

TUAN DUNG “JOSH” NGUYEN

Department of Computer and Information Science
School of Engineering and Applied Science
University of Pennsylvania
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EDUCATION

Ph.D. in Computer and Information Science

University of Pennsylvania
Advisor: Duncan Watts

2023–now

Philadelphia, PA, USA

M.Phil. in Computer Science

Australian National University
Advisors: Lexing Xie and Colin Klein

2021–2023

Canberra, ACT, Australia

B.S. in Computing and Software Systems

University of Melbourne
First class honours

2018–2020

Melbourne, VIC, Australia

EXPERIENCE

Visiting Student

Mathematics and Computer Science Division, Argonne National Laboratory
Collaborator: Sandeep Madireddy
Project: *Holistic Evaluation of Large Language Models in Specialized Scientific Domains*

2024–now

Lemont, IL, USA

Research Associate

Research School of Astronomy, Australian National University
Collaborators: Yuan-Sen Ting and Ioana Ciucă
Project: *Large Language Models for Astronomical Research*

2023–2023

Canberra, ACT, Australia

Summer Research Scholar

Computational Media Lab, Australian National University
Advisor: Lexing Xie
Project: *Data-Driven Understanding of Real-Life Moral Dilemmas*

2020–2021

Canberra, ACT, Australia

Research Intern

Faculty of Engineering, University of Sydney
Advisor: Nguyen Tran
Project 1: *Federated Learning with Stochastic Variance Reduced Gradient Algorithms*
Project 2: *Personalized Federated Learning with Moreau Envelopes* (Best CS Project)

2019–2020

Sydney, NSW, Australia

Vacation Research Scholar

School of Mathematics and Statistics, University of Melbourne
Advisor: Charl Ras
Project: *Analysis and Design of R-Resilient Graph Embeddings*

2019–2019

Melbourne, VIC, Australia

RESEARCH INTERESTS

Computational Social Science, Machine Learning, Natural Language Processing, Cognitive Science, Social Psychology, Network Science, Commonsense Knowledge and Intelligence, Numerical Optimization, Statistics, Practical Ethics and Artificial Intelligence for Science.

HONORS AND AWARDS

Conference Travel Grant, School of Engineering and Applied Science, University of Pennsylvania, 2024.

George M. Ball, Jr. First-Year Ph.D. Fellowship, Department of Computer and Information Science, University of Pennsylvania, 2023.

Ph.D. Fellowship, Department of Computer and Information Science, University of Pennsylvania, 2023–now.

Vice-Chancellor’s Travel Grant – Higher Degree Research, Australian National University, 2022.

M.Phil. Scholarship, Australian National University, 2021–2023.

Summer Research Scholarship, Australian National University, 2020.

Project Recognition, Innovation Expo, Vietnam-Australia Innovation Network (NIC-AU), 2020.

Dean’s Honour List, Faculty of Science, University of Melbourne, 2018–2020

Undergraduate Student Scholarship, University of Melbourne, 2020.

Summer Research Scholarship, Faculty of Engineering, University of Sydney, 2020.

Summer Research Scholarship, School of Mathematics and Statistics, University of Melbourne, 2019.

PUBLICATIONS

Google Scholar: <https://scholar.google.com/citations?user=mmylv8oAAAAJ>

Semantic Scholar: <https://semanticscholar.org/author/Tuan-Dung-Nguyen/2116225572>

ORCID: <https://orcid.org/0000-0002-1105-005X>

REFEREED JOURNAL ARTICLES

- [1] Long Tan Le, Tung-Anh Nguyen, **Tuan Dung Nguyen**, Nguyen H. Tran, Nguyen Binh Truong, Phuong L. Vo, Bui Thanh Hung, and Tuan Anh Le. “Distributionally Robust Federated Learning for Mobile Edge Networks”. In: *Mobile Networks and Applications* (2024). DOI: 10.1007/s11036-024-02316-w.
- [2] Tung-Anh Nguyen, Long Tan Le, **Tuan Dung Nguyen**, Wei Bao, Suranga Seneviratne, Choong Seon Hong, and Nguyen H. Tran. “Federated PCA on Grassmann Manifold for IoT Anomaly Detection”. In: *IEEE/ACM Transactions on Networking* 34.5 (2024), pp. 4456–4471. DOI: 10.1109/TNET.2024.3423780.
- [3] Yuan-Sen Ting, **Tuan Dung Nguyen**, Tirthankar Ghosal, Rui Pan, Hardik Arora, Zechang Sun, Tijmen de Haan, Nesar Ramachandra, Azton Wells, Sandeep Madireddy, and Alberto Accomazzi. “AstroMLab 1: Who Wins Astronomy Jeopardy!?” In: *Astronomy and Computing* (2024), p. 100893. DOI: 10.1016/j.ascom.2024.100893.
- [4] Canh T. Dinh, Nguyen H. Tran, **Tuan Dung Nguyen**, Wei Bao, Amir Rezaei Balef, Bing B. Zhou, and Albert Y. Zomaya. “DONE: Distributed Approximate Newton-type Method for Federated Edge Learning”. In: *IEEE Transactions on Parallel and Distributed Systems* 33.11 (2022), pp. 2648–2660. DOI: 10.1109/TPDS.2022.3146253.

- [5] **Tuan Dung Nguyen**, Amir R. Balef, Canh T. Dinh, Nguyen H. Tran, Duy T. Ngo, Tuan Anh Le, and Phuong L. Vo. “Accelerating Federated Edge Learning”. In: *IEEE Communications Letters* 25.10 (2021), pp. 3282–3286. DOI: 10.1109/LCOMM.2021.3103536.

PEER-REVIEWED CONFERENCE PAPERS

- [1] Long Tan Le, **Tuan Dung Nguyen**, Tung-Anh Nguyen, Choong Seon Hong, Suranga Seneviratne, Wei Bao, and Nguyen H. Tran. “Federated Deep Equilibrium Learning: Harnessing Compact Global Representations to Enhance Personalization”. In: *Proceedings of the 33rd ACM International Conference on Information and Knowledge Management*. 2024, pp. 1132–1142. DOI: 10.1145/3627673.3679752.
- [2] Anh Duc Nguyen, **Tuan Dung Nguyen**, Quang Minh Nguyen, Hoang H. Nguyen, Lam M. Nguyen, and Kim-Chuan Toh. “On Partial Optimal Transport: Revising the Infeasibility of Sinkhorn and Efficient Gradient Methods”. In: *Proceedings of the AAAI Conference on Artificial Intelligence* 38.8 (2024), pp. 8090–8098. DOI: 10.1609/aaai.v38i8.28648.
- [3] **Tuan Dung Nguyen**, Ziyu Chen, Nicholas George Carroll, Alasdair Tran, Colin Klein, and Lexing Xie. “Measuring Moral Dimensions in Social Media with Mformer”. In: *Proceedings of the International AAAI Conference on Web and Social Media* 18.1 (2024), pp. 1134–1147. DOI: 10.1609/icwsm.v18i1.31378.
- [4] **Tuan Dung Nguyen**, Georgiana Lyall, Alasdair Tran, Minjeong Shin, Nicholas George Carroll, Colin Klein, and Lexing Xie. “Mapping Topics in 100,000 Real-Life Moral Dilemmas”. In: *Proceedings of the International AAAI Conference on Web and Social Media* 16.1 (2022), pp. 699–710. DOI: 10.1609/icwsm.v16i1.19327.
- [5] Canh T. Dinh, Nguyen H. Tran, and **Tuan Dung Nguyen**. “Personalized Federated Learning with Moreau Envelopes”. In: *Advances in Neural Information Processing Systems*. Vol. 33. 2020, pp. 21394–21405. DOI: 10.48550/arXiv.2006.08848.
- [6] Canh T. Dinh, Nguyen H. Tran, **Tuan Dung Nguyen**, Wei Bao, Albert Y. Zomaya, and Bing B. Zhou. “Federated Learning with Proximal Stochastic Variance Reduced Gradient Algorithms”. In: *Proceedings of the 49th International Conference on Parallel Processing (ICPP '20)*. 2020, pp. 1–11. DOI: 10.1145/3404397.3404457.

THESES

- [1] **Tuan Dung Nguyen**. “Data-Driven Understanding of Real-Life Moral Dilemmas via Topic Mapping and Moral Foundations”. M.Phil. Thesis. Canberra, ACT: Australian National University, 2023. DOI: 10.25911/9ZCS-SJ43.

WORKSHOP AND NON-PEER-REVIEWED PAPERS

- [1] Rui Pan, **Tuan Dung Nguyen**, Hardik Arora, Alberto Accomazzi, Tirthankar Ghosal, and Yuan-Sen Ting. “AstroMLab 2: AstroLLaMA-2-70B Model and Benchmarking Specialised LLMs for Astronomy”. In: *Proceedings of the 5th Workshop on Artificial Intelligence and Machine Learning for Scientific Applications (SC'24)*. 2024. DOI: 10.48550/arXiv.2409.19750.
- [2] Ernest Perkowski, Rui Pan, **Tuan Dung Nguyen**, Yuan-Sen Ting, Sandor Kruk, Tong Zhang, Charlie O’Neill, Maja Jablonska, Zechang Sun, Michael J. Smith, Huiling Liu, Kevin Schawinski, Kartheik Iyer, Ioana Ciucă, and UniverseTBD. “AstroLLaMA-Chat: Scaling AstroLLaMA with Conversational and Diverse Datasets”. In: *Research Notes of the AAS* 8.1 (2024), p. 7. DOI: 10.3847/2515-5172/ad1abe.
- [3] **Tuan Dung Nguyen**, Yuan-Sen Ting, Ioana Ciucă, Charles O’Neill, Ze-Chang Sun, Maja Jabłońska, Sandor Kruk, Ernest Perkowski, Jack Miller, Jason Jingshi Li, Josh Peek, Kartheik Iyer, Tomasz Róžański, Pranav Khetarpal, Sharaf Zaman, David Brodrick, Sergio J. Rodríguez Méndez, Thang Bui, Alyssa Goodman, Al-

berto Accomazzi, Jill Naiman, Jesse Cranney, Kevin Schawinski, and Roberta Răileanu. “AstroLLaMA: Towards Specialized Foundation Models in Astronomy”. In: *Proceedings of the Second Workshop on Information Extraction from Scientific Publications (IJCNLP-AACL)*. 2023, pp. 49–55. DOI: 10.18653/v1/2023.wiesp-1.7.

PREPRINTS

- [1] Tijmen de Haan, Yuan-Sen Ting, Tirthankar Ghosal, **Tuan Dung Nguyen**, Alberto Accomazzi, Azton Wells, Nesar Ramachandra, Rui Pan, and Zechang Sun. *AstroMLab 3: Achieving GPT-4o Level Performance in Astronomy with a Specialized 8B-parameter Large Language Model*. 2024. DOI: 10.48550/arXiv.2411.09012.

TEACHING

COMM 3200 *Common Sense vs. Data Science in Communications Research and Practice*, University of Pennsylvania, 2024. Teaching assistant.

COMP4650 *Document Analysis*, Australian National University, 2022. Teaching assistant.

COMP4680 *Advanced Topics in Machine Learning*, Australian National University, 2022. Teaching assistant and guest lecturer.

COMP4670 *Statistical Machine Learning*, Australian National University, 2022–2023. Teaching assistant.

COMP5318 *Machine Learning and Data Mining*, University of Sydney, 2021. Teaching assistant.

COMP4691 *Optimisation*, Australian National University, 2021. Teaching assistant.

COMP30024 *Artificial Intelligence*, University of Melbourne, 2021. Teaching assistant.

COMP20008 *Elements of Data Processing*, University of Melbourne, 2020–2022. Teaching assistant.

LECTURES, TALKS AND PRESENTATIONS

“Benchmarking Specialized LLMs for Astronomy.” International Conference for High Performance Computing, Networking, Storage, and Analysis (Atlanta, GA), November 2024.

“Leveraging Large-Scale Human Opinions to Evaluate Language Models’ Common Sense.” 10th International Conference on Computational Social Science (Philadelphia, PA), July 2024.

“Natural Language Processing for Computational Social Science Research.” Summer Institute in Computational Social Science, University of Pennsylvania, July 2024.

“Measuring Moral Dimensions on Social Media with Mformer.” 18th International AAAI Conference on Web and Social Media (Buffalo, NY), June 2024. (Spotlight presentation.)

“How Aligned are Humans and Language Models on Common Sense?” Generative AI and Social Science Research Workshop, Yale University Institution for Social and Public Policy and Data-Intensive Social Science Center, April 2024.

“Science Meets AI: Lessons from the Exploration of LLMs in Astronomical Research.” Planet+AI Consortium, online, February 2024.

“AstroLLaMA: Towards Specialized Foundation Models in Astronomy.” International Joint Conference on Natural Language Processing and the 3rd Conference of the Asia-Pacific Chapter of the Association for Computational Linguistics, online, November 2023.

“Data-Driven Understanding of Real-Life Moral Dilemmas.” AI, ML and Friends Seminar, Australian National University, April 2023.

“Introduction to Computational Optimal Transport.” Advanced Topics in Machine Learning, Australian National University, November 2022.

“Mapping Topics in 100,000 Real-Life Moral Dilemmas.” AI, ML and Friends Seminar, Australian National University, May 2022; 16th International Conference on Web and Social Media, June 2022.

“Personalized Federated Learning with Moreau Envelopes.” 34th Annual Conference on Neural Information Processing Systems, online, December 2020.

“Federated Learning with Proximal Stochastic Variance Reduced Gradient Algorithms.” 49th International Conference on Parallel Processing, online, August 2020.

OTHERS

Dean’s Advisory Board Member, School of Engineering and Applied Science, University of Pennsylvania, 2024.

Teaching Assistant, Summer Institute in Computational Social Science, University of Pennsylvania, 2024.

Fellow, Vietnam Education Network 2.0 (VEF) Program, 2022.

Student, Monash University International School in Artificial Intelligence and its Applications in Computer Science, 2021.

Student Volunteer, AAAI/ACM Conference on AI, Ethics and Society, 2021.

Student Volunteer. International AAAI Conference on Web and Social Media, 2021.

Student, Cornell, Maryland and Max Planck Pre-Doctoral Research School, 2021.

Secretary, University of Melbourne Competitive Programming Club, 2019–2020.

Undergraduate Representative, Melbourne University Mathematics and Statistics Society, 2019–2020.

Committee, University of Melbourne Internet of Things Club, 2018–2020.

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