

Zhiqian Chen

Research Interests

Application Dynamics on Graphs including epidemiology, info propagation, traffic, supply chain, financial network, etc
Method Spectral Graph, Combinatorial Optimization, Higher-order Analysis, Uncertainty Quantification

Employment History

2020–now **Assistnat Professor**, *Computer Science and Engineering, Mississippi State University.*

Education

2014–2020 **Ph.D., Computer Science**, *Virginia Tech*, Falls Church, Virginia, United States.

2010–2013 **M.E., Software Engi.**, *Peking University*, Beijing, China.

2005–2009 **B.E., Software Engin. / B.A., Japanese Language**, *Huazhong Univ. of Sci. & Tech.*, Wuhan, China.

Grants

Personal Credits: \$ 1,122,628. / Total External: \$ 10,653,443.

NSF [CNS] MSI: RCBP: III: Advancing Speech Detection: A Hybrid Approach Using Large Language Models and Graph Neural Networks (#2431176),

Co-PI, **\$400,000** (33% credit, MS State share \$259,948.00), 1/2025-12/2026

NSF [CNS] CIRC: Planning-C: Synergistic Graph Flow Analytics: An Integrated Infrastructure for Bridging Complexity, Fragmentation, and Interdisciplinary Gaps (#2345921),

PI, **\$99,998** (60% credit), 7/2024-6/2025

NSF [III] CRII: Interpretable Influence Propagating and Blocking on Graphs (#2153369),

PI, **\$174,004** (100% credit), 5/2022-11/2024

USDA [ARS] Developing Detection and Modeling Tools for the Geospatial and Environmental Epidemiology of Animal Disease (#58-6064-3-017)

Co-PI, **\$3,073,602** (5% credit), 10/2023-08/2028

USDA [ARS] Advancing Agricultural Research through High Performance Computing (#58-0200-0-002)

Co-PI, **\$5,690,689** (5% credit), 10/2022-08/2024

NSF [EDU] ITEST: Learning to create Intelligent Solutions with Machine Learning and Computer Vision: A Pathway to AI Careers for Diverse High School Students (#2342574)

Co-PI, **\$1,192,951** (25% credit), 09/2024-08/2027

NSF [III] REU Supplementary, PI, **\$14,000** (100% credit)

USDA [ARS] Summer Internship Project

PI, **\$8,199** (100% credit), 5/2024-4/2025

Total Internal \$ 14,100

MS State PI, Global Development Seed Grant Award, International Institute \$6,000

MS State PI, Working Group in Graph AI, Bagley College of Engineering \$4,100

MS State Undergraduate Research Program, ORED, 2022 (PI, \$2,000), 2023 (Co-PI, \$1,500), 2024 (PI, \$2,000)

Award & Honor

Award Best Paper Award at ACM SIGSPATIAL 2020 🌐 <https://www.sigspatial.org/people/award-recipients/>

Award Best Paper Award at GISTAM 2015 🌐 <https://gistam.scitevents.org/PreviousAwards.aspx>

Award Outstanding Contribution Award, 2016, Intern at Toyota Research Institute, North America (TRI-NA)

Honor Editor's Choice Article, 🌐 www.mdpi.com/journal/sensors/editors_choice

Honor Top 50 Chemistry and Material Sciences Articles in Nature Communications 2019.
🌐 www.nature.com/collections/giacagiaca

Honor Excellent Reviewer, IEEE Transactions on Network Science and Engineering Journal, 2024

Mentoring (as Major Advisor)

Graduate **Ph.D.:** Zonghan Zhang, Zijian Zhang, Amin George, Josh Waldbieser, Jiashan Wu, Rocker D'Antonio, Peter Dinh, Josh Dowdy.

Undergrad Jason Weeks, Kevin Ho

Alumnus **Graduate:** Samuel Prabhakar, Rajeev Jogi, Piero Bracamonte, Suman Adhikari, Ramyasri Veerapaneni; **Undergrad:** Ben Moore, Jack Maloney, Ethan Rogers, Prathyusha Mustiyala, Andrew McBride, Aalok Uprety, Mason Fisher, Reid Sewell.

Talks

- Tutorial Unifying Spectral and Spatial Graph Neural Network
CIKM 2024, Oct 21, Boise, Idaho, U.S. 📄 <https://cikm2024.org/tutorials/>
- Tutorial Unifying Spectral and Spatial Graph Neural Network
SIAM MDS 2024, Oct 23, Atlanta, GA, U.S.
📄 https://meetings.siam.org/session/dsp_programsess.cfm?SESSIONCODE=80791
- Tutorial Unifying Spectral and Spatial Graph Neural Network
CVPR 2024, June 18, Seattle, Washington, U.S. 📄 <https://cvpr.thecvf.com/virtual/2024/tutorial/23726>
- Paper Early forecasting of the impact of traffic accidents using a single shot observation
SIAM Data Mining 2022, April, Minneapolis, Minnesota, U.S.
- Tutorial Studying spread patterns of covid-19 based on spatiotemporal data
SIAM Data Mining 2021, April, Online

Teaching

- Split-level CSE 4633/6633 Artificial Intelligence, CSE 4693/6693 Intro to Machine Learning
- Graduate CSE 8673 Machine Learning, CSE 8990 Graph Machine Learning

Service

- Reviewer International Conference on Machine Learning (*ICML*), 2021-2024. International Conference on Learning Representations (*ICLR*), 2022-2023. Neural Information Processing System (*NeurIPS*), 2020-2022. AAAI conference on Artificial Intelligence (*AAAI*), 2021-2023. International Joint Conference on Artificial Intelligence (*IJCAI*), 2022-2024. ACM SIG on Knowledge Discovery and Data Mining (*KDD*), 2020-2024. ACM SIG on Information Retrieval (*SIGIR*), 2020, 2022, 2023. IEEE Transactions on Knowledge and Data Engineering (*TKDE*), 2020. ACM Transactions on Knowledge Discovery from Data (*TKDD*), 2021, 2024
- Editorial Board Frontiers in Big Data - Data Science, Frontiers in Big Data - Data Mining and Management, Frontier Topic Editor, 2022-present
- Co-Chair IEEE BigData 2024, Bigdata Cup Challenges
- Panelist NSF Panel, 2021, 2023, 2024

Publications

- [1] Taoran Ji, Nathan Self, Kaiqun Fu, Zhiqian Chen, Naren Ramakrishnan, and Chang-Tien Lu. Citation forecasting with multi-context attention-aided dependency modeling. *ACM Transactions on Knowledge Discovery from Data*, 18(6):1–23, 2024.
- [2] Kollin Napier, Tanmay Bhowmik, and Zhiqian Chen. Explaining poor performance of text-based machine learning models for vulnerability detection. *Empirical Software Engineering*, 29(5):113, 2024.
- [3] Nisha Pillai, Bindu Nanduri, Michael J Rothrock Jr, Zhiqian Chen, and Mahalingam Ramkumar. Bayesian-guided generation of synthetic microbiomes with minimized pathogenicity. *arXiv preprint arXiv:2405.00070*, 2024.
- [4] Rui Shang, Siji Chen, Zhiqian Chen, and Chang-Tien Lu. Graphnilm: A graph neural network for energy disaggregation. In *Pacific-Asia Conference on Knowledge Discovery and Data Mining*, pages 431–443. Springer Nature Singapore Singapore, 2024.
- [5] Zirui Yuan, Minglai Shao, and Zhiqian Chen. Graph bayesian optimization for multiplex influence maximization. In *Proceedings of the AAAI Conference on Artificial Intelligence*, volume 38, pages 22475–22483, 2024.
- [6] Lei Zhang, Zhiqian Chen, Chang-Tien Lu, and Liang Zhao. Network interdiction goes neural. *arXiv preprint arXiv:2405.16409*, 2024.
- [7] Zijian Zhang, Zonghan Zhang, and Zhiqian Chen. Flowgpt: How long can llms trace back and predict the trends of graph dynamics?, 2024.
- [8] Zonghan Zhang, Zijian Zhang, and Zhiqian Chen. Multiple-source localization from a single-snapshot observation using graph bayesian optimization. In *Proceedings of the AAAI Conference on Artificial Intelligence*, volume 38, pages 22538–22546, 2024.
- [9] Yaya Zhao, Kaiqi Zhao, Zhiqian Chen, Yuanyuan Zhang, Yalei Du, and Xiaoling Lu. A graph-based representation framework for trajectory recovery via spatiotemporal interval-informed seq2seq. In *Proceedings of the Thirty-Third International Joint Conference on Artificial Intelligence (IJCAI-24)*, pages 2588–2597. <https://doi.org/10.24963/ijcai.2024/286>, 2024.
- [10] Kourosh T Baghaei, Amirreza Payandeh, Pooya Fayyazsanavi, Zhiqian Chen, Somayeh Bakhtiari Ramezani, and Shahram Rahimi. Deep representation learning: Fundamentals, technologies, applications, and open challenges. *IEEE Access*, 2023.
- [11] Subhodip Biswas, Fanglan Chen, Zhiqian Chen, Chang-Tien Lu, and Naren Ramakrishnan. Memetic algorithms for spatial partitioning problems. *ACM Transactions on Spatial Algorithms and Systems*, 9(1):1–31, 2023.
- [12] Fanglan Chen, Subhodip Biswas, Zhiqian Chen, Shuo Lei, Naren Ramakrishnan, and Chang-Tien Lu. Exploring tradeoffs in automated school redistricting: Computational and ethical perspectives. In *Proceedings of the AAAI Conference on Artificial Intelligence*, volume 37, pages 15912–15920, 2023.

- [13] Zhiqian Chen, Fanglan Chen, Lei Zhang, Taoran Ji, Kaiqun Fu, Liang Zhao, Feng Chen, Lingfei Wu, Charu Aggarwal, and Chang-Tien Lu. Bridging the gap between spatial and spectral domains: A unified framework for graph neural networks. *ACM Computing Surveys*, 56(5):42, 2023.
- [14] Nisha Pillai, Bindu Nanduri, Michael J Rothrock, Zhiqian Chen, and Mahalingam Ramkumar. Towards optimal microbiome to inhibit multidrug resistance. In *2023 IEEE Conference on Computational Intelligence in Bioinformatics and Computational Biology (CIBCB)*, pages 1–9. IEEE, 2023.
- [15] Lei Zhang, Zhiqian Chen, Chang-Tien Lu, and Liang Zhao. Fast and adaptive dynamics-on-graphs to dynamics-of-graphs translation. *Frontiers in big Data*, 6:1274135, 2023.
- [16] Lei Zhang, Qisheng Zhang, Zhiqian Chen, Yanshen Sun, Chang-Tien Lu, and Liang Zhao. Infinitely deep graph transformation networks. In *2023 IEEE International Conference on Data Mining (ICDM)*, pages 778–787. IEEE Computer Society, 2023.
- [17] Zijian Zhang, Zonghan Zhang, and Zhiqian Chen. Xflow: Benchmarking flow behaviors over graphs. *arXiv preprint arXiv:2308.03819*, 2023.
- [18] Zonghan Zhang and Zhiqian Chen. Accelerating simulation-based influence maximization via bayesian optimization. 2023.
- [19] Zonghan Zhang and Zhiqian Chen. Understanding influence maximization via higher-order decomposition. In *Proceedings of the 2023 SIAM International Conference on Data Mining (SDM)*, pages 766–774. Society for Industrial and Applied Mathematics, 2023.
- [20] Subhodip Biswas, Fanglan Chen, Zhiqian Chen, Chang-Tien Lu, and Naren Ramakrishnan. Sampling-based techniques for designing school boundaries. *arXiv preprint arXiv:2206.03703*, 2022.
- [21] Zhiqian Chen and Zonghan Zhang. Demystifying graph convolution with a simple concatenation. *arXiv preprint arXiv:2207.12931*, 2022.
- [22] Guangyu Meng, Qisheng Jiang, Kaiqun Fu, Beiyu Lin, Chang-Tien Lu, and Zhqian Chen. Early forecasting of the impact of traffic accidents using a single shot observation. In *Proceedings of the 2022 SIAM International Conference on Data Mining (SDM)*, pages 100–108. Society for Industrial and Applied Mathematics, 2022.
- [23] Setareh Rafatirad, Houman Homayoun, Zhiqian Chen, and Sai Manoj Pudukotai Dinakarrao. Machine learning for computer scientists and data analysts: from an applied perspective, 2022.
- [24] Setareh Rafatirad, Houman Homayoun, Zhiqian Chen, and Sai Manoj Pudukotai Dinakarrao. Adversarial machine learning. In *Machine Learning for Computer Scientists and Data Analysts: From an Applied Perspective*, pages 305–328. Springer International Publishing Cham, 2022.
- [25] Setareh Rafatirad, Houman Homayoun, Zhiqian Chen, and Sai Manoj Pudukotai Dinakarrao. Applied machine learning for cloud resource management. In *Machine Learning for Computer Scientists and Data Analysts: From an Applied Perspective*, pages 405–427. Springer International Publishing Cham, 2022.
- [26] Setareh Rafatirad, Houman Homayoun, Zhiqian Chen, and Sai Manoj Pudukotai Dinakarrao. A brief review of probability theory and linear algebra. *Machine Learning for Computer Scientists and Data Analysts: From an Applied Perspective*, pages 35–79, 2022.
- [27] Setareh Rafatirad, Houman Homayoun, Zhiqian Chen, and Sai Manoj Pudukotai Dinakarrao. Graph learning. In *Machine Learning for Computer Scientists and Data Analysts: From an Applied Perspective*, pages 277–304. Springer International Publishing Cham, 2022.
- [28] Setareh Rafatirad, Houman Homayoun, Zhiqian Chen, and Sai Manoj Pudukotai Dinakarrao. Online learning. In *Machine Learning for Computer Scientists and Data Analysts: From an Applied Perspective*, pages 235–256. Springer International Publishing Cham, 2022.
- [29] Setareh Rafatirad, Houman Homayoun, Zhiqian Chen, and Sai Manoj Pudukotai Dinakarrao. Recommender learning. In *Machine Learning for Computer Scientists and Data Analysts: From an Applied Perspective*, pages 257–276. Springer International Publishing Cham, 2022.
- [30] Setareh Rafatirad, Houman Homayoun, Zhiqian Chen, and Sai Manoj Pudukotai Dinakarrao. Reinforcement learning. In *Machine Learning for Computer Scientists and Data Analysts: From an Applied Perspective*, pages 217–232. Springer International Publishing Cham, 2022.
- [31] Setareh Rafatirad, Houman Homayoun, Zhiqian Chen, and Sai Manoj Pudukotai Dinakarrao. Sensornet: An educational neural network framework for low-power multimodal data classification. In *Machine Learning for Computer Scientists and Data Analysts: From an Applied Perspective*, pages 331–357. Springer International Publishing Cham, 2022.
- [32] Setareh Rafatirad, Houman Homayoun, Zhiqian Chen, and Sai Manoj Pudukotai Dinakarrao. Supervised learning. In *Machine Learning for Computer Scientists and Data Analysts: From an Applied Perspective*, pages 81–162. Springer International Publishing Cham, 2022.

- [33] Setareh Rafatirad, Houman Homayoun, Zhiqian Chen, and Sai Manoj Pudukotai Dinakarrao. Transfer learning in mobile health. In *Machine Learning for Computer Scientists and Data Analysts: From an Applied Perspective*, pages 359–382. Springer International Publishing Cham, 2022.
- [34] Setareh Rafatirad, Houman Homayoun, Zhiqian Chen, and Sai Manoj Pudukotai Dinakarrao. Unsupervised learning. In *Machine Learning for Computer Scientists and Data Analysts: From an Applied Perspective*, pages 163–216. Springer International Publishing Cham, 2022.
- [35] Jason Wang, Kaiqun Fu, Zhiqian Chen, and Chang-Tien Lu. Augmentation of chinese character representations with compositional graph learning (student abstract). In *Proceedings of the AAAI Conference on Artificial Intelligence*, volume 36, pages 13075–13076, 2022.
- [36] Lei Zhang, Zhiqian Chen, Chang-Tien Lu, and Liang Zhao. From “dynamics on graphs” to “dynamics of graphs”: An adaptive echo-state network solution (student abstract). In *Proceedings of the AAAI Conference on Artificial Intelligence*, volume 36, pages 13111–13112, 2022.
- [37] Zonghan Zhang, Subhodip Biswas, Fanglan Chen, Kaiqun Fu, Taoran Ji, Chang-Tien Lu, Naren Ramakrishnan, and Zhiqian Chen. Blocking influence at collective level with hard constraints (student abstract). In *Proceedings of the AAAI Conference on Artificial Intelligence*, volume 36, pages 13115–13116, 2022.
- [38] Zhiqian Chen, Lei Zhang, Gaurav Kolhe, Hadi Mardani Kamali, Setareh Rafatirad, Sai Manoj Pudukotai Dinakarrao, Houman Homayoun, Chang-Tien Lu, and Liang Zhao. Deep graph learning for circuit deobfuscation. *Frontiers in big Data*, 4:608286, 2021.
- [39] Kaiqun Fu, Taoran Ji, Nathan Self, Zhiqian Chen, and Chang-Tien Lu. A hierarchical attention graph convolutional network for traffic incident impact forecasting. In *2021 IEEE International Conference on Big Data (Big Data)*, pages 1619–1624. IEEE, 2021.
- [40] Taoran Ji, Nathan Self, Kaiqun Fu, Zhiqian Chen, Naren Ramakrishnan, and Chang-Tien Lu. Dynamic multi-context attention networks for citation forecasting of scientific publications. In *Proceedings of the AAAI Conference on Artificial Intelligence*, volume 35, pages 7953–7960, 2021.
- [41] Guoming Li, Yanbo Huang, Zhiqian Chen, Gary D Chesser Jr, Joseph L Purswell, John Linhoss, and Yang Zhao. Practices and applications of convolutional neural network-based computer vision systems in animal farming: A review. *Sensors*, 21(4):1492, 2021.
- [42] Guoming Li, Xue Hui, Zhiqian Chen, Gary D Chesser Jr, and Yang Zhao. Development and evaluation of a method to detect broilers continuously walking around feeder as an indication of restricted feeding behaviors. *Computers and electronics in agriculture*, 181:105982, 2021.
- [43] Beiyu Lin, Xiaowei Jia, and Zhiqian Chen. Sdm 21 tutorial: Studying spread patterns of covid-19 based on spatiotemporal data. In *SIAM Data Mining 2021*, 2021.
- [44] Padmaksha Roy, Shailik Sarkar, Subhodip Biswas, Fanglan Chen, Zhiqian Chen, Naren Ramakrishnan, and Chang-Tien Lu. Deep diffusion-based forecasting of covid-19 by incorporating network-level mobility information. In *Proceedings of the 2021 IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining*, pages 168–175, 2021.
- [45] Subhodip Biswas, Fanglan Chen, Zhiqian Chen, Chang-Tien Lu, and Naren Ramakrishnan. Incorporating domain knowledge into memetic algorithms for solving spatial optimization problems. In *Proceedings of the 28th International Conference on Advances in Geographic Information Systems*, pages 25–35, 2020.
- [46] Subhodip Biswas, Fanglan Chen, Andreea Sistrunk, Sathappan Muthiah, Zhiqian Chen, Nathan Self, Chang-Tien Lu, and Naren Ramakrishnan. Geospatial clustering for balanced and proximal schools. In *Proceedings of the AAAI Conference on Artificial Intelligence*, volume 34, pages 13358–13365, 2020.
- [47] Fanglan Chen, Zhiqian Chen, Subhodip Biswas, Shuo Lei, Naren Ramakrishnan, and Chang-Tien Lu. Graph convolutional networks with kalman filtering for traffic prediction. In *Proceedings of the 28th international conference on advances in geographic information systems*, pages 135–138, 2020.
- [48] Zhiqian Chen, Gaurav Kolhe, Setareh Rafatirad, Chang-Tien Lu, Sai Manoj PD, Houman Homayoun, and Liang Zhao. Estimating the circuit de-obfuscation runtime based on graph deep learning. In *2020 Design, Automation & Test in Europe Conference & Exhibition (DATE)*, pages 358–363. IEEE, 2020.
- [49] Zhao Ding, Zhiqian Chen, Tianyi Ma, Chang-Tien Lu, Wenhui Ma, and Leon Shaw. Predicting the hydrogen release ability of libh4-based mixtures by ensemble machine learning. *Energy Storage Materials*, 27:466–477, 2020.
- [50] Zhao Ding, Shaoyuan Li, Yang Zhou, Zhiqian Chen, Weijie Yang, Wenhui Ma, and Leon Shaw. Libh4 for hydrogen storage-new perspectives. *Nano Materials Science*, 2(2):109–119, 2020.
- [51] Jianfeng He, Xuchao Zhang, Shuo Lei, Zhiqian Chen, Fanglan Chen, Abdulaziz Alhamadani, Bei Xiao, and Chang-Tien Lu. Towards more accurate uncertainty estimation in text classification. In *Proceedings of the 2020 Conference on Empirical Methods in Natural Language Processing (EMNLP)*, pages 8362–8372, 2020.
- [52] Subhodip Biswas, Fanglan Chen, Zhiqian Chen, Andreea Sistrunk, Nathan Self, Chang-Tien Lu, and Naren Ramakrishnan. Regal: A regionalization framework for school boundaries. In *Proceedings of the 27th ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems*, pages 544–547, 2019.

- [53] Taoran Ji, Zhiqian Chen, Nathan Self, Kaiqun Fu, Chang-Tien Lu, and Naren Ramakrishnan. Patent citation dynamics modeling via multi-attention recurrent networks. In *Proceedings of the Twenty-Eighth International Joint Conference on Artificial Intelligence (IJCAI-19)*, 2019.
- [54] Ying Zhang, Xingfeng He, Zhiqian Chen, Qiang Bai, Adelaide M Nolan, Charles A Roberts, Debasish Banerjee, Tomoya Matsunaga, Yifei Mo, and Chen Ling. Unsupervised discovery of solid-state lithium ion conductors. *Nature communications*, 10(1):5260, 2019.
- [55] Zhiqian Chen, Feng Chen, Rongjie Lai, Xuchao Zhang, and Chang-Tien Lu. Rational neural networks for approximating graph convolution operator on jump discontinuities. In *2018 IEEE International Conference on Data Mining (ICDM)*, pages 59–68. IEEE, 2018.
- [56] Kaiqun Fu, Zhiqian Chen, and Chang-Tien Lu. Streetnet: preference learning with convolutional neural network on urban crime perception. In *Proceedings of the 26th ACM SIGSPATIAL international conference on advances in geographic information systems*, pages 269–278, 2018.
- [57] Manu Shukla, Zhiqian Chen, and Chang-Tien Lu. Dimpl: a distributed in-memory drone flight path builder system. *Journal of Big Data*, 5:1–29, 2018.
- [58] Bingsheng Wang, Zhiqian Chen, Arnold P Boedihardjo, and Chang-Tien Lu. Virtual metering: An efficient water disaggregation algorithm via nonintrusive load monitoring. *ACM Transactions on Intelligent Systems and Technology (TIST)*, 9(4):1–30, 2018.
- [59] Xuchao Zhang, Liang Zhao, Zhiqian Chen, and Chang-Tien Lu. Distributed self-paced learning in alternating direction method of multipliers. *arXiv preprint arXiv:1807.02234*, 2018.
- [60] Zhiqian Chen, Chih-Wei Wu, Yen-Cheng Lu, Alexander Lerch, and Chang-Tien Lu. Learning to fuse music genres with generative adversarial dual learning. In *2017 IEEE International Conference on Data Mining (ICDM)*, pages 817–822. IEEE, 2017.
- [61] Zhiqian Chen, Xuchao Zhang, Arnold P Boedihardjo, Jing Dai, and Chang-Tien Lu. Multimodal storytelling via generative adversarial imitation learning. In *Proceedings of the Twenty-Sixth International Joint Conference on Artificial Intelligence (IJCAI-17)*, 2017.
- [62] Xuchao Zhang, Zhiqian Chen, Liang Zhao, Arnold P Boedihardjo, and Chang-Tien Lu. Traces: Generating twitter stories via shared subspace and temporal smoothness. In *2017 IEEE International Conference on Big Data (Big Data)*, pages 1688–1693. IEEE, 2017.
- [63] Xuchao Zhang, Liang Zhao, Zhiqian Chen, Arnold P Boedihardjo, Jing Dai, and Chang-Tien Lu. Trendi: Tracking stories in news and microblogs via emerging, evolving and fading topics. In *2017 IEEE International Conference on Big Data (Big Data)*, pages 1590–1599. IEEE, 2017.
- [64] Xuchao Zhang, Zhiqian Chen, Weisheng Zhong, Arnold P Boedihardjo, and Chang-Tien Lu. Storytelling in heterogeneous twitter entity network based on hierarchical cluster routing. In *2016 IEEE International Conference on Big Data (Big Data)*, pages 1522–1531. IEEE, 2016.
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- [66] Zhiqian Chen and Wenya Feng. Detecting impolite crawler by using time series analysis. In *2013 IEEE 25th International Conference on Tools with Artificial Intelligence*, pages 123–126. IEEE, 2013.