Tong Zhao

Research Scientist · Snap Inc., Seattle, WA

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Education

University of Notre Dame, Notre Dame, IN *Aug. 2017 - Apr. 2022*

Ph.D. in Computer Science & Engineering (GPA:3.7/4.0) (Advisor: Prof. Meng Jiang)

Case Western Reserve University, Cleveland, OH *Aug. 2013 - May 2017*

B.A. in Mathematics (GPA:3.6/4.0)

Professional Experience

Research Scientist *June 2022 - present*

Snap Inc. *Seattle, WA*

- I work on graph data mining, representation learning, anomaly detection, and user modeling in computational social science domains, specifically in the context of applying graph machine learning techniques on social platforms.

Applied Scientist Intern *June 2021 - Sept. 2021*

Amazon *Palo Alto, CA*

- Led a research project on automated graph data augmentation. The work is published at LoG 2022 [C17].

Research Intern *Jan. 2020 - Aug. 2020*

Snap Inc. *Santa Monica, CA*

- Led a research project on graph data augmentation for graph machine learning. The work is published at AAAI 2021 [C7].
- Co-developed a large scale graph neural network-based system for unsupervised user representation learning and supervised user age inference. (**Used in production**)

Graduate Teaching Assistant *Aug. 2018 - Dec. 2019*

University of Notre Dame *Notre Dame, IN*

- Data Science (Fall 2018, Fall 2019).

Honors & Awards

2021 **Amazon Post-Intern Fellowship** Amazon.

2020 **Snap Research Fellowship** Snap Inc.

2020 **SIGIR Student Travel Grant** the 29th ACM CIKM.

2020 **Best Paper Award** DLG-KDD 2020.

2019 **Outstanding Teaching Assistant Honorable Mention** University of Notre Dame.

Publications

Refereed Journal Publications

[J6] Daheng Wang, **Tong Zhao**, Wenhao Yu, Nitesh Chawla, and Meng Jiang. "Deep Multimodal Complementarity Learning." IEEE Transactions on Neural Networks and Learning Systems (**TNNLS**), 2022.

[J5] Yihao Hu, **Tong Zhao**, Shixin Xu, Zhiliang Xu, and Lizhen Lin. "Neural-PDE: A RNN based Neural Network for Solving Time Dependent PDEs." Communications in Information and Systems (**CIS**), 2022.

[J4] Meng Jiang, Taeho Jung, Ryan Karl, and **Tong Zhao**. "Federated Dynamic Graph Neural Networks with Secure Aggregation for Video-based Distributed Surveillance." ACM Transactions on Intelligent Systems and Technology (**TIST**), 2021.

[J3] **Tong Zhao**, Tianwen Jiang, Neil Shah, and Meng Jiang. "A Synergistic Approach for Graph Anomaly Detection with Pattern Mining and Feature Learning." IEEE Transactions on Neural Networks and Learning Systems (**TNNLS**), 2021.

[J2] Daheng Wang, Zhihan Zhang, Yihong Ma, **Tong Zhao**, Tianwen Jiang, Nitesh V. Chawla, and Meng Jiang. "Modeling Co-evolution of Attributed and Structural Information in Graph Sequence." IEEE Transactions on Knowledge and Data Engineering (**TKDE**), 2021.

[J1] Tianwen Jiang, Qingkai Zeng, **Tong Zhao**, Bing Qin, Ting Liu, Nitesh Chawla, and Meng Jiang. "Biomedical Knowledge Graphs Construction from Conditional Statements." IEEE/ACM Transactions on Computational Biology and Bioinformatics (**TCBB**), 2020.

Refereed Conference Publications

[C21] Wei Jin, **Tong Zhao**, Jiayuan Ding, Yozen Liu, Jiliang Tang, and Neil Shah. "Empowering Graph Representation Learning with Test-Time Graph Transformation." In International Conference on Learning Representations (**ICLR**). 2022.

[C20] Xiaotian Han, **Tong Zhao**, Yozen Liu, Xia Hu, and Neil Shah. "MLPInit: Embarrassingly Simple GNN Training Acceleration with MLP Initialization." In International Conference on Learning Representations (**ICLR**). 2022.

[C19] Mingxuan Ju, **Tong Zhao**, Qianlong Wen, Wenhao Yu, Neil Shah, Yanfang Ye, and Chuxu Zhang. "Multi-task Self-supervised Graph Neural Networks Enable Stronger Task Generalization." In International Conference on Learning Representations (**ICLR**). 2022.

[C18] William Shiao, Zhichun Guo, **Tong Zhao**, Evangelos E Papalexakis, Yozen Liu, and Neil Shah. "Link Prediction with Non-Contrastive Learning." In International Conference on Learning Representations (**ICLR**). 2022.

[C17] **Tong Zhao**, Xianfeng Tang, Danqing Zhang, Haoming Jiang, Nikhil Rao, Yiwei Song, Pallav Agrawal, Karthik Subbian, Bing Yin, and Meng Jiang. "AutoGDA: Automated Graph Data Augmentation for Node Classification." In the First Learning on Graphs Conference (**LoG**). 2022.

[C16] Yiwei Wang, Bryan Hooi, Yozen Liu, **Tong Zhao**, Zhichun Guo, and Neil Shah. "Flashlight: Scalable Link Prediction with Effective Decoders." In the First Learning on Graphs Conference (**LoG**). 2022.

[C15] Mingxuan Ju, Wenhao Yu, **Tong Zhao**, Chuxu Zhang, and Yanfang Ye. "Grape: Knowledge Graph Enhanced Passage Reader for Open-domain Question Answering." In Findings of Empirical Methods in Natural Language Processing (**EMNLP**). 2022.

[C14] Gang Liu, **Tong Zhao**, Jiaxin Xu, Tengfei Luo, and Meng Jiang. "Graph Rationalization with Environment-based Augmentations." In Proceedings of ACM SIGKDD International Conference on Knowledge Discovery and Data Mining (**KDD**). 2022.

[C13] **Tong Zhao**, Gang Liu, Daheng Wang, Wenhao Yu, and Meng Jiang. "Learning from Counterfactual Links for Link Prediction." In International Conference on Machine Learning (**ICML**). 2022.

[C12] Wenhao Yu, Chenguang Zhu, Lianhui Qin, Zhihan Zhang, **Tong Zhao**, and Meng Jiang. "Diversifying Content Generation for Commonsense Reasoning with Mixture of Knowledge Graph Experts." In Findings of Annual Meeting of the Association for Computational Linguistics (**ACL**). 2022.

[C11] Daheng Wang, **Tong Zhao**, Nitesh Chawla, and Meng Jiang. "Dynamic Attributed Graph Prediction with Conditional Normalizing Flows." In Proceedings of IEEE International Conference on Data Mining (**ICDM**). 2021.

[C10] Wenhao Yu, Chenguang Zhu, **Tong Zhao**, Zhichun Guo, and Meng Jiang. "Sentence-Permuted Paragraph Generation." In Proceedings of the Conference on Empirical Methods in Natural Language Processing (**EMNLP**). 2021.

[C9] **Tong Zhao***, Bo Ni*, Wenhao Yu, Zhichun Guo, Neil Shah, and Meng Jiang. "Action Sequence Augmentation for Early Graph-based Anomaly Detection." In Proceedings of ACM International Conference on Information and Knowledge Management (**CIKM**). 2021.

[C8] Yao Ma, Xiaorui Liu, **Tong Zhao**, Yozen Liu, Jiliang Tang, and Neil Shah. "A Unified View on Graph Neural Networks as Graph Signal Denoising." In Proceedings of ACM International Conference on Information and Knowledge Management (**CIKM**). 2021.

[C7] **Tong Zhao**, Yozen Liu, Leonardo Neves, Oliver Woodford, Meng Jiang, and Neil Shah. "Data Augmentation for Graph Neural Networks." In Proceedings of AAAI Conference on Artificial Intelligence (**AAAI**). 2021.

[C6] **Tong Zhao**, Chuchen Deng, Kaifeng Yu, Tianwen Jiang, Daheng Wang, and Meng Jiang. "Error-bounded Graph Anomaly Loss for GNNs." In Proceedings of ACM International Conference on Information and Knowledge Management (**CIKM**). 2020.

[C5] Wenhao Yu, Mengxia Yu, **Tong Zhao**, and Meng Jiang. "Identifying Referential Intention with Heterogeneous Contexts." In Proceedings of the Web Conference (**WWW**). 2020.

[C4] Tianwen Jiang, Zhihan Zhang, **Tong Zhao**, Bing Qin, Ting Liu, Nitesh V. Chawla, and Meng Jiang. "CTGA: Graph-based Biomedical Literature Search." In Proceedings of IEEE International Conference on Bioinformatics and Biomedicine (**BIBM**). 2019.

[C3] Tianwen Jiang, **Tong Zhao**, Bing Qin, Ting Liu, Nitesh V. Chawla, and Meng Jiang. "Multi-input Multi-output Sequence Labeling for Joint Extraction of Fact and Condition Tuples from Scientific Text." In Proceedings of the Conference on Empirical Methods in Natural Language Processing (**EMNLP**). 2019.

[C2] Tianwen Jiang, **Tong Zhao**, Bing Qin, Ting Liu, Nitesh V. Chawla, and Meng Jiang. "The Role of 'Condition': A Novel Scientific Knowledge Graph Representation and Construction Model." In Proceedings of ACM SIGKDD International Conference on Knowledge Discovery and Data Mining (**KDD**). 2019.

[C1] **Tong Zhao**, Matthew Malir, and Meng Jiang. "Actionable Objective Optimization for Suspicious Behavior Detection on Large Bipartite Graphs." In Proceedings of IEEE International Conference on Big Data (**BigData**). 2018.

Refereed Workshop Publications

[W6] Songtao Liu, Shixiong Jing, **Tong Zhao**, Zengfeng Huang, and Dinghao Wu. "Enhancing Multi-hop Connectivity for Graph Convolutional Networks." In Workshop on Pre-training at International Conference on Machine Learning (ICML). 2022.

[W5] **Tong Zhao**, Chuchen Deng, Kaifeng Yu, Tianwen Jiang, Daheng Wang, and Meng Jiang. "GNN-based Graph Anomaly Detection with Graph Anomaly Loss." In Workshop on Deep Learning on Graphs (DLG-KDD) at ACM SIGKDD International Conference on Knowledge Discovery and Data Mining (KDD). 2020.

[W4] **Tong Zhao***, Bo Ni*, Wenhao Yu, and Meng Jiang. "Early Fraud Detection with Augmented Graph Learning." In Workshop on Deep Learning on Graphs (DLG-KDD) at ACM SIGKDD International Conference on Knowledge Discovery and Data Mining (KDD). 2020.

[W3] Daheng Wang, Zhihan Zhang, Yihong Ma, **Tong Zhao**, Tianwen Jiang, Nitesh V. Chawla, and Meng Jiang. "Learning Attribute-Structure Co-Evolutions in Dynamic Graphs." In Workshop on Deep Learning on Graphs (DLG-KDD) at ACM SIGKDD International Conference on Knowledge Discovery and Data Mining (KDD). 2020. (**Best Paper Award**)

[W2] Yang Zhou, **Tong Zhao**, and Meng Jiang. "A Probabilistic Model with Commonsense Constraints for Pattern-based Temporal Fact Extraction." In Workshop on Fact Extraction and Verification (FEVER) at Annual Meeting of the Association for Computational Linguistics (ACL), 2020.

[W1] Tianwen Jiang, **Tong Zhao**, Bing Qin, Ting Liu, Nitesh V. Chawla, and Meng Jiang. "Constructing Information-Lossless Biological Knowledge Graphs from Conditional Statements." In International Workshop on Data Mining in Bioinformatics (BioKDD) at ACM SIGKDD International Conference on Knowledge Discovery and Data Mining (KDD). 2019.

Refereed Conference Tutorials

[T1] **Tong Zhao**, Kaize Ding, Wei Jin, Gang Liu, Meng Jiang, and Neil Shah. "Augmentation Methods for Graph Learning." In the SIAM International Conference on Data Mining (**SDM**). 2023.

Preprints

[P2] Zhichun Guo, William Shiao, Shichang Zhang, Yozen Liu, Nitesh Chawla, Neil Shah, and **Tong Zhao**. "Linkless Link Prediction via Relational Distillation." arXiv:2210.05801.

[P1] **Tong Zhao**, Wei Jin, Yozen Liu, Yingheng Wang, Gang Liu, Stephan Günnemann, Neil Shah, and Meng Jiang. "Graph Data Augmentation for Graph Machine Learning: A Survey." arXiv:2202.08871.

Academic Experience

Invited Talks

2022 Keynote for MLoG workshop at ICDM.
2022 Panelist for Mis2-TrueFact workshop at KDD.
2022 Keynote for Mis2-TrueFact workshop at KDD.
2022 Invited speaker at DGL user group.
2022 Invited speaker at shenlanxueyuan.com.
2021 Invited speaker for A9 (Amazon Search & Ads) ML research talk.

Service

Organization

Proceeding Chair for Machine Learning on Graphs Workshop (MLoG) at WSDM, 2022.
Session Chair for "Recommendation Systems" session at KDD, 2022.
Session Chair for "Graphs and Networks" session at ECML-PKDD, 2021.

Conference Program Committee / Reviewer

International Conference on Machine Learning (ICML): 2022, 2023
International Conference on Learning Representations (ICLR): 2022, 2023
Conference on Neural Information Processing Systems (NeurIPS): 2020-2022
ACM SIGKDD International Conference on Knowledge Discovery and Data Mining (KDD): 2020-2022
AAAI Conference on Artificial Intelligence (AAAI): 2021-2023
ACM International Conference on Knowledge Management (CIKM): 2021, 2022
The Web Conference (TheWebConf/WWW): 2021, 2022
International Conference on Web Search and Data Mining (WSDM): 2021-2023
International Joint Conference on Artificial Intelligence (IJCAI): 2021-2023
SIAM Conference on Data Mining (SDM): 2022, 2023
Learning on Graphs Conference (LoG): 2022
European Conf. on Machine Learning and Principles and Practice of Knowledge Discovery in Databases (ECML-PKDD): 2021, 2022

Journal Reviewer

IEEE Transactions on Neural Networks and Learning Systems (TNNLS)
IEEE Transactions on Knowledge and Data Engineering (TKDE)
IEEE Transactions on Big Data (TBD)
Transactions on Machine Learning Research (TMLR)
ACM Transactions on Knowledge Discovery from Data (TKDD)
Patttern Recognition (PR)
Neurocomputing (NEUCOM)
Knowledge-Based Systems (KNOSYS)
Digital Signal Processing (DSP)
Data Mining and Knowledge Discovery (DAMI)
Frontiers in Big Data

Mentorship

Ms. Yunshu Wu (PhD student at University of California Riverside, 2022-2023)
Ms. Zhichun Guo (Research Intern at Snap Inc., 2022-2023)
Mr. William Shiao (Research Intern at Snap Inc., 2022)
Mr. Wei Jin (Research Intern at Snap Inc., 2022)
Mr. Xiaotian Han (Research Intern at Snap Inc., 2022)
Mr. Gang Liu (PhD student at University of Notre Dame, 2021-2023)
Mr. Mingxuan Ju (PhD student at University of Notre Dame, 2022-2023)
Mr. Bo Ni (undergraduate student at University of Notre Dame, 2020)
Mr. Chuchen Deng (visiting undergraduate student at University of Notre Dame, 2019)
Ms. Kaifeng Yu (visiting undergraduate student at University of Notre Dame, 2019)