

# Tong Zhao

355 Fitzpatrick Hall, Department of Computer Science and Engineering, University of Notre Dame, Notre Dame, IN 46556

☎ (+1) 216-785-3351 | ✉ tzhao2@nd.edu | 🌐 tzhao.io | 📱 zhao-tong | 🌐 zhao-tong | 📄 Google Scholar

## 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 for graph neural networks. The work is under review at AAAI 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**)

## 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

[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

[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

- [P3] **Tong Zhao**, Gang Liu, Daheng Wang, Wenhao Yu, and Meng Jiang. “Counterfactual Graph Learning for Link Prediction.” arXiv:2106.02172. Under review at ICLR 2022.
- [P2] Meng Jiang, Taeho Jung, Ryan Karl, and **Tong Zhao**. “Federated Dynamic GNN with Secure Aggregation.” arXiv:2009.07351.
- [P1] Yihao Hu, **Tong Zhao**, Zhiliang Xu, and Lizhen Lin. “Neural Time-Dependent Partial Differential Equation.” arXiv:2009.03892.

## Professional Services

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- 2022 **Invited Conference PC member/Reviewer**, WSDM, AAAI, ICLR, IJCAI-ECAI, SDM.
- 2021 **Conference Session Chair**, ECML-PKDD.
- 2021 **Invited Journal Reviewer**, TNNLS, TKDE, Frontiers in Big Data.
- 2021 **Invited Conference PC member/Reviewer**, AAAI, IJCAI, ECML-PKDD, KDD, NeurIPS, CIKM.
- 2020 **Invited Journal Reviewer**, Frontiers in Big Data.
- 2020 **Invited Conference PC member/Reviewer**, NeurIPS, LXAI at ICML.