

REFERENCES

- [1] “StackExchange” [Online]. Available: <https://stackexchange.com/sites>
- [2] “Quora” [Online]. Available: <https://www.quora.com>
- [3] J. Yang, K. Tao, A. Bozzon, and G.-J. Houben, “Sparrows and Owls: Characterisation of Expert Behaviour in StackOverflow,” in *User Modeling, Adaptation, and Personalization*, vol. 8538, V. Dimitrova, T. Kuflik, D. Chin, F. Ricci, P. Dolog, and G.-J. Houben, Eds., in Lecture Notes in Computer Science, vol. 8538. , Cham: Springer International Publishing, 2014, pp. 266–277. doi: 10.1007/978-3-319-08786-3_23.
- [4] X. Wang, C. Huang, L. Yao, B. Benatallah, and M. Dong, “A Survey on Expert Recommendation in Community Question Answering,” *J. Comput. Sci. Technol.*, vol. 33, no. 4, pp. 625–653, Jul. 2018, doi: 10.1007/s11390-018-1845-0.
- [5] A. Pal, R. Farzan, J. A. Konstan, and R. E. Kraut, “Early Detection of Potential Experts in Question Answering Communities,” in *User Modeling, Adaption and Personalization*, vol. 6787, J. A. Konstan, R. Conejo, J. L. Marzo, and N. Oliver, Eds., in Lecture Notes in Computer Science, vol. 6787. , Berlin, Heidelberg: Springer Berlin Heidelberg, 2011, pp. 231–242. doi: 10.1007/978-3-642-22362-4_20.
- [6] J. Zhang, M. S. Ackerman, and L. Adamic, “Expertise networks in online communities: structure and algorithms,” in *Proceedings of the 16th international conference on World Wide Web*, Banff Alberta Canada: ACM, May 2007, pp. 221–230. doi: 10.1145/1242572.1242603.
- [7] T. C. Zhou, M. R. Lyu, and I. King, “A classification-based approach to question routing in community question answering,” in *Proceedings of the 21st International Conference on World Wide Web*, Lyon France: ACM, Apr. 2012,

pp. 783–790. doi: 10.1145/2187980.2188201.

- [8] S. Wang, D. Lo, and L. Jiang, “An empirical study on developer interactions in StackOverflow,” in *Proceedings of the 28th Annual ACM Symposium on Applied Computing*, Coimbra Portugal: ACM, Mar. 2013, pp. 1019–1024. doi: 10.1145/2480362.2480557.
- [9] J. Zhou *et al.*, “Graph neural networks: A review of methods and applications,” *AI Open*, vol. 1, pp. 57–81, 2020, doi: 10.1016/j.aiopen.2021.01.001.
- [10] Z. Wu, S. Pan, F. Chen, G. Long, C. Zhang, and P. S. Yu, “A Comprehensive Survey on Graph Neural Networks,” *IEEE Trans. Neural Netw. Learn. Syst.*, vol. 32, no. 1, pp. 4–24, Jan. 2021, doi: 10.1109/TNNLS.2020.2978386.
- [11] L. Page, S. Brin, R. Motwani, and T. Winograd, “The PageRank citation ranking: Bringing order to the web.,” Stanford InfoLab, 1999.
- [12] B. Dom, I. Eiron, A. Cozzi, and Y. Zhang, “Graph-based ranking algorithms for e-mail expertise analysis,” in *Proceedings of the 8th ACM SIGMOD workshop on Research issues in data mining and knowledge discovery*, San Diego California: ACM, Jun. 2003, pp. 42–48. doi: 10.1145/882082.882093.
- [13] J. M. Kleinberg, “Authoritative sources in a hyperlinked environment,” *J. ACM*, vol. 46, no. 5, pp. 604–632, Sep. 1999, doi: 10.1145/324133.324140.
- [14] C. S. Campbell, P. P. Maglio, A. Cozzi, and B. Dom, “Expertise identification using email communications,” in *Proceedings of the twelfth international conference on Information and knowledge management*, New Orleans LA USA: ACM, Nov. 2003, pp. 528–531. doi: 10.1145/956863.956965.
- [15] P. Jurczyk and E. Agichtein, “Discovering authorities in question answer communities by using link analysis,” in *Proceedings of the sixteenth ACM*

conference on Conference on information and knowledge management, Lisbon Portugal: ACM, Nov. 2007, pp. 919–922. doi: 10.1145/1321440.1321575.

- [16] M. Shahriari, S. Parekodi, and R. Klamma, “Community-aware ranking algorithms for expert identification in question-answer forums,” in *Proceedings of the 15th International Conference on Knowledge Technologies and Data-driven Business*, Graz Austria: ACM, Oct. 2015, pp. 1–8. doi: 10.1145/2809563.2809592.
- [17] X. Liu, W. B. Croft, and M. Koll, “Finding experts in community-based question-answering services,” in *Proceedings of the 14th ACM international conference on Information and knowledge management*, Bremen Germany: ACM, Oct. 2005, pp. 315–316. doi: 10.1145/1099554.1099644.
- [18] K. Balog, L. Azzopardi, and M. de Rijke, “Formal models for expert finding in enterprise corpora,” in *Proceedings of the 29th annual international ACM SIGIR conference on Research and development in information retrieval*, Seattle Washington USA: ACM, Aug. 2006, pp. 43–50. doi: 10.1145/1148170.1148181.
- [19] D. R. H. Miller, T. Leek, and R. M. Schwartz, “A hidden Markov model information retrieval system,” in *Proceedings of the 22nd annual international ACM SIGIR conference on Research and development in information retrieval*, Berkeley California USA: ACM, Aug. 1999, pp. 214–221. doi: 10.1145/312624.312680.
- [20] X. Liu and W. B. Croft, “Cluster-based retrieval using language models,” in *Proceedings of the 27th annual international ACM SIGIR conference on Research and development in information retrieval*, Sheffield United Kingdom: ACM, Jul. 2004, pp. 186–193. doi: 10.1145/1008992.1009026.
- [21] V. Lavrenko and W. B. Croft, “Relevance-Based Language Models,” *ACM SIGIR Forum*, vol. 51, no. 2, pp. 260–267, Aug. 2017, doi:

10.1145/3130348.3130376.

- [22] D. Petkova and W. B. Croft, “HIERARCHICAL LANGUAGE MODELS FOR EXPERT FINDING IN ENTERPRISE CORPORA,” *Int. J. Artif. Intell. Tools*, vol. 17, no. 01, pp. 5–18, Feb. 2008, doi: 10.1142/S0218213008003741.
- [23] B. Li, I. King, and M. R. Lyu, “Question routing in community question answering: putting category in its place,” in *Proceedings of the 20th ACM international conference on Information and knowledge management*, Glasgow Scotland, UK: ACM, Oct. 2011, pp. 2041–2044. doi: 10.1145/2063576.2063885.
- [24] Y. Zhou, G. Cong, B. Cui, C. S. Jensen, and J. Yao, “Routing Questions to the Right Users in Online Communities,” in *2009 IEEE 25th International Conference on Data Engineering*, Shanghai, China: IEEE, Mar. 2009, pp. 700–711. doi: 10.1109/ICDE.2009.44.
- [25] D. Blei, A. Ng, and M. Jordan, “Latent dirichlet allocation,” *Adv. Neural Inf. Process. Syst.*, vol. 14, 2001.
- [26] X. Zheng, Z. Hu, A. Xu, D. Chen, K. Liu, and B. Li, “Algorithm for recommending answer providers in community-based question answering,” *J. Inf. Sci.*, vol. 38, no. 1, pp. 3–14, Feb. 2012, doi: 10.1177/0165551511423149.
- [27] B. Li and I. King, “Routing questions to appropriate answerers in community question answering services,” in *Proceedings of the 19th ACM international conference on Information and knowledge management*, Toronto ON Canada: ACM, Oct. 2010, pp. 1585–1588. doi: 10.1145/1871437.1871678.
- [28] H. Wu, Y. Wang, and X. Cheng, “Incremental probabilistic latent semantic analysis for automatic question recommendation,” in *Proceedings of the 2008 ACM conference on Recommender systems*, Lausanne Switzerland: ACM, Oct. 2008, pp. 99–106. doi: 10.1145/1454008.1454026.

- [29] F. Riahi, Z. Zolaktaf, M. Shafiei, and E. Milios, “Finding expert users in community question answering,” in *Proceedings of the 21st International Conference on World Wide Web*, Lyon France: ACM, Apr. 2012, pp. 791–798. doi: 10.1145/2187980.2188202.
- [30] Y. Tian, P. S. Kochhar, E.-P. Lim, F. Zhu, and D. Lo, “Predicting Best Answerers for New Questions: An Approach Leveraging Topic Modeling and Collaborative Voting,” in *Social Informatics*, vol. 8359, A. Nadamoto, A. Jatowt, A. Wierzbicki, and J. L. Leidner, Eds., in *Lecture Notes in Computer Science*, vol. 8359, Berlin, Heidelberg: Springer Berlin Heidelberg, 2014, pp. 55–68. doi: 10.1007/978-3-642-55285-4_5.
- [31] A. Pal and J. A. Konstan, “Expert identification in community question answering: exploring question selection bias,” in *Proceedings of the 19th ACM international conference on Information and knowledge management*, Toronto ON Canada: ACM, Oct. 2010, pp. 1505–1508. doi: 10.1145/1871437.1871658.
- [32] M. Choetkiertikul, D. Avery, H. K. Dam, T. Tran, and A. Ghose, “Who Will Answer My Question on Stack Overflow?,” in *2015 24th Australasian Software Engineering Conference*, Adelaide, SA, Australia: IEEE, Sep. 2015, pp. 155–164. doi: 10.1109/ASWEC.2015.28.
- [33] D. van Dijk, M. Tsagkias, and M. de Rijke, “Early Detection of Topical Expertise in Community Question Answering,” in *Proceedings of the 38th International ACM SIGIR Conference on Research and Development in Information Retrieval*, Santiago Chile: ACM, Aug. 2015, pp. 995–998. doi: 10.1145/2766462.2767840.
- [34] Z. Ji and B. Wang, “Learning to rank for question routing in community question answering,” in *Proceedings of the 22nd ACM international conference on Conference on information & knowledge management - CIKM '13*, San Francisco, California, USA: ACM Press, 2013, pp. 2363–2368. doi:

10.1145/2505515.2505670.

- [35] H. Zhu, H. Cao, H. Xiong, E. Chen, and J. Tian, “Towards expert finding by leveraging relevant categories in authority ranking,” in *Proceedings of the 20th ACM international conference on Information and knowledge management*, Glasgow Scotland, UK: ACM, Oct. 2011, pp. 2221–2224. doi: 10.1145/2063576.2063931.
- [36] T. Zhao, N. Bian, C. Li, and M. Li, “Topic-Level Expert Modeling in Community Question Answering,” in *Proceedings of the 2013 SIAM International Conference on Data Mining*, Society for Industrial and Applied Mathematics, May 2013, pp. 776–784. doi: 10.1137/1.9781611972832.86.
- [37] G. Zhou, K. Liu, and J. Zhao, “Topical Authority Identification in Community Question Answering,” in *Pattern Recognition*, vol. 321, C.-L. Liu, C. Zhang, and L. Wang, Eds., in *Communications in Computer and Information Science*, vol. 321. , Berlin, Heidelberg: Springer Berlin Heidelberg, 2012, pp. 622–629. doi: 10.1007/978-3-642-33506-8_76.
- [38] G. Zhou, S. Lai, K. Liu, and J. Zhao, “Topic-sensitive probabilistic model for expert finding in question answer communities,” in *Proceedings of the 21st ACM international conference on Information and knowledge management*, Maui Hawaii USA: ACM, Oct. 2012, pp. 1662–1666. doi: 10.1145/2396761.2398493.
- [39] G. A. Wang, J. Jiao, A. S. Abrahams, W. Fan, and Z. Zhang, “ExpertRank: A topic-aware expert finding algorithm for online knowledge communities,” *Decis. Support Syst.*, vol. 54, no. 3, pp. 1442–1451, Feb. 2013, doi: 10.1016/j.dss.2012.12.020.
- [40] J. Jiao, J. Yan, H. Zhao, and W. Fan, “ExpertRank: An Expert User Ranking Algorithm in Online Communities,” in *2009 International Conference on New Trends in Information and Service Science*, Beijing, China: IEEE, Jun. 2009, pp.

674–679. doi: 10.1109/NISS.2009.75.

- [41] M. Liu, Y. Liu, and Q. Yang, “Predicting Best Answerers for New Questions in Community Question Answering,” in *Web-Age Information Management*, vol. 6184, L. Chen, C. Tang, J. Yang, and Y. Gao, Eds., in Lecture Notes in Computer Science, vol. 6184. , Berlin, Heidelberg: Springer Berlin Heidelberg, 2010, pp. 127–138. doi: 10.1007/978-3-642-14246-8_15.
- [42] C. Zheng, S. Zhai, and Z. Zhang, “A Deep Learning Approach for Expert Identification in Question Answering Communities.” arXiv, Nov. 14, 2017. Accessed: Feb. 04, 2023. [Online]. Available: <http://arxiv.org/abs/1711.05350>
- [43] B. Perozzi, R. Al-Rfou, and S. Skiena, “DeepWalk: online learning of social representations,” in *Proceedings of the 20th ACM SIGKDD international conference on Knowledge discovery and data mining*, New York New York USA: ACM, Aug. 2014, pp. 701–710. doi: 10.1145/2623330.2623732.
- [44] Z. Li, J.-Y. Jiang, Y. Sun, and W. Wang, “Personalized Question Routing via Heterogeneous Network Embedding,” *Proc. AAAI Conf. Artif. Intell.*, vol. 33, no. 01, pp. 192–199, Jul. 2019, doi: 10.1609/aaai.v33i01.3301192.
- [45] C. Liu, Y. Hao, W. Shan, and Z. Dai, “Identifying Experts in Community Question Answering Website Based on Graph Convolutional Neural Network,” *IEEE Access*, vol. 8, pp. 137799–137811, 2020, doi: 10.1109/ACCESS.2020.3012553.
- [46] Y. Liu, W. Tang, Z. Liu, L. Ding, and A. Tang, “High-quality domain expert finding method in CQA based on multi-granularity semantic analysis and interest drift,” *Inf. Sci.*, vol. 596, pp. 395–413, Jun. 2022, doi: 10.1016/j.ins.2022.02.039.
- [47] J. Devlin, M.-W. Chang, K. Lee, and K. Toutanova, “BERT: Pre-training of Deep Bidirectional Transformers for Language Understanding.” arXiv, May 24,

2019. Accessed: Feb. 05, 2023. [Online]. Available: <http://arxiv.org/abs/1810.04805>
- [48] D. Ramage, D. Hall, R. Nallapati, and C. D. Manning, “Labeled LDA: A supervised topic model for credit attribution in multi-labeled corpora,” in *Proceedings of the 2009 Conference on Empirical Methods in Natural Language Processing*, Singapore: Association for Computational Linguistics, Aug. 2009, pp. 248–256. [Online]. Available: <https://aclanthology.org/D09-1026>
- [49] J. Sun, J. Zhao, H. Sun, and S. Parthasarathy, “EndCold: An End-to-End Framework for Cold Question Routing in Community Question Answering Services,” in *Proceedings of the Twenty-Ninth International Joint Conference on Artificial Intelligence*, Yokohama, Japan: International Joint Conferences on Artificial Intelligence Organization, Jul. 2020, pp. 3244–3250. doi: 10.24963/ijcai.2020/449.
- [50] “stackoverflow.com.” [Online]. Available: <https://stackoverflow.com/>
- [51] “https://archive.org/details/stackexchange_20220606.” [Online]. Available: https://archive.org/details/stackexchange_20220606
- [52] “<https://api.stackexchange.com/>.” [Online]. Available: <https://api.stackexchange.com/>
- [53] L. A. Adamic, J. Zhang, E. Bakshy, and M. S. Ackerman, “Knowledge sharing and yahoo answers: everyone knows something,” in *Proceedings of the 17th international conference on World Wide Web*, Beijing China: ACM, Apr. 2008, pp. 665–674. doi: 10.1145/1367497.1367587.
- [54] “<https://www.zhihu.com/>.” [Online]. Available: <https://www.zhihu.com/>
- [55] “<https://ttlc.intuit.com/community/home/misc/03/en-us>.” [Online]. Available: <https://ttlc.intuit.com/community/home/misc/03/en-us>

<https://tltc.intuit.com/community/home/misc/03/en-us>

- [56] W. Tang, T. Lu, D. Li, H. Gu, and N. Gu, “Hierarchical Attentional Factorization Machines for Expert Recommendation in Community Question Answering,” *IEEE Access*, vol. 8, pp. 35331–35343, 2020, doi: 10.1109/ACCESS.2020.2974893.
- [57] “StackExchange Data Explorer.” [Online]. Available: <https://data.stackexchange.com/stackoverflow/queries>
- [58] J. Sun, A. Vishnu, A. Chakrabarti, C. Siegel, and S. Parthasarathy, “ColdRoute: effective routing of cold questions in stack exchange sites,” *Data Min. Knowl. Discov.*, vol. 32, no. 5, pp. 1339–1367, Sep. 2018, doi: 10.1007/s10618-018-0577-7.
- [59] W. Wang, F. Wei, L. Dong, H. Bao, N. Yang, and M. Zhou, “MiniLM: Deep Self-Attention Distillation for Task-Agnostic Compression of Pre-Trained Transformers.” arXiv, Apr. 05, 2020. Accessed: Mar. 20, 2024. [Online]. Available: <http://arxiv.org/abs/2002.10957>
- [60] “sentence-transformers/all-MiniLM-L6-v2.” [Online]. Available: <https://huggingface.co/sentence-transformers/all-MiniLM-L6-v2>
- [61] “Sentence Transformers - Pretrained Models.” [Online]. Available: https://www.sbert.net/docs/pretrained_models.html
- [62] S. Mumtaz, C. Rodriguez, and B. Benatallah, “Expert2Vec: Experts Representation in Community Question Answering for Question Routing,” in *Advanced Information Systems Engineering*, vol. 11483, P. Giorgini and B. Weber, Eds., in Lecture Notes in Computer Science, vol. 11483. , Cham: Springer International Publishing, 2019, pp. 213–229. doi: 10.1007/978-3-030-21290-2_14.

- [63] “GENSIM - Latent Dirichlet Allocation.” [Online]. Available: <https://radimrehurek.com/gensim/models/ldamodel.html>
- [64] A. Grover and J. Leskovec, “node2vec: Scalable Feature Learning for Networks,” in *Proceedings of the 22nd ACM SIGKDD International Conference on Knowledge Discovery and Data Mining*, San Francisco California USA: ACM, Aug. 2016, pp. 855–864. doi: 10.1145/2939672.2939754.
- [65] “Node2Vec.” [Online]. Available: <https://pypi.org/project/node2vec/>
- [66] “Google Colaboratory,” Google Colaboratory. [Online]. Available: <https://colab.google/>
- [67] L. van der Maaten and G. Hinton, “Visualizing Data using t-SNE,” *J. Mach. Learn. Res.*, vol. 9, no. 86, pp. 2579–2605, 2008.