

Tianyu Ding

SENIOR RESEARCHER MICROSOFT

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Education

Johns Hopkins University Baltimore, Maryland, USA
PH.D. IN APPLIED MATHEMATICS AND STATISTICS 2016 – 2021
Advisor: Dr. Daniel P. Robinson and Dr. René Vidal
MASTER OF SCIENCE IN ENGINEERING IN COMPUTER SCIENCE 2017 – 2020
MASTER OF SCIENCE IN ENGINEERING IN FINANCIAL MATHEMATICS 2014 – 2016
Sun Yat-sen University Guangzhou, Guangdong, China
BACHELOR OF SCIENCE IN MATHEMATICS 2010 – 2014

Work Experience

Nov. 2021 – Present **Senior Researcher**, Microsoft
Jun. 2021 – Oct. 2021 **Research Intern**, Microsoft
May. 2020 – Aug. 2020 **Research Intern**, Microsoft
Jan. 2019 – Jul. 2019 **C/C++ Software Engineer in Test Intern**, MathWorks
Jan. 2018 – Jun. 2021 **Research Assistant**, Johns Hopkins University
Aug. 2015 – Dec. 2017 **Teaching Assistant**, Johns Hopkins University

Publications

* indicates equal contribution

PUBLISHED

Zhenxing Ge, Zheng Xu, **Tianyu Ding**, Wenbin Li, and Yang Gao, “Efficient Subgame Refinement for Extensive-form Games”. *Neural Information Processing Systems (NeurIPS)*, 2023.

Yanqi Bao, Yuxin Li, Jing Huo, **Tianyu Ding**, Xinyue Liang, Wenbin Li, and Yang Gao, “Where and How: Mitigating Confusion in Neural Radiance Fields from Sparse Inputs”. *ACM International Conference on Multimedia (ACMMM)*, 2023.

Yiyu Chen, Jing Huo, **Tianyu Ding**, and Yang Gao, “A Survey of Meta-Reinforcement Learning Research”. *Journal of Software (JoS)*, 2023.

Tianyi Chen, Luming Liang, **Tianyu Ding**, Zhihui Zhu, and Ilya Zharkov, “OTOv2: Automatic, Generic, User-Friendly”. *International Conference on Learning Representations (ICLR)*, 2023.

Jinxin Zhou, Xiao Li, **Tianyu Ding**, Chong You, Qing Qu, and Zhihui Zhu, “On the Optimization Landscape of Neural Collapse under MSE Loss: Global Optimality with Unconstrained Features”. *International Conference on Machine Learning (ICML)*, 2022.

Zhicheng Geng*, Luming Liang*, **Tianyu Ding**, and Ilya Zharkov, “RSTT: Real-time Spatial Temporal Transformer for Space-Time Video Super-Resolution”. *Computer Vision and Pattern Recognition (CVPR)*, 2022.

Zhihui Zhu*, **Tianyu Ding***, Jinxin Zhou, Xiao Li, Chong You, Jeremias Sulam, and Qing Qu, “A Geometric Analysis of Neural Collapse with Unconstrained Features”. *Neural Information Processing Systems (NeurIPS)*, 2021.

Tianyi Chen, Bo Ji, **Tianyu Ding**, Biyi Fang, Guanyi Wang, Zhihui Zhu, Luming Liang, Yixin Shi, Sheng Yi, and Xiao Tu, “Only Train Once: A One-Shot Neural Network Training and Pruning Framework”. *Neural Information Processing Systems (NeurIPS)*, 2021.

Tianyu Ding, Zhihui Zhu, René Vidal, and Daniel P. Robinson, “Dual Principal Component Pursuit for Robust Subspace Learning: Theory and Algorithms for a Holistic Approach”. *International Conference on Machine Learning (ICML)*, 2021.

- Tianyu Ding***, Luming Liang*, Zhihui Zhu, and Ilya Zharkov, “CDFI: Compression-Driven Network Design for Frame Interpolation”. *Computer Vision and Pattern Recognition (CVPR)*, 2021.
- Tianyu Ding**, Zhihui Zhu, Manolis C. Tsakiris, René Vidal, and Daniel P. Robinson, “Dual Principal Component Pursuit for Learning a Union of Hyperplanes: Theory and Algorithms”. *Artificial Intelligence and Statistics (AISTATS)*, 2021.
- Tianyi Chen, **Tianyu Ding**, Bo Ji, Guanyi Wang, Yixin Shi, Sheng Yi, Xiao Tu, and Zhihui Zhu, “Orthant Based Proximal Stochastic Gradient Method for ℓ_1 Regularized Optimization”. *European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases (ECML-PKDD)*, 2020.
- Zhihui Zhu, **Tianyu Ding**, Daniel P. Robinson, Manolis C. Tsakiris, and René Vidal, “A Linearly Convergent Method for Non-Smooth Non-Convex Optimization on the Grassmannian with Applications to Robust Subspace and Dictionary Learning”. *Neural Information Processing Systems (NeurIPS)*, 2019.
- Tianyu Ding***, Zhihui Zhu*, Tianjiao Ding, Yunchen Yang, René Vidal, Manolis C. Tsakiris, and Daniel P. Robinson, “Noisy Dual Principal Component Pursuit”. *International Conference on Machine Learning (ICML)*, 2019.

PREPRINTS

- Tianyu Ding**, Tianyi Chen, Haidong Zhu, Jiachen Jiang, Yiqi Zhong, Jinxin Zhou, Guangzhi Wang, Zhihui Zhu, Ilya Zharkov, and Luming Liang, “The Efficiency Spectrum of Large Language Models: An Algorithmic Survey”. *arXiv:2312.00678*, 2023.
- Jinxin Zhou*, **Tianyu Ding***, Tianyi Chen, Jiachen Jiang, Ilya Zharkov, Zhihui Zhu, and Luming Liang, “DREAM: Diffusion Rectification and Estimation-Adaptive Models”. *arXiv:2312.00210*, 2023.
- Haidong Zhu*, **Tianyu Ding***, Tianyi Chen, Ilya Zharkov, Ram Nevatia, and Luming Liang, “CaesarNeRF: Calibrated Semantic Representation for Few-shot Generalizable Neural Rendering”. *arXiv:2311.15510*, 2023.
- Tianyi Chen, **Tianyu Ding**, Badal Yadav, Ilya Zharkov, and Luming Liang, “LoRAShear: Efficient Large Language Model Structured Pruning and Knowledge Recovery”. *arXiv:2310.18356*, 2023.
- Yanqi Bao, **Tianyu Ding**, Jing Huo, Wenbin Li, Yuxin Li, and Yang Gao, “InsertNeRF: Instilling Generalizability into NeRF with HyperNet Modules”. *arXiv:2308.13897*, 2023.
- Tianyi Chen, Luming Liang, **Tianyu Ding**, and Ilya Zharkov, “Towards Automatic Neural Architecture Search within General Super-Networks”. *arXiv:2305.18030*, 2023.
- Tianyu Ding***, Luming Liang*, Zhihui Zhu, Tianyi Chen, and Ilya Zharkov, “Sparsity-guided Network Design for Frame Interpolation”. *arXiv:2209.04551*, 2022.
- Tianyi Chen*, Bo Ji*, Yixin Shi, **Tianyu Ding**, Biyi Fang, Sheng Yi, and Xiao Tu, “Neural Network Compression via Sparse Optimization”. *arXiv:2011.04868*, 2020.
- Tianyi Chen, Guanyi Wang, **Tianyu Ding**, Bo Ji, Sheng Yi, and Zhihui Zhu, “Half-Space Proximal Stochastic Gradient Method for Group-Sparsity Regularized Problem”. *arXiv:2009.12078*, 2020.

PATENTS

- Tianyu Ding**, Luming Liang, Ilya Zharkov, and Tianyi Chen, “Encoding Irregular Shapes Using Angle-Based Contour Descriptors”. *Filed through Microsoft, in progress*, 2023.
- Tianyi Chen, **Tianyu Ding**, Luming Liang, and Ilya Zharkov, “Computer-Implemented Technologies For Training And Compressing A Deep Neural Network”. *Filed through Microsoft, in progress*, 2023.
- Luming Liang, Zhicheng Geng, Ilya Zharkov, and **Tianyu Ding**, “Unified Space-Time Interpolation of Video Information”. *Filed through Microsoft, US Patent App. 17/670,978*, 2023.
- Luming Liang, **Tianyu Ding**, and Ilya Zharkov, “Video Frame Interpolation Via Feature Pyramid Flows”. *Filed through Microsoft, US Patent App. 17/347,481*, 2022.

Talks

INVITED CONFERENCE PRESENTATIONS

- Tianyu Ding**. (Poster) RSTT: Real-time Spatial Temporal Transformer for Space-Time Video Super-Resolution. *Computer Vision and Pattern Recognition (CVPR)*, New Orleans, Louisiana, USA, June 2022.

- Tianyu Ding.** (Poster) Dual Principal Component Pursuit for Robust Subspace Learning: Theory and Algorithms for a Holistic Approach. *International Conference on Machine Learning (ICML)*, Online, July 2021.
- Tianyu Ding.** (Poster) CDFI: Compression-Driven Network Design for Frame Interpolation. *Computer Vision and Pattern Recognition (CVPR)*, Online, June 2021.
- Tianyu Ding.** (Poster) Dual Principal Component Pursuit for Learning a Union of Hyperplanes: Theory and Algorithms. *Artificial Intelligence and Statistics (AISTATS)*, Online, April 2021.
- Tianyu Ding.** (Oral) Noisy Dual Principal Component Pursuit. *International Conference on Machine Learning (ICML)*, Long Beach, California, USA, June 2019.

INVITED SEMINAR PRESENTATIONS AT UNIVERSITIES

- Tianyu Ding.** Seeking Low-dimensionality in Deep Neural Networks. *Nanjing University of Aeronautics and Astronautics, College of Computer Science and Technology, MIIT Key Laboratory of Pattern Analysis and Machine Intelligence*, Online, March, 2023.
- Tianyu Ding.** Seeking Low-dimensionality in Deep Neural Networks. *University of Science and Technology, School of Earth and Space Sciences, Computational Interpretation Group*, Online, January, 2023.
- Tianyu Ding.** Seeking Low-dimensionality in Deep Neural Networks. *Nanjing University, Department of Computer Science and Technology, State Key Laboratory of Novel Software Technology, Nanjing, Jiangsu, China*, January, 2023.

INTERNAL DEPARTMENT AND OTHER PRESENTATIONS

- Tianyu Ding.** RECAST: Reconfiguring Content And Scene Transformation. *Microsoft, Applied Sciences Group, Perception Sync*, Online, September, 2023.
- Tianyu Ding.** Seeking Low-dimensionality in Deep Neural Networks. *Microsoft, Applied Sciences Group, ASG Research Day*, Online, April, 2023.
- Tianyu Ding.** Compression-Driven Network Design for Frame Interpolation. *AI TIME (Youth PhD Talk)*, Online, August, 2021.
- Tianyu Ding.** Compression-Driven Network Design for Frame Interpolation. *Johns Hopkins University, Department of Applied Mathematics and Statistics, Baltimore, Maryland*, April, 2021.

Teaching

Spring 2021	Teaching Fellow , Department of Applied Mathematics and Statistics	<i>JHU</i>
Intersession 2016 – 2019	EN 553.282.13(14) A Hands-On Introduction to MATLAB , Instructor	<i>JHU</i>
Fall 2019	EN 553.665 Introduction to Convexity , Teaching Assistant	<i>JHU</i>
Fall 2016 & Fall 2017	EN 553.761 Nonlinear Optimization , Teaching Assistant	<i>JHU</i>
Fall 2017	EN 553.644 Introduction to Financial Derivatives , Teaching Assistant	<i>JHU</i>
Spring 2016 & Spring 2017	EN 553.645 Interest Rate and Credit Derivatives , Teaching Assistant	<i>JHU</i>
Fall 2015 & Fall 2016	EN 553.627 Stochastic Processes , Teaching Assistant	<i>JHU</i>
Spring 2016	EN 553.628 Stochastic Processes and Applications to Finance , Teaching Assistant	<i>JHU</i>

Mentoring

May. 2023 – Aug. 2023	Haidong Zhu , Research Intern, Microsoft (Haidong was a fourth-year Ph.D. student from Department of Computer Science at University of Southern California)
May. 2023 – Aug. 2023	Jinxin Zhou , Research Intern, Microsoft (Jinxin was a second-year Ph.D. student from Department of Computer Science and Engineering at Ohio State University)

Professional Service

CONFERENCE REVIEWER

Artificial Intelligence and Statistics (2021)

Computer Vision and Pattern Recognition Conference (2021, 2022, 2023, 2024)
European Conference on Computer Vision (2022)
European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases (2020)
International Conference on Computer Vision (2021, 2023)
International Conference on Learning Representations (2021, 2022, 2023, 2024)
International Conference on Machine Learning (2021, 2023)
Neural Information Processing Systems (2020, 2021, 2022, 2023)

JOURNAL REVIEWER

Computer Science Review (1)
Journal of Electronic Imaging (2)
IEEE Transactions on Multimedia (2)
IEEE Transactions on Image Processing (2)
IEEE Transactions on Mobile Computing (2)
SCIENCE CHINA Information Sciences (1)
The Visual Computer (3)
Transactions on Machine Learning Research (2)
ACM Transactions on Multimedia Computing, Communications, and Applications (2)