

Tong Zhao

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Research Interests

Graph machine learning, graph mining, computational behavior modeling, and graph anomaly detection.

Education

University of Notre Dame, Notre Dame, IN

Aug. 2017 - expect 2022

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 automatic 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].
- Helped in the implementation of 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).

Honors & Awards

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

[C8] **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.

[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. (* for equal contributions)
- [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

- [P5] **Tong Zhao**, Gang Liu, Daheng Wang, Wenhao Yu, and Meng Jiang. “Counterfactual Graph Learning for Link Prediction.” arXiv:2106.02172.
- [P4] Meng Jiang, Taeho Jung, Ryan Karl, and **Tong Zhao**. “Federated Dynamic GNN with Secure Aggregation.” arXiv:2009.07351.
- [P3] Wenhao Yu, Chenguang Zhu, **Tong Zhao**, Zhichun Guo, and Meng Jiang. “Sentence-Permuted Paragraph Generation.” arXiv:2104.07228.
- [P2] Yihao Hu, **Tong Zhao**, Zhiliang Xu, and Lizhen Lin. “Neural Time-Dependent Partial Differential Equation.” arXiv:2009.03892.
- [P1] Yao Ma, Xiaorui Liu, **Tong Zhao**, Yozen Liu, Jiliang Tang, and Neil Shah. “A Unified View on Graph Neural Networks as Graph Signal Denoising.” arXiv:2010.01777.

Professional Services

- 2022 **Invited Conference PC member/Reviewer**, WSDM, AAAI, ICLR, IJCAI-ECAI.
- 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.