of the 20th international conference companion on World wide web* (2011) 277–278.
- [61] R. Lemonnier, K. Scaman, N. Vayatis, Tight bounds for influence in diffusion networks and application to bond percolation and epidemiology, *Advances in Neural Information Processing Systems* (2014) 846–854.
- [62] V. Mahajan, E. Muller, F. M. Bass, New product diffusion models in marketing: A review and directions for research, *Journal of marketing* 54 (1990) 1–26.
- [63] P. Domingos, M. Richardson, Mining the network value of customers, *Proceedings of the seventh ACM SIGKDD international conference on Knowledge discovery and data mining* (2001) 57–66.
- [64] J. Tang, X. Tang, J. Yuan, Profit maximization for viral marketing in online social networks: Algorithms and analysis, *IEEE Transactions on Knowledge and Data Engineering* 30 (2018) 1095–1108.
- [65] R. M. Bond, C. J. Fariss, J. J. Jones, A. D. Kramer, C. Marlow, J. E. Settle, J. H. Fowler, A 61-million-person experiment in social influence and political mobilization, *Nature* 489 (2012) 295.
- [66] N. P. Nguyen, G. Yan, M. T. Thai, S. Eidenbenz, Containment of misinformation spread in online social networks, *Proceedings of the 4th Annual ACM Web Science Conference* (2012) 213–222.
- [67] W. Chen, Y. Wang, S. Yang, Efficient influence maximization in social networks, *Proceedings of the 15th ACM SIGKDD international conference on Knowledge discovery and data mining* (2009) 199–208.

- [68] A. Sheikhahmadi, M. A. Nematbakhsh, A. Shokrollahi, Improving detection of influential nodes in complex networks, *Physica A: Statistical Mechanics and its Applications* 436 (2015) 833–845.
- [69] X. Wang, Y. Su, C. Zhao, D. Yi, Effective identification of multiple influential spreaders by degreepunishment, *Physica A: Statistical Mechanics and its Applications* 461 (2016) 238–247.
- [70] L. Guo, J.-H. Lin, Q. Guo, J.-G. Liu, Identifying multiple influential spreaders in term of the distance-based coloring, *Physics Letters A* 380 (2016) 837–842.
- [71] M. Sviridenko, A note on maximizing a submodular set function subject to a knapsack constraint, *Operations Research Letters* 32 (2004) 41–43.
- [72] J. Leskovec, A. Krause, C. Guestrin, C. Faloutsos, J. VanBriesen, N. Glance, Cost-effective outbreak detection in networks, *Proceedings of the 13th ACM SIGKDD international conference on Knowledge discovery and data mining* (2007) 420–429.
- [73] A. Goyal, W. Lu, L. V. Lakshmanan, Celf++ optimizing the greedy algorithm for influence maximization in social networks, *Proceedings of the 20th international conference companion on World wide web* (2011) 47–48.
- [74] M. Kimura, K. Saito, Tractable models for information diffusion in social networks, *European conference on principles of data mining and knowledge discovery* (2006) 259–271.
- [75] W. Chen, C. Wang, Y. Wang, Scalable influence maximization for prevalent viral marketing in large-scale social networks, *Proceedings of the 16th ACM SIGKDD international conference on Knowledge discovery and data mining* (2010) 1029–1038.
- [76] J. Kim, S.-K. Kim, H. Yu, Scalable and parallelizable processing of influence maximization for large-scale social networks?, *2013 IEEE 29th international conference on data engineering (ICDE)* (2013) 266–277.
- [77] M.-E. G. Rossi, B. Shi, N. Tziortziotis, F. D. Malliaros, C. Giatsidis, M. Vazirgiannis, Mati: An efficient algorithm for influence maximization in social networks, *PloS one* 13 (2018).

- [78] A. Mochalova, A. Nanopoulos, A targeted approach to viral marketing, *Electronic Commerce Research and Applications* 13 (2014) 283–294.
- [79] Z. Zhu, Discovering the influential users oriented to viral marketing based on online social networks, *Physica A: Statistical Mechanics and its Applications* 392 (2013) 3459–3469.
- [80] Y. Li, D. Zhang, K.-L. Tan, Real-time targeted influence maximization for online advertisements (2015).
- [81] S. Liu, C. Jiang, Z. Lin, Y. Ding, R. Duan, Z. Xu, Identifying effective influencers based on trust for electronic word-of-mouth marketing: A domain-aware approach, *Information sciences* 306 (2015) 34–52.
- [82] A. Zareie, A. Sheikhhahmadi, M. Jalili, Identification of influential users in social networks based on users' interest, *Information Sciences* 493 (2019) 217–231.
- [83] S. Chen, J. Fan, G. Li, J. Feng, K.-l. Tan, J. Tang, Online topic-aware influence maximization, *Proceedings of the VLDB Endowment* 8 (2015) 666–677.
- [84] A. Zareie, A. Sheikhhahmadi, K. Khamforoosh, Influence maximization in social networks based on topsis, *Expert Systems with Applications* 108 (2018) 96–107.
- [85] K. Klemm, M. Á. Serrano, V. M. Eguíluz, M. San Miguel, A measure of individual role in collective dynamics, *Scientific reports* 2 (2012) 1–8.
- [86] W. Chen, C. Wang, Y. Wang, Scalable influence maximization for prevalent viral marketing in large-scale social networks, *Proceedings of the 16th ACM SIGKDD International Conference on Knowledge Discovery and Data Mining* (2010) 1029–1038.
- [87] J. A. Chevalier, D. Mayzlin, The effect of word of mouth on sales: Online book reviews, *Journal of marketing research* 43 (2006) 345–354.
- [88] Y. Xiao, R. Li, X. Lu, Y. Liu, Link prediction based on feature representation and fusion, *Information Sciences* 548 (2021) 1–17.

- [89] D. Q. Vu, D. Hunter, P. Smyth, A. U. Asuncion, Continuous-time regression models for longitudinal networks, *Advances in neural information processing systems* (2011) 2492–2500.
- [90] F. Aghabozorgi, M. R. Khayyambashi, A new similarity measure for link prediction based on local structures in social networks, *Physica A: Statistical Mechanics and its Applications* 501 (2018) 12–23.
- [91] L. E. Baum, T. Petrie, Statistical inference for probabilistic functions of finite state markov chains, *The annals of mathematical statistics* 37 (1966) 1554–1563.
- [92] Z. Ghahramani, G. E. Hinton, Variational learning for switching state-space models, *Neural computation* 12 (2000) 831–864.
- [93] P. Sarkar, D. Chakrabarti, M. Jordan, Nonparametric link prediction in dynamic networks, *arXiv preprint arXiv:1206.6394* (2012).
- [94] U. Sharan, J. Neville, Temporal-relational classifiers for prediction in evolving domains, *2008 Eighth IEEE International Conference on Data Mining* (2008) 540–549.
- [95] L. Pizzato, T. Rej, J. Akehurst, I. Koprinska, K. Yacef, J. Kay, Recommending people to people: the nature of reciprocal recommenders with a case study in online dating, *User modelling and User-Adapted Interaction* 23 (2013) 447–488.
- [96] A. Clauset, C. Moore, M. E. Newman, Hierarchical structure and the prediction of missing links in networks, *Nature* 453 (2008) 98–101.
- [97] N. Z. Gong, A. Talwalkar, L. Mackey, L. Huang, E. C. R. Shin, E. Stefanov, E. Shi, D. Song, Joint link prediction and attribute inference using a social-attribute network, *ACM Transactions on Intelligent Systems and Technology (TIST)* 5 (2014) 1–20.
- [98] J. Chang, D. Blei, Relational topic models for document networks, *Artificial Intelligence and Statistics* (2009) 81–88.
- [99] J. Liu, B. Xu, X. Xu, T. Xin, A link prediction algorithm based on label propagation, *Journal of computational science* 16 (2016) 43–50.

- [100] C. Brown, V. Nicosia, S. Scellato, A. Noulas, C. Mascolo, Social and place-focused communities in location-based online social networks, *The European Physical Journal B* 86 (2013) 290–299.
- [101] W. Zhi-Xiao, L. Ze-chao, D. Xiao-fang, T. Jin-hui, Overlapping community detection based on node location analysis, *Knowledge-Based Systems* 105 (2016) 225–235.
- [102] Z. Wang, D. Zhang, X. Zhou, D. Yang, Z. Yu, Z. Yu, Discovering and profiling overlapping communities in location-based social networks, *IEEE Transactions on Systems, Man, and Cybernetics: Systems* 44 (2013) 499–509.
- [103] T. Wang, X.-S. He, M.-Y. Zhou, Z.-Q. Fu, Link prediction in evolving networks based on popularity of nodes, *Scientific reports* 7 (2017) 1–10.
- [104] T. Althoff, P. Jindal, J. Leskovec, Online actions with offline impact: How online social networks influence online and offline user behaviour, *Proceedings of the tenth ACM international conference on web search and data mining* (2017) 537–546.
- [105] L. Li, J. He, M. Wang, X. Wu, Trust agent-based behaviour induction in social networks, *IEEE Intelligent Systems* 31 (2016) 24–30.
- [106] H. Wang, A. Meghwat, L.-P. Morency, E. P. Xing, Select-additive learning: Improving generalization in multimodal sentiment analysis, *IEEE International Conference on Multimedia and Expo (ICME)* (2017) 949–954.
- [107] S. Gündüz, M. T. Özsu, A web page prediction model based on click-stream tree representation of user behaviour, *Proceedings of the ninth ACM SIGKDD international conference on Knowledge discovery and data mining* (2003) 535–540.
- [108] V. S. Tseng, K. W. Lin, Efficient mining and prediction of user behaviour patterns in mobile web systems, *Information and software technology* 48 (2006) 357–369.
- [109] V. Agarwal, K. K. Bharadwaj, A collaborative filtering framework for friends recommendation in social networks based on interaction intensity and adaptive user similarity, *Social Network Analysis and Mining* 3 (2013) 359–379.

- [110] E. Khadangi, A. Bagheri, Presenting novel application-based centrality measures for finding important users based on their activities and social behaviour, *Computers in Human behaviour* 73 (2017) 64–79.
- [111] A. Shahmohammadi, E. Khadangi, A. Bagheri, Presenting new collaborative link prediction methods for activity recommendation in facebook, *Neurocomputing* 210 (2016) 217–226.
- [112] H. Fu, X. Xie, Y. Rui, N. Z. Gong, G. Sun, E. Chen, Robust spammer detection in microblogs: Leveraging user carefulness, *ACM Transactions on Intelligent Systems and Technology (TIST)* 8 (2017) 1–31.
- [113] C. P. Muniz, R. Goldschmidt, R. Choren, Combining contextual, temporal and topological information for unsupervised link prediction in social networks, *Knowledge-Based Systems* 156 (2018) 129–137.
- [114] C. A. Bliss, M. R. Frank, C. M. Danforth, P. S. Dodds, An evolutionary algorithm approach to link prediction in dynamic social networks, *Journal of Computational Science* 5 (2014) 750–764.
- [115] N. Sett, S. R. Singh, S. Nandi, Influence of edge weight on node proximity based link prediction methods: an empirical analysis, *Neurocomputing* 172 (2016) 71–83.
- [116] F. Li, J. He, G. Huang, Y. Zhang, Y. Shi, R. Zhou, Node-coupling clustering approaches for link prediction, *Knowledge-Based Systems* 89 (2015) 669–680.
- [117] V. Martínez, F. Berzal, J.-C. Cubero, Adaptive degree penalization for link prediction, *Journal of Computational Science* 13 (2016) 1–9.
- [118] R. Hisano, Semi-supervised graph embedding approach to dynamic link prediction, *International Workshop on Complex Networks* (2018) 109–121.
- [119] Y. Li, J. Fan, Y. Wang, K.-L. Tan, Influence maximization on social graphs: A survey, *IEEE Transactions on Knowledge and Data Engineering* 30 (2018) 1852–1872.
- [120] M. Li, X. Wang, K. Gao, S. Zhang, A survey on information diffusion in online social networks: Models and methods, *Information* 8 (2017) 118.

- [121] R. Rabade, N. Mishra, S. Sharma, Survey of influential user identification techniques in online social networks, Springer, 2014, pp. 359–370.
- [122] A. Guille, H. Hacid, C. Favre, D. A. Zighed, Information diffusion in online social networks: A survey, ACM Sigmod Record 42 (2013) 17–28.
- [123] J. Sun, J. Tang, A survey of models and algorithms for social influence analysis, Springer, 2011, pp. 177–214.
- [124] A. Zareie, R. Sakellariou, Influence maximization in social networks: A survey of behaviour-aware methods, arXiv preprint arXiv:2108.03438 (2021).
- [125] Z. Wang, C. Sun, J. Xi, X. Li, Influence maximization in social graphs based on community structure and node coverage gain, Future Generation Computer Systems 118 (2021) 327–338.
- [126] S. S. Singh, K. Singh, A. Kumar, B. Biswas, Influence maximization on social networks: a study, Recent Advances in Computer Science and Communications (Formerly: Recent Patents on Computer Science) 14 (2021) 13–29.
- [127] C. Zhou, P. Zhang, J. Guo, X. Zhu, L. Guo, Ublf: An upper bound based approach to discover influential nodes in social networks, 2013 IEEE 13th International Conference on Data Mining (2013) 907–916.
- [128] Y. Wang, G. Cong, G. Song, K. Xie, Community-based greedy algorithm for mining top-k influential nodes in mobile social networks, Proceedings of the 16th ACM SIGKDD International Conference on Knowledge Discovery and Data Mining (2010) 1039–1048.
- [129] C. C. Aggarwal, S. Lin, P. S. Yu, On influential node discovery in dynamic social networks, Proceedings of the 2012 SIAM International Conference on Data Mining (2012) 636–647.
- [130] H. Zhuang, Y. Sun, J. Tang, J. Zhang, X. Sun, Influence maximization in dynamic social networks, 2013 IEEE 13th International Conference on Data Mining (2013) 1313–1318.

- [131] G. Song, Y. Li, X. Chen, X. He, J. Tang, Influential node tracking on dynamic social network: an interchange greedy approach, *IEEE Transactions on Knowledge and Data Engineering* 29 (2017) 359–372.
- [132] C. Wang, J. Tang, J. Sun, J. Han, Dynamic social influence analysis through time-dependent factor graphs, *2011 International Conference on Advances in Social Networks Analysis and Mining* (2011) 239–246.
- [133] M. G. Rodriguez, B. Schölkopf, Influence maximization in continuous time diffusion networks, *arXiv preprint arXiv:1205.1682* (2012).
- [134] N. T. Gayraud, E. Pitoura, P. Tsaparas, Diffusion maximization in evolving social networks, *Proceedings of the 2015 ACM on conference on online social networks* (2015) 125–135.
- [135] H. Li, S. S. Bhowmick, A. Sun, J. Cui, Conformity-aware influence maximization in online social networks, *The VLDB Journal—The International Journal on Very Large Data Bases* 24 (2015) 117–141.
- [136] M. Han, M. Yan, Z. Cai, Y. Li, X. Cai, J. Yu, Influence maximization by probing partial communities in dynamic online social networks, *Transactions on Emerging Telecommunications Technologies* 28 (2017) e3054.
- [137] Y. Wang, Q. Fan, Y. Li, K.-L. Tan, Real-time influence maximization on dynamic social streams, *Proceedings of the VLDB Endowment* 10 (2017) 805–816.
- [138] G. Tong, W. Wu, S. Tang, D.-Z. Du, Adaptive influence maximization in dynamic social networks, *IEEE/ACM Transactions on Networking (TON)* 25 (2017) 112–125.
- [139] S. Kianian, M. Rostamnia, An efficient path-based approach for influence maximization in social networks, *Expert Systems with Applications* 167 (2021) 114168.
- [140] C.-L. Hwang, K. Yoon, *Methods for multiple attribute decision making*, Springer, 1981, pp. 58–191.
- [141] Z. Huang, D. K. Lin, The time-series link prediction problem with applications in communication surveillance, *INFORMS Journal on Computing* 21 (2009) 286–303.

- [142] K. Saito, M. Kimura, K. Ohara, H. Motoda, Learning asynchronous-time information diffusion models and its application to behavioural data analysis over social networks, arXiv preprint arXiv:1204.4528 (2012).
- [143] G. L. Nemhauser, L. A. Wolsey, M. L. Fisher, An analysis of approximations for maximizing submodular set functions—i, Mathematical programming 14 (1978) 265–294.
- [144] X. Li, N. Du, H. Li, K. Li, J. Gao, A. Zhang, A deep learning approach to link prediction in dynamic networks, Proceedings of the 2014 SIAM International Conference on Data Mining (2014) 289–297.
- [145] D. M. Blei, A. Y. Ng, M. I. Jordan, Latent dirichlet allocation, Journal of machine Learning research 3 (2003) 993–1022.
- [146] M. Rosen-Zvi, T. Griffiths, M. Steyvers, P. Smyth, The author-topic model for authors and documents, arXiv preprint arXiv:1207.4169 (2012).
- [147] M. Al Hasan, V. Chaoji, S. Salem, M. Zaki, Link prediction using supervised learning, SDM06: workshop on link analysis, counter-terrorism and security 30 (2006) 798–805.
- [148] D. M. Powers, Evaluation: from precision, recall and f-measure to roc, informedness, markedness and correlation, arXiv preprint arXiv:2010.16061 (2020).
- [149] J. A. Hanley, B. J. McNeil, The meaning and use of the area under a receiver operating characteristic (roc) curve., Radiology 143 (1982) 29–36.
- [150] A. Kumar, S. S. Singh, K. Singh, B. Biswas, Level-2 node clustering coefficient-based link prediction, Applied Intelligence 49 (2019) 2762–2779.
- [151] P. Panzarasa, T. Opsahl, K. M. Carley, Patterns and dynamics of users' behaviour and interaction: Network analysis of an online community, Journal of the American Society for Information Science and Technology 60 (2009) 911–932.
- [152] A. Paranjape, A. R. Benson, J. Leskovec, Motifs in temporal networks, Proceedings of the Tenth ACM International Conference on Web Search and Data Mining (2017) 601–610.

- [153] J. Leskovec, D. Huttenlocher, J. Kleinberg, Governance in social media: A case study of the wikipedia promotion process, Fourth International AAAI Conference on Weblogs and Social Media (2010).
- [154] J. Leskovec, J. J. Mcauley, Learning to discover social circles in ego networks, Advances in neural information processing systems (2012) 539–547.
- [155] J. Li, X. Hu, L. Wu, H. Liu, Robust unsupervised feature selection on networked data, Proceedings of the SIAM International Conference on Data Mining (2016) 387–395.
- [156] E. Cho, S. A. Myers, J. Leskovec, Friendship and mobility: user movement in location-based social networks, Proceedings of the 17th ACM SIGKDD international conference on Knowledge discovery and data mining (2011) 1082–1090.
- [157] J. Yang, J. Leskovec, Defining and evaluating network communities based on ground-truth, Knowledge and Information Systems 42 (2015) 181–213.
- [158] M. De Domenico, A. Lima, P. Mougel, M. Musolesi, The anatomy of a scientific rumor, Scientific reports 3 (2013) 2980.
- [159] S. Brin, L. Page, The anatomy of a large-scale hypertextual web search engine, Computer networks and ISDN systems 30 (1998) 107–117.
- [160] Y. Yang, X. Mao, J. Pei, X. He, Continuous influence maximization: What discounts should we offer to social network users?, Proceedings of the 2016 international conference on management of data (2016) 727–741.
- [161] S. Lei, S. Maniu, L. Mo, R. Cheng, P. Senellart, Online influence maximization, Proceedings of the 21th ACM SIGKDD International Conference on Knowledge Discovery and Data Mining (2015) 645–654.
- [162] H. Tong, C. Faloutsos, J.-Y. Pan, Fast random walk with restart and its applications, Sixth International Conference on Data Mining (ICDM'06) (2006) 613–622.
- [163] C.-C. Hsu, Y.-A. Lai, W.-H. Chen, M.-H. Feng, S.-D. Lin, Unsupervised ranking using graph structures and node attributes, Proceedings of the Tenth ACM International Conference on Web Search and Data Mining (2017) 771–779.

- [164] Z. Liu, Q.-M. Zhang, L. Lü, T. Zhou, Link prediction in complex networks: A local naïve bayes model, *EPL (Europhysics Letters)* 96 (2011) 48007.
- [165] Y. Xiao, X. Li, H. Wang, M. Xu, Y. Liu, 3-hbp: A three-level hidden bayesian link prediction model in social networks, *IEEE Transactions on Computational Social Systems* 5 (2018) 430–443.
- [166] J. Leskovec, J. Kleinberg, C. Faloutsos, Graphs over time: Densification laws, shrinking diameters and possible explanations, *Proceedings of the Eleventh ACM SIGKDD International Conference on Knowledge Discovery in Data Mining* (2005) 177–187.
- [167] J. Leskovec, J. Kleinberg, C. Faloutsos, Graph evolution: Densification and shrinking diameters, *ACM Trans. Knowl. Discov. Data* 1 (2007).
- [168] J. Leskovec, L. Backstrom, R. Kumar, A. Tomkins, Microscopic evolution of social networks, *Proceedings of the 14th ACM SIGKDD International Conference on Knowledge Discovery and Data Mining* (2008) 462–470.
- [169] S. G. Mazman, Y. K. Usluel, modelling educational usage of facebook, *Computers & Education* 55 (2010) 444–453.
- [170] D. Murthy, Twitter, Polity Press Cambridge, UK, 2018.
- [171] G. E. Hinton, Training products of experts by minimizing contrastive divergence, *Neural computation* 14 (2002) 1771–1800.
- [172] D. Wang, D. Pedreschi, C. Song, F. Giannotti, A.-L. Barabasi, Human mobility, social ties, and link prediction, *Proceedings of the 17th ACM SIGKDD international conference on Knowledge discovery and data mining* (2011) 1100–1108.
- [173] S. Scellato, A. Noulas, C. Mascolo, Exploiting place features in link prediction on location-based social networks, *Proceedings of the 17th ACM SIGKDD international conference on Knowledge discovery and data mining* (2011) 1046–1054.
- [174] C. Chelmis, V. K. Prasanna, Social link prediction in online social tagging systems, *ACM Transactions on Information Systems (TOIS)* 31 (2013) 1–27.

- [175] Y. Liu, A. Niculescu-Mizil, W. Gryc, Topic-link lda: joint models of topic and author community, proceedings of the 26th annual international conference on machine learning (2009) 665–672.
- [176] A. M. Martínez, G. I. Webb, S. Chen, N. A. Zaidi, Scalable learning of bayesian network classifiers, *The Journal of Machine Learning Research* 17 (2016) 1515–1549.
- [177] J. Zhang, C. Wang, P. S. Yu, J. Wang, Learning latent friendship propagation networks with interest awareness for link prediction, *Proceedings of the 36th international ACM SIGIR conference on Research and development in information retrieval* (2013) 63–72.
- [178] M. Nasim, R. Charbey, C. Prieur, U. Brandes, Investigating link inference in partially observable networks: Friendship ties and interaction, *IEEE Transactions on Computational Social Systems* 3 (2016) 113–119.
- [179] M. Stager, P. Lukowicz, G. Troster, Dealing with class skew in context recognition, *26th IEEE International Conference on Distributed Computing Systems Workshops (ICDCSW'06)* (2006) 58–58.
- [180] J.-H. Kim, Estimating classification error rate: Repeated cross-validation, repeated hold-out and bootstrap, *Computational statistics & data analysis* 53 (2009) 3735–3745.
- [181] F. Abel, Q. Gao, G.-J. Houben, K. Tao, Semantic enrichment of twitter posts for user profile construction on the social web, *Extended semantic web conference* (2011) 375–389.
- [182] F. Orlandi, J. Breslin, A. Passant, Aggregated, interoperable and multi-domain user profiles for the social web, *Proceedings of the 8th International Conference on Semantic Systems* (2012) 41–48.
- [183] A. Bhattacharyya, On a measure of divergence between two statistical populations defined by their probability distributions, *Bull. Calcutta Math. Soc.* 35 (1943) 99–109.

- [184] P. Kapanipathi, P. Jain, C. Venkataramani, A. Sheth, User interests identification on twitter using a hierarchical knowledge base, European Semantic Web Conference (2014) 99–113.
- [185] K. Tao, F. Abel, Q. Gao, G.-J. Houben, Tums: twitter-based user modelling service, Extended Semantic Web Conference (2011) 269–283.
- [186] T. L. Griffiths, M. Steyvers, Finding scientific topics, Proceedings of the National academy of Sciences 101 (2004) 5228–5235.
- [187] T. Hofmann, Probabilistic latent semantic analysis, arXiv preprint arXiv:1301.6705 (2013).
- [188] I. Vayansky, S. A. Kumar, A review of topic modelling methods, Information Systems 94 (2020) 101582.
- [189] J. Qiang, Z. Qian, Y. Li, Y. Yuan, X. Wu, Short text topic modelling techniques, applications, and performance: a survey, IEEE Transactions on Knowledge and Data Engineering (2020).
- [190] X. Cheng, X. Yan, Y. Lan, J. Guo, Btm: Topic modelling over short texts, IEEE Transactions on Knowledge and Data Engineering 26 (2014) 2928–2941.