

# Tong Zhao

Research Scientist · Snap Inc., Seattle, WA

☎ (+1) 216-785-3351 | ✉ tzhao@snap.com | 🏠 tzhao.io | 📱 zhao-tong | 📁 zhao-tong | 📖 Google Scholar

## 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.

### 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

- [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. (Oral)

## 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.

## PREPRINTS

[P1] **Tong Zhao**, Gang Liu, Stephan Günnemann, and Meng Jiang. “Graph Data Augmentation for Graph Machine Learning: A Survey.” arXiv:2202.08871.

## Academic Experience

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### INVITED TALKS

- 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

International Conference on Learning Representations (ICLR): 2022, 2023

Conference on Neural Information Processing Systems (NeurIPS): 2020-2022

ACM SIGKDD Int'l Conf. 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, 2022

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)

ACM Transactions on Knowledge Discovery from Data (TKDD)

Pattttern Recognition (PR)  
Neurocomputing (NEUCOM)  
Knowledge-Based Systems (KNOSYS)  
Digital Signal Processing (DSP)  
Frontiers in Big Data

## **MENTORSHIP**

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