

# Tianyu Ding

PRINCIPAL RESEARCHER MICROSOFT

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## Education

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

## Work Experience

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Sep. 2024 – Present	<b>Principal Researcher</b> , Microsoft	Redmond, Washington, USA
Nov. 2021 – Aug. 2024	<b>Senior Researcher</b> , Microsoft	Redmond, Washington, USA
Jun. 2021 – Oct. 2021	<b>Research Intern</b> , Microsoft	Redmond, Washington, USA
May. 2020 – Aug. 2020	<b>Research Intern</b> , Microsoft	Redmond, Washington, USA
Jan. 2019 – Jul. 2019	<b>C/C++ Software Engineer in Test Intern</b> , MathWorks	Natick, Massachusetts, USA
Jan. 2018 – Jun. 2021	<b>Research Assistant</b> , Johns Hopkins University	Baltimore, Maryland, USA
Aug. 2015 – Dec. 2017	<b>Teaching Assistant</b> , Johns Hopkins University	Baltimore, Maryland, USA

## Publications

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\* indicates equal contribution, † indicates corresponding authorship

### PUBLISHED

- Haidong Zhu\*, **Tianyu Ding**\*†, Tianyi Chen, Ilya Zharkov, Ram Nevatia, and Luming Liang†, “CaesarNeRF: Calibrated Semantic Representation for Few-shot Generalizable Neural Rendering”. *European Conference on Computer Vision (ECCV)*, 2024.
- Zheng Gu, Wenbin Li, **Tianyu Ding**, Zhengli Wang, Jing Huo, Kuihua Huang, and Yang Gao, “Task-aware Few-shot Image Generation via Dynamic Local Distribution Estimation and Sampling”. *Pattern Recognition and Computer Vision (PRCV)*, 2024.
- Zhenxing Ge, Zheng Xu, **Tianyu Ding**, Linjian Meng, Bo An, Wenbin Li, and Yang Gao, “Safe and Robust Subgame Exploitation in Imperfect Information Games”. *International Conference on Machine Learning (ICML)*, 2024.
- Jinxin Zhou\*, **Tianyu Ding**\*†, Tianyi Chen, Jiachen Jiang, Ilya Zharkov, Zihui Zhu, and Luming Liang†, “DREAM: Diffusion Rectification and Estimation-Adaptive Models”. *Computer Vision and Pattern Recognition (CVPR)*, 2024.
- Wenxiao Deng, Wenbin Li, **Tianyu Ding**, Lei Wang, Hongguang Zhang, Kuihua Huang, Jing Huo, and Yang Gao, “Exploiting Inter-sample and Inter-feature Relations in Dataset Distillation”. *Computer Vision and Pattern Recognition (CVPR)*, 2024.
- Yanqi Bao, **Tianyu Ding**, Jing Huo, Wenbin Li, Yuxin Li, and Yang Gao, “InsertNeRF: Instilling Generalizability into NeRF with HyperNet Modules”. *International Conference on Learning Representations (ICLR)*, 2024.
- Zhenxing Ge, Zheng Xu, **Tianyu Ding**, Wenbin Li, and Yang Gao, “Efficient Subgame Refinement for Extensive-form Games”. *Neural Information Processing Systems (NeurIPS)*, 2023.

8. 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.
9. Yiyu Chen, Jing Huo, **Tianyu Ding**, and Yang Gao, “A Survey of Meta-Reinforcement Learning Research”. *Journal of Software (JoS)*, 2023.
10. Tianyi Chen, Luming Liang, **Tianyu Ding**, Zhihui Zhu, and Ilya Zharkov, “OTOv2: Automatic, Generic, User-Friendly”. *International Conference on Learning Representations (ICLR)*, 2023.
11. 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.
12. 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.
13. 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.
14. 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.
15. **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.
16. **Tianyu Ding\***, Luming Liang\*, Zhihui Zhu, and Ilya Zharkov, “CDFI: Compression-Driven Network Design for Frame Interpolation”. *Computer Vision and Pattern Recognition (CVPR)*, 2021.
17. **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.
18. Tianyi Chen, **Tianyu Ding**, Bo Ji, Guanyi Wang, Yixin Shi, Sheng Yi, Xiao Tu, and Zhihui Zhu, “Orthant Based Proximal Stochastic Gradient Method for  $\ell_1$  Regularized Optimization”. *European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases (ECML-PKDD)*, 2020.
19. 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.
20. **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

1. Jiwei Guan, **Tianyu Ding**, Longbing Cao, Lei Pan, Chen Wang, and Xi Zheng, “Probing the Robustness of Vision-Language Pretrained Models: A Multimodal Adversarial Attack Approach”. *arXiv:2408.13461*, 2024.
2. Yanqi Bao, **Tianyu Ding**, Jing Huo, Yaoli Liu, Yuxin Li, Wenbin Li, Yang Gao, and Jiebo Luo, “3D Gaussian Splatting: Survey, Technologies, Challenges, and Opportunities”. *arXiv:2407.17418*, 2024.
3. Pratheba Selvaraju, **Tianyu Ding**<sup>†</sup>, Tianyi Chen, Ilya Zharkov, and Luming Liang, “FORA: Fast-Forward Caching in Diffusion Transformer Acceleration”. *arXiv:2407.01425*, 2024.
4. **Tianyu Ding**, Jinxin Zhou, Tianyi Chen, Zhihui Zhu, Ilya Zharkov, and Luming Liang, “AdaContour: Adaptive Contour Descriptor with Hierarchical Representation”. *arXiv:2404.08292*, 2024.
5. Guangzhi Wang, Tianyi Chen, Kamran Ghasedi, HsiangTao Wu, **Tianyu Ding**, Chris Nuesmeyer, Ilya Zharkov, Mohan Kankanhalli, and Luming Liang, “S3Editor: A Sparse Semantic-Disentangled Self-Training Framework for Face Video Editing”. *arXiv:2404.08111*, 2024.

6. Dongdong Ren, Wenbin Li, **Tianyu Ding**, Lei Wang, Qi Fan, Jing Huo, Hongbing Pan, and Yang Gao, “ONNXPruner: ONNX-Based General Model Pruning Adapter”. *arXiv:2404.08016*, 2024.
7. Tianyi Chen, **Tianyu Ding**, Zhihui Zhu, Zeyu Chen, HsiangTao Wu, Ilya Zharkov, and Luming Liang, “OTOv3: Automatic Architecture-Agnostic Neural Network Training and Compression from Structured Pruning to Erasing Operators”. *arXiv:2312.09411*, 2023.
8. **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.
9. 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.
10. Tianyi Chen, Luming Liang, **Tianyu Ding**, and Ilya Zharkov, “Towards Automatic Neural Architecture Search within General Super-Networks”. *arXiv:2305.18030*, 2023.
11. **Tianyu Ding**\*, Luming Liang\*, Zhihui Zhu, Tianyi Chen, and Ilya Zharkov, “Sparsity-guided Network Design for Frame Interpolation”. *arXiv:2209.04551*, 2022.
12. 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.
13. 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

1. Luming Liang, **Tianyu Ding**, and Ilya Zharkov, “Video Frame Interpolation Via Feature Pyramid Flows”. *Filed through Microsoft, US Patent 12,003,885*, 2024.
2. Tianyi Chen, **Tianyu Ding**, Luming Liang, Ilya Zharkov, and Yong Ma, “Pruning of Neural Network with Corrective Identification of Redundancy”. *Filed through Microsoft, in progress*, 2024.
3. Tianyi Chen, David Aponte, **Tianyu Ding**, Luming Liang, and Ilya Zharkov, “Jointly Pruning and Quantizing a Neural Network”. *Filed through Microsoft, in progress*, 2024.
4. Tianyi Chen, **Tianyu Ding**, Luming Liang, and Ilya Zharkov, “Compressing A Large Language Model That Includes Low Rank Adaption Modules”. *Filed through Microsoft, in progress*, 2024.
5. Tianyi Chen, **Tianyu Ding**, Luming Liang, Ilya Zharkov, and Guangzhi Wang, “Sparse Semantic Disentangled Face Attribute Editing”. *Filed through Microsoft, in progress*, 2023.
6. **Tianyu Ding**, Haidong Zhu, Tianyi Chen, Ilya Zharkov, and Luming Liang, “Novel View Synthesis Utilizing Scene-Level Features And Pixel-Level Features”. *Filed through Microsoft, in progress*, 2023.
7. **Tianyu Ding**, Jinxin Zhou, Tianyi Chen, Ilya Zharkov, and Luming Liang, “Adaptive Model For Super-Resolution”. *Filed through Microsoft, in progress*, 2023.
8. **Tianyu Ding**, Luming Liang, Ilya Zharkov, and Tianyi Chen, “Encoding Irregular Shapes Using Angle-Based Contour Descriptors”. *Filed through Microsoft, in progress*, 2023.
9. 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.
10. 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.

## Mentoring

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- 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)  
He was working on the project about generalizable & few-shot NeRF.  
*The internship project has been accepted by ECCV 2024!*
- 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)  
He was working on the project about efficient training of diffusion models.  
*The internship project has been accepted by CVPR 2024!*

## Talks

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### INVITED CONFERENCE PRESENTATIONS

1. **Tianyu Ding**. (Poster) DREAM: Diffusion Rectification and Estimation-Adaptive Models *Computer Vision and Pattern Recognition (CVPR)*, Seattle, Washington, USA, June 2024.
2. **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.
3. **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.
4. **Tianyu Ding**. (Poster) CDFI: Compression-Driven Network Design for Frame Interpolation. *Computer Vision and Pattern Recognition (CVPR)*, Online, June 2021.
5. **Tianyu Ding**. (Poster) Dual Principal Component Pursuit for Learning a Union of Hyperplanes: Theory and Algorithms. *Artificial Intelligence and Statistics (AISTATS)*, Online, April 2021.
6. **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

1. **Tianyu Ding**. DREAM: Diffusion Rectification and Estimation-Adaptive Models. *Nanjing University-Suzhou Campus, School of Intelligent Science and Technology, Suzhou, Jiangsu, China*, December, 2023.
2. **Tianyu Ding**. DREAM: Diffusion Rectification and Estimation-Adaptive Models. *Nanjing University of Aeronautics and Astronautics, College of Computer Science and Technology, Nanjing, Jiangsu, China*, December, 2023.
3. **Tianyu Ding**. Seeking Low-dimensionality in Deep Neural Networks. *Nanjing University of Aeronautics and Astronautics, College of Computer Science and Technology, MIT Key Laboratory of Pattern Analysis and Machine Intelligence, Online*, March, 2023.
4. **Tianyu Ding**. Seeking Low-dimensionality in Deep Neural Networks. *University of Science and Technology of China, School of Earth and Space Sciences, Computational Interpretation Group, Online*, January, 2023.
5. **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.
6. **Tianyu Ding**. Seeking Low-dimensionality in Deep Neural Networks. *ShanghaiTech University, School of Information Science and Technology, Shanghai, China*, October, 2022.

### INTERNAL DEPARTMENT AND OTHER PRESENTATIONS

1. **Tianyu Ding**. DREAM: Diffusion Rectification and Estimation-Adaptive Models. *Microsoft, Applied Sciences Group, ASG Research Day, Online*, August, 2024.
2. **Tianyu Ding**. Seeking Low-dimensionality in Deep Neural Networks. *Microsoft, Applied Sciences Group, ASG Research Day, Online*, April, 2023.

3. **Tianyu Ding**. Compression-Driven Network Design for Frame Interpolation. *AI TIME (Youth PhD Talk)*, Online, August, 2021.
4. **Tianyu Ding**. Compression-Driven Network Design for Frame Interpolation. *Johns Hopkins University, Department of Applied Mathematics and Statistics, Baltimore, Maryland*, April, 2021.

## Teaching

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

## Professional Service

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### CONFERENCE REVIEWER

Asian Conference on Computer Vision (2024)  
 Artificial Intelligence and Statistics (2021)  
 British Machine Vision Conference (2024)  
 Computer Vision and Pattern Recognition Conference (2021, 2022, 2023, 2024)  
 European Conference on Computer Vision (2022, 2024)  
 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, 2024)  
 Neural Information Processing Systems (2020, 2021, 2022, 2023, 2024)

### JOURNAL REVIEWER

The Visual Computer (3)  
 Computer Science Review (1)  
 Journal of Electronic Imaging (2)  
 IEEE Transactions on Multimedia (2)  
 IEEE Transactions on Image Processing (2)  
 SCIENCE CHINA Information Sciences (1)  
 IEEE Transactions on Mobile Computing (2)  
 Transactions on Machine Learning Research (5)  
 IEEE Journal of Selected Topics in Signal Processing (1)  
 ACM Transactions on Multimedia Computing, Communications, and Applications (4)