# Zhaocheng Zhu

6666 St Urbain St, Montréal, QC H2S 3H1, Canada

(+1)514-994-9516 ⋄ `https://kiddozhu.github.io` ⋄ zhaocheng.zhu@umontreal.ca

## EDUCATION

**Mila - Québec AI Institute / Université de Montréal**, Canada — *Sep. 2019 - Present*
Ph.D. in Computer Science (expected graduation: Aug. 2024)
· Reasoning, Knowledge Graphs, Machine Learning Systems
Advisor: Jian Tang

**Mila - Québec AI Institute / Université de Montréal**, Canada — *Sep. 2018 - Aug. 2019*
M.Sc. in Computer Science, transferred to Ph.D.
· Graph Representation learning, Machine Learning Systems
Advisor: Jian Tang

**Peking University**, China — *Sep. 2014 - July 2018*
B.S. in Computer Science (with honors)
· Natural Language Processing, Unsupervised Representation Learning, Word Semantics
Advisor: Junfeng Hu
· Computer Vision, Object Detection
Thesis Advisor: Yizhou Wang, Jifeng Dai (Microsoft Research Asia)

## INTERNSHIP

**Google**, Sunnyvale, United States — *Sep. 2023 - Apr. 2024*
· Reasoning and tool use with large language models
· Retrieval-augmented generation for multi-hop question answering
Mentor: Hanjun Dai, Yuan Xue

**Google**, Remote from Canada — *Apr. 2023 - June 2023*
· Factuality and hallucination in large language models
· Learning explicit rules with large language models
Mentor: Hanjun Dai, Yuan Xue

**Microsoft Research Asia**, Beijing, China — *Sep. 2017 - May 2018*
· Video object detection with optical flow and temporal context
· Reproduction of Mask R-CNN for keypoint detection
· Towards accurate localization in object detection
Mentor: Jifeng Dai

**Carnegie Mellon University**, Pittsburgh, United States — *July 2017 - Sep. 2017*
· Stacked local linear explanations for deep neural networks
Advisor: Pradeep Ravikumar

**Mitsubishi Information Technology R&D Center**, Kamakura, Japan — *July 2016 - Aug. 2016*
· Dialog State Tracking Challenge 5
· Chinese language understanding for navigation systems
Mentor: Yusuke Koji

## TUTORIALS

**Reasoning on Knowledge Graphs: Symbolic or Neural?**
Meng Qu, **Zhaocheng Zhu**, Jian Tang. In *Proceedings of the AAAI Conference on Artificial Intelligence*, 2022.

## PUBLICATIONS

**Zero-shot Logical Query Reasoning on any Knowledge Graph**
Mikhail Galkin, Jincheng Zhou, Bruno Ribeiro, Jian Tang, **Zhaocheng Zhu**.
*arXiv preprint arXiv:2404.07198*, 2024.

**Towards Foundation Models for Knowledge Graph Reasoning**
Mikhail Galkin, Xinyu Yuan, Hesham Mostafa, Jian Tang, **Zhaocheng Zhu**. In *International Conference on Learning Representations*, 2024.

**Towards Foundation Models for Molecular Learning on Large-Scale Multi-Task Datasets**
Dominique Beaini, Shenyang Huang, Joao Alex Cunha, Gabriela Moisescu-Pareja, Oleksandr Dymov, Samuel Maddrell-Mander, Callum McLean, Frederik Wenkel, Luis Mller, Jama Hussein Mohamud, Ali Parviz, Michael Craig, Micha Koziarski, Jiarui Lu, **Zhaocheng Zhu**, Cristian Gabellini, Kerstin Klaser, Josef Dean, Cas Wognum, Maciej Sypetkowski, Guillaume Rabusseau, Reihaneh Rabbany, Jian Tang, Christopher Morris, Ioannis Koutis, Mirco Ravanelli, Guy Wolf, Prudencio Tossou, Hadrien Mary, Therence Bois, Andrew Fitzgibbon, Baej Banaszewski, Chad Martin, Dominic Masters. In *International Conference on Learning Representations*, 2024.

**A*Net: A Scalable Path-based Reasoning Approach for Knowledge Graphs**
**Zhaocheng Zhu**[*], Xinyu Yuan[*], Mikhail Galkin, Sophie Xhonneux, Ming Zhang, Maxime Gazeau, Jian Tang. In *Conference on Neural Information Processing Systems*, 2023.

**Large Language Models can Learn Rules**
**Zhaocheng Zhu**, Yuan Xue, Xinyun Chen, Denny Zhou, Jian Tang, Dale Schuurmans, Hanjun Dai.
*arXiv preprint arXiv:2310.07064*, 2023.

**GraphText: Graph Reasoning in Text Space**
Jianan Zhao, Le Zhuo, Yikang Shen, Meng Qu, Kai Liu, Michael Bronstein, **Zhaocheng Zhu**, Jian Tang. *arXiv preprint arXiv:2310.01089*, 2023.

**Neural Graph Reasoning: Complex Logical Query Answering Meets Graph Databases**
Hongyu Ren[*], Mikhail Galkin[*], Michael Cochez, **Zhaocheng Zhu**, Jure Leskovec. *arXiv preprint arXiv:2303.14617*, 2023.

**Inductive Logical Query Answering in Knowledge Graphs**
Mikhail Galkin, **Zhaocheng Zhu**, Hongyu Ren, Jian Tang. In *Conference on Neural Information Processing Systems*, 2022.

**PEER: A Comprehensive and Multi-Task Benchmark for Protein Sequence Understanding**
Minghao Xu, Zuobai Zhang, Jiarui Lu, **Zhaocheng Zhu**, Yangtian Zhang, Chang Ma, Runcheng Liu, Jian Tang. In *Conference on Neural Information Processing Systems (Datasets and Benchmarks Track)*, 2022.

**Neural-Symbolic Models for Logical Queries on Knowledge Graphs**
**Zhaocheng Zhu**, Mikhail Galkin, Zuobai Zhang, Jian Tang. In *International Conference on Machine Learning*, 2022.

**TorchDrug: A Powerful and Flexible Machine Learning Platform for Drug Discovery**
**Zhaocheng Zhu**, Chence Shi, Zuobai Zhang, Shengchao Liu, Minghao Xu, Xinyu Yuan, Yangtian Zhang, Junkun Chen, Huiyu Cai, Jiarui Lu, Chang Ma, Runcheng Liu, Louis-Pascal Xhonneux, Meng Qu, Jian Tang. *arXiv preprint arXiv:2202.08320*, 2022.

**Neural Bellman-Ford Networks: A General Graph Neural Network Framework for Link Prediction**
**Zhaocheng Zhu**, Zuobai Zhang, Louis-Pascal Xhonneux, Jian Tang. In *Conference on Neural Information Processing Systems*, 2021. Rank 12/39 in the link prediction task of OGB-LSC.

**KEPLER: A Unified Model for Knowledge Embedding and Pre-trained Language Representation**
Xiaozhi Wang, Tianyu Gao, **Zhaocheng Zhu**, Zhengyan Zhang, Zhiyuan Liu, Juanzi Li, Jian Tang. In *Transactions of the Association for Computational Linguistics*, 2021.

**GraphAF: A Flow-based Autoregressive Model for Molecular Graph Generation**
Chence Shi[*], Minkai Xu[*], **Zhaocheng Zhu**, Weinan Zhang, Ming Zhang, Jian Tang. In *International Conference on Learning Representations*, 2020

**Self-Adaptive Network Pruning**
Jinting Chen, **Zhaocheng Zhu**, Cheng Li, Yuming Zhao. In *International Conference on Neural Information Processing*, 2019. (Best Student Paper Finalist)

**GraphVite: A High-Performance CPU-GPU Hybrid System for Node Embedding**
**Zhaocheng Zhu**, Shizhen Xu, Meng Qu and Jian Tang. In *The World Wide Web Conference*, 2019.

**Saliency Supervision: An Intuitive and Effective Approach for Pain Intensity Regression**
Conghui Li, **Zhaocheng Zhu** and Yuming Zhao. In *International Conference on Neural Information Processing*, 2018.

**Context Aware Document Embedding**
**Zhaocheng Zhu** and Junfeng Hu. *arXiv preprint arXiv:1707.01521*, 2017.

**Dialog State Tracking with Attention-based Sequence-to-Sequence Learning**
Takaaki Hori, Hai Wang, Chiori Hori, Shinji Watanabe, Bret Harsham, Jonathan Le Roux, John R Hershey, Yusuke Koji, Yi Jing, **Zhaocheng Zhu** and Takeyuki Aikawa. In *IEEE Spoken Language Technology Workshop (SLT)*, 2016. (Runner up at Dialog State Tracking Challenge 5)

## SELECTED PROJECTS

**TorchDrug: A Powerful and Flexible Machine Learning Platform for Drug Discovery** (leader of TorchDrug team)
Machine learning development platform for drug discovery in PyTorch. Support 6 tasks, more than 25 models. Over 1,400 stars and 51,000 downloads.
Featured in *PyTorch ecosystem*. Supported by NVIDIA Applied Research Accelerator Program.
https://torchdrug.ai    https://github.com/DeepGraphLearning/torchdrug

**GraphVite: A General and High-Performance Graph Embedding System for Various Applications** (leader of GraphVite team)
General and high-performance graph embedding system. Support 3 applications, 10 models and more than 40 baseline benchmarks. Over 1,200 stars and 36,000 downloads.
https://graphvite.io    https://github.com/DeepGraphLearning/graphvite

**Literature of Deep Learning for Graphs** (with Meng Qu and Weiping Song)
Comprehensive paper list of deep learning for graphs. Over 3,000 stars.
https://github.com/DeepGraphLearning/LiteratureDL4Graph

## HONORS AND AWARDS

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| NVIDIA Applied Research Accelerator Program | *2022* |
| Tuition Fee Exemption Scholarships, Université de Montréal | *2019 - 2021* |
| Outstanding Graduate Student, Peking University | *2018* |
| Top Talent Class of EECS, Peking University | *2016 - 2018* |

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| Outstanding Research Award, Peking University | *2016* |
| Kwang-Hua Scholarship, Peking University | *2016* |
| Honorable Mention, Mathematical Contest in Modeling (MCM) | *2016* |
| Merit Student, Peking University | *2015* |
| Tung OCCL Scholarship, Peking University | *2015* |
| Honorable Mention, Mathematical Contest in Modeling (MCM) | *2015* |
| Group Champion, Peking University Debate Competition for Freshman | *2014* |
| Second Prize (ranked 86th in China), National Olympiad in Informatics (NOI) | *2013* |

## SERVICE

**Academic Reviewer**
- ICML · *2024*
- WWW, ICML, KDD, NeurIPS, LoG · *2023*
- TKDE, ICML, NeurIPS · *2022*
- GNNSys Workshop (MLSys) · *2021*
- DLG Workshop (KDD) · *2020*
- GRL Workshop (NeurIPS) · *2019*

**Mentoring & Teaching**
- Mentor, Buddy Program for New Students, Mila · *2019 - 2021*
- Reviewer, PhD / MSc Recruitment, Mila · *2019 - 2021*
- Teaching Assistant, Machine Learning II, HEC Montréal · *Winter 2020*

**Social & Leadership**
- Lab representatives[1] (11 out of 1,000+ students), Mila · *Nov. 2022 - Nov. 2023*
- League branch secretary, Society of Photography, Peking University · *Sep. 2017 - June 2018*
- Leader of story portrait group, Society of Photography, Peking University · *Apr. 2015 - Aug. 2017*
- Member of organizers & news team, HackPKU, Peking University · *Apr. 2016*
- Member of debate team, School of EECS, Peking University · *Sep. 2014 - June 2015*

## SKILLS

**Programming Languages:**
- Proficient: C/C++, Python, CUDA, Pascal/Object Pascal
- Capable: MATLAB, SQL, Bash, Assembly, HTML/CSS

**Software Development:** OOP design, refactorization ($> 20k$ lines), parallel programming

**Deep Learning:** PyTorch, MXNet, Keras, TensorFlow

**Toolchains:** Git, LaTeX, GDB, CMake, Conda(build), Pip(build), Photoshop

**Languages:** Mandarin Chinese(native), English(proficient), French(beginner)

**Open-Source Contributions:** PyTorch-Geometric, Gensim, PyKEEN, OpenFold, Graphium

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[1]A committee that serves students and represents students in meetings with professors and staffs.