

Tong Zhao

Final-year Ph.D. Student · University of Notre Dame, Notre Dame, IN

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Research Interests

Graph machine learning, Representation learning, Anomaly detection, and User modeling.

Education

University of Notre Dame, Notre Dame, IN

Aug. 2017 - May. 2022 (expected)

PH.D. IN COMPUTER SCIENCE & ENGINEERING (GPA:3.7/4.0) (ADVISOR: PROF. MENG JIANG)

Case Western Research University, Cleveland, OH

Aug. 2013 - May 2017

B.A. IN MATHEMATICS (GPA:3.6/4.0)

Professional Experience

Applied Scientist Intern

June 2020 - Sept. 2020

AMAZON

Palo Alto, CA

- Led a research project on automated graph data augmentation. The work is under review at KDD 2022.

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 age/gender inference. (**Used in production**)

Graduate Teaching Assistant

Aug. 2018 - Dec. 2019

UNIVERSITY OF NOTRE DAME

Notre Dame, IN

- Data Science (Fall 2018, Fall 2019).

Peer Tutor

Sept. 2016 - May 2017

CASE WESTERN RESERVE UNIVERSITY

Cleveland, OH

- Provided on-campus tutoring for undergraduate students in EECS courses.

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

[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

- [C12] Wenhao Yu, Chenguang Zhu, Lianhui Qin, Zhihan Zhang, **Tong Zhao**, and Meng Jiang. “Diverse Generative Reasoning on Commonsense Knowledge Graphs.” 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. (Oral)

REFEREED WORKSHOP PUBLICATIONS

- [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.

PREPRINTS

[P2] **Tong Zhao**, Gang Liu, Stephan Günnemann, and Meng Jiang. “Graph Data Augmentation for Graph Machine Learning: A Survey.” arXiv:2202.08871. Under review at IJCAI 2022.

[P1] **Tong Zhao**, Gang Liu, Daheng Wang, Wenhao Yu, and Meng Jiang. “Counterfactual Graph Learning for Link Prediction.” arXiv:2106.02172. Under review at ICML 2022.

Academic Experience

TALKS

- 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

- 2022 **Proceeding Chair** Machine Learning on Graphs Workshop (MLOG) at ACM International Conference on Web Search and Data Mining (WSDM)
- 2022 **Invited Journal Reviewer** TKDE, TKDD, TBD, Neurocomputing.
- 2022 **Invited Conference PC member/Reviewer** WSDM, AAI, ICLR, IJCAI-ECAI, SDM, KDD, ICML, CIKM.
- 2021 **Conference Session Chair** ECML-PKDD.
- 2021 **Invited Journal Reviewer** TNNLS, TKDE, Frontiers in Big Data, Knowledge-Based Systems, Neurocomputing, Digital Signal Processing.
- 2021 **Invited Conference PC member/Reviewer** AAI, IJCAI, ECML-PKDD, KDD, NeurIPS, CIKM.
- 2021 **Conference Subreviewer** WWW, WSDM, ICMD.
- 2020 **Invited Journal Reviewer** Frontiers in Big Data.
- 2020 **Invited Conference PC member/Reviewer** NeurIPS, LXAI at ICML.
- 2020 **Conference Subreviewer** BigCom, KDD, ICMD.

MENTORSHIP

- 2021 Mr. Gang Liu (CSE PhD student at University of Notre Dame)
- 2020 Mr. Bo Ni (CSE undergraduate student at University of Notre Dame)
- 2019 Mr. Chuchen Deng (visiting CSE student at University of Notre Dame)
- 2019 Ms. Kaifeng Yu (visiting CSE student at University of Notre Dame)