

Sean Xuefeng Du

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Research Interests

Reliable machine learning, foundation model reliability, and related applications, specifically I work on:

- Out-of-distribution (OOD) research: designing adaptive and interpretable learning algorithms that help ML models detect and generalize on OOD samples, such as semantic/covariate shifts, adversarial and noisy samples.
- Reliability of foundation models: understanding the blindspots of LLMs and VLMs for improved safeguarding efforts, such as model hallucination and harmful prompt detection.
- Applications: Graph embedding, object detection and segmentation.
- Interdisciplinary research: Biometrics, AI-aided cryo-microscopy/protein structural analysis.

Education

Ph.D. candidate in Computer Sciences Jan. 2021–Present
[University of Wisconsin–Madison](#), Madison, WI

- Ph.D. research in reliable machine learning.
- Advisor: Prof. [Sharon Yixuan Li](#).

B. Eng. in Electrical Engineering Sept. 2016 – Jun. 2020
[Xi'an Jiaotong University](#), Xi'an, China

- Overall GPA: 91.60/100(3.83/4.0), Rank: 1st/170.

Research Experience

Research Intern June 2024 – Sept. 2024
Microsoft Research, Redmond, WA, USA

- Hosts: Dr. [Robert Sim](#), [Jay Stokes](#) and [Reshmi Ghosh](#).
- Research on *Malicious prompt detection for vision language models*

Student Researcher June 2022 – Sept. 2022
Google Research, Sunnyvale, CA, USA

- Hosts: Dr. [Zizhao Zhang](#), [Ting Chen](#) and [Han Zhang](#).
- Research on *Open-vocabulary object detection with language models*

Research Intern Mar. 2021 – June 2021
Tencent AI Lab, Shenzhen, China

- Supervised by Dr. [Yu Rong](#) and [Junzhou Huang](#).
- Research on *Robust graph neural networks against noisy labels*.

Research Assistant Oct. 2020 – Jan. 2021
Department of Computer Science, Hong Kong Baptist University, Hong Kong

- Supervised by Dr. [Bo Han](#).
- Research on *Effective network architecture for adversarial robustness*.

Research Engineer Intern Aug. 2020 -Sept. 2020
 AI Lab, Bytedance Inc., Beijing, China
 • Supervised by Dr. [Changhu Wang](#).
 • Research on *Fine-grained image classification*.

Research Intern Dec. 2019 -July 2020
 AI Theory Group, Noah’s Ark Lab, Shenzhen, China
 • Supervised by Dr. [Hang Xu](#) and [Chenhan Jiang](#).
 • Research on *Hybrid supervised panoptic segmentation*.

Student Intern July 2018 – Feb. 2020
 Department of Computational Biology, CMU, Pittsburgh, PA, USA
 • Supervised by Dr. [Min Xu](#) and Dr. [Haohan Wang](#).
 • Research on *Deep learning for cellular electron cryo-tomography analysis*.

Research Assistant Nov. 2018 – Jun. 2020
 Intelligent Networks and Network Security Lab, XJTU, Xi’an, China
 • Supervised by Dr. [Pinghui Wang](#).
 • Research on *Few-shot node classification with meta learning*.

Research Assistant Jun. 2017 - Apr. 2019
 Institute of Automatic Control, XJTU, Xi’an, China
 • Supervised by Dr. [Dexing Zhong](#).
 • Research on *Machine learning for hand-based biometrics*.

Awards

- [Rising Stars in Data Science](#), September, 2024.
- [Jane Street Graduate Research fellowship](#) (\$50,000 grant), April, 2023.
- NeurIPS Scholar Award, November, 2022.
- CS departmental research fellowship, UW-Madison, September, 2021.
- National Scholarship (2x), Ministry of Education in China, 2017-2018.

Publications

See full list in [my google scholar](#) page, * indicates Equal Contribution

40. **Sean Xuefeng Du**, Yiyu Sun, Yixuan Li, [When and How does In-distribution Label Help Out-of-distribution Detection?](#), ICML 2024.
39. **Sean Xuefeng Du***, Zhen Fang*, Ilias Diakonikolas, Yixuan Li, [How does Un-labeled Data Provably Help Out-of-distribution Detection?](#), ICLR 2024.
38. Haoyue Bai, Gregory Canal, **Sean Xuefeng Du**, Jeongyeol Kwon, Robert D Nowak, Yixuan Li, [Feed Two Birds with One Scone: Exploiting Wild Data for Both Out-of-Distribution Generalization and Detection](#), ICML 2023.
37. **Sean Xuefeng Du**, Yiyu Sun, Jerry Zhu, Yixuan Li, [Dream the Impossible: Outlier Imagination with Diffusion Models](#), NeurIPS 2023.
36. Jingyang Zhang, Jingkang Yang, Pengyun Wang, Haoqi Wang, Yueqian Lin, Haoran Zhang, Yiyu Sun, **Sean Xuefeng Du**, Kaiyang Zhou, Wayne Zhang, Yixuan Li, Ziwei Liu, Yiran Chen, Hai Li, [OpenOOD v1.5: Enhanced Benchmark for Out-of-Distribution Detection](#), NeurIPS 2023 DistShift Workshop.
35. Leitian Tao, **Sean Xuefeng Du**, Jerry Zhu, Yixuan Li, [Non-parametric Outlier Synthesis](#), ICLR 2023.

34. **Sean Xuefeng Du**, Tian Bian, Yu Rong, Bo Han, Tongliang Liu, Tingyang Xu, Wenbing Huang, Yixuan Li, Junzhou Huang , [Noise-robust Graph Learning by Estimating and Leveraging Pairwise Interactions](#), Transactions on Machine Learning Research (TMLR), 2023
33. **Sean Xuefeng Du**, Gabriel Gozum, Yifei Ming, Yixuan Li, [SIREN: Shaping Representations for Detecting Out-of-distribution Objects](#), NeurIPS 2022.
32. Jingkang Yang, Pengyun Wang, Dejian Zou, Zitang Zhou, Kunyuan Ding, Wenxuan Peng, Haoqi Wang, Guangyao Chen, Bo Li, Yiyu Sun, **Sean Xuefeng Du**, Kaiyang Zhou, Wayne Zhang, Dan Hendrycks, Yixuan Li, Ziwei Liu, [penOOD: Benchmarking Generalized Out-of-Distribution Detection](#), NeurIPS Datasets and Benchmarks Track, 2022.
31. **Sean Xuefeng Du**, Xin Wang, Gabriel Gozum, Yixuan Li, [Unknown-Aware Object Detection: Learning What You Don't Know from Videos in the Wild](#), CVPR 2022, **oral**.
30. Pengtao Xie, **Sean Xuefeng Du**, [Performance-Aware Mutual Knowledge Distillation for Improving Neural Architecture Search](#), CVPR 2022.
29. **Sean Xuefeng Du**, Eric Wang, Mu Cai, Yixuan Li , [VOS: Learning What You Don't Know by Virtual Outliers Synthesis](#), ICLR 2022.
28. **Sean Xuefeng Du**, Jingfeng Zhang, Bo Han, Tongliang Liu, Yu Rong, Gang Niu, Junzhou Huang, Masashi Sugiyama , [Learning Diverse-Structured Networks for Adversarial Robustness](#), ICML 2021.
27. **Sean Xuefeng Du**, Chenhan Jiang, Hang Xu, Gengwei Zhang, Zhenguo Li, [How to save your annotation cost for Panoptic Segmentation?](#), AAAI 2021.
26. **Sean Xuefeng Du**, Haohan Wang, Zhenxi Zhu, Xiangrui Zeng, Yi-Wei Chang, Jing Zhang, Eric Xing, Min Xu, [Active learning to classify macromolecular structures in situ for less supervision in cryoelectron tomography](#), Bioinformatics, 2021
25. Lin Lan, Pinghui Wang, **Sean Xuefeng Du**, Kaikai Song, Jing Tao, Xiaohong Guan, [Node Classification on Graphs with Few-Shot Novel Labels via Meta Transformed Network Embedding](#), NeurIPS 2020.
24. Huikai Shao, Dexing Zhong, **Sean Xuefeng Du**, [A deep biometric hash learning framework for three advanced hand-based biometrics.](#), IET Biometrics.
23. Huikai Shao, Dexing Zhong, **Sean Xuefeng Du**, Shaoyi Du, Raymond NJ Veldhuis, [Few-shot learning for palmprint recognition via meta-siamese network](#), IEEE transactions on instrumentation and measurement.
22. Huikai Shao, Dexing Zhong, **Sean Xuefeng Du**, [Deep distillation hashing for unconstrained palmprint recognition](#), IEEE transactions on instrumentation and measurement.
21. **Sean Xuefeng Du**, Dexing Zhong, Huikai Shao, [Cross-domain palmprint recognition via regularized adversarial domain adaptive hashing](#), IEEE Transactions on Circuits and Systems for Video Technology.
20. Huikai Shao, Dexing Zhong, **Sean Xuefeng Du**, [Effective deep ensemble hashing for open-set palmprint recognition](#), Journal of Electronic Imaging.
19. Huikai Shao, Dexing Zhong, **Sean Xuefeng Du**, [Cross-domain palmprint recognition based on transfer convolutional autoencoder](#), IEEE International Conference on Image Processing 2019.
18. **Sean Xuefeng Du**, Dexing Zhong, Huikai Shao, [Continual palmprint recognition without forgetting](#), IEEE International Conference on Image Processing 2019.

17. **Sean Xuefeng Du**, Dexing Zhong, Huikai Shao, [Building an active palmprint recognition system](#), IEEE International Conference on Image Processing 2019.
16. **Sean Xuefeng Du**, Dexing Zhong, Pengna Li, [Low-shot palmprint recognition based on meta-siamese network](#), IEEE International Conference on Multimedia and Expo 2019.
15. Dexing Zhong, Huikai Shao, **Sean Xuefeng Du**, [A hand-based multi-biometrics via deep hashing network and biometric graph matching](#), IEEE Transactions on Information Forensics and Security.
14. Dexing Zhong, **Sean Xuefeng Du**, Kuncai Zhong, [Decade progress of palmprint recognition: A brief survey](#), Neurocomputing.
13. Ilja Gubins, Gijs van der Schot, Remco C Veltkamp, Friedrich Förster, **Sean Xuefeng Du**, Xiangrui Zeng, Zhenxi Zhu, Lufan Chang, Min Xu, Emmanuel Moebel, Antonio Martinez-Sanchez, Charles Kervrann, Tuan M Lai, Xusi Han, Genki Terashi, Daisuke Kihara, Benjamin A Himes, Xiaohua Wan, Jingrong Zhang, Shan Gao, Yu Hao, Zhilong Lv, Xiaohua Wan, Zhidong Yang, Zijun Ding, Xuefeng Cui, Fa Zhang, [Classification in Cryo-Electron Tomograms](#), in Eurographics 2019.
12. **Sean Xuefeng Du**, Xiangrui Zeng, Bo Zhou, Alex Singh and Min Xu, [Open-set Recognition of Unseen Macromolecules in Cellular Electron Cryo-Tomograms by Soft Large Margin Centralized Cosine Loss](#), in British Machine Vision Conference (BMVC) 2019, **Spotlight**.
11. Siyuan Liu, **Sean Xuefeng Du**, Rong Xi, Fuya Xu, Xiangrui Zeng, Bo Zhou and Min Xu, [Semisupervised Macromolecule Structural Classification in Cellular Electron Cryo-Tomograms using 3D Autoencoding Classifier](#), in British Machine Vision Conference (BMVC) 2019.
10. Huikai Shao, Dexing Zhong and **Sean Xuefeng Du**, [Efficient Deep Palmprint Recognition via Distilled Hashing Coding](#), in CVPR Workshops 2019.
9. Dexing Zhong, Shuming Liu, Wenting Wang, **Sean Xuefeng Du**, [Palm vein recognition with deep hashing network](#), Pattern Recognition and Computer Vision 2019.
8. Dexing Zhong, Yuan Yang, **Sean Xuefeng Du**, [Palmprint recognition using siamese network](#), 13th Conference of Biometric Recognition, CCBR 2018.

Preprints

7. Haoyue Bai, **Sean Xuefeng Du**, Katie Rainey, Shibin Parameswaran, Yixuan Li, [Out-of-Distribution Learning with Human Feedback](#), arXiv preprint arXiv:2408.07772.
6. Sheriff Issaka, Zhaoyi Zhang, Mihir Heda, Keyi Wang, Yinka Ajibola, Ryan DeMar, **Sean Xuefeng Du**, [The Ghanaian NLP Landscape: A First Look](#), arXiv preprint arXiv:2405.06818.
5. Bojun Liu, Jordan G Boysen, Ilona Christy Unarta, **Sean Xuefeng Du**, Yixuan Li, Xuhui Huang, [Exploring Transition States of Protein Conformational Changes via Out-of-Distribution Detection in the Hyperspherical Latent Space](#), Chemrxiv, 2024
4. **Sean Xuefeng Du**, Pengtao Xie, [Learning by Passing Tests, with Application to Neural Architecture Search](#), arXiv preprint arXiv:2011.15102.
3. Pengtao Xie, **Sean Xuefeng Du**, Hao Ban, [Skilllearn: Machine Learning Inspired by Humans' Learning Skills](#), arXiv preprint arXiv:2012.04863.
2. **Sean Xuefeng Du**, Pengtao Xie, [Small-Group Learning, with Application to Neural Architecture Search](#), arXiv preprint arXiv:2012.12502.

1. Huikai Shao, Dexing Zhong, [Sean Xuefeng Du](#), [Towards efficient unconstrained palmprint recognition via deep distillation hashing](#), arXiv preprint arXiv:2004.03303.

Talks

- Talk at Adobe, 12/2021
- Talk at Microsoft, 12/2021
- Talk at Google, 01/2022
- Talk at [MLOPT Seminar](#), UW-Madison, 05/2022
- Talk at [AI talks](#), 02/2023
- Talk at Jane Street, 04/2023
- Talk at Microsoft, 08/2024

Teaching

Teaching Assistant for

- [CS540](#), UW-Madison: Intro to AI, Spring 2021.
–Designing lectures on topics in unsupervised learning, deep learning, and reinforcement learning. Preparing all the homework related to the topic of deep learning, and design final exams, guiding students on final projects, holding office hours, and delivering discussion sections.
- [CS762](#), UW-Madison: Advanced Deep Learning, Fall 2022.
–Designing lectures on topics in trustworthy machine learning, grading students’ written papers, holding office hours, leading discussions and answering questions.

Research Mentoring

- [Pengna Li](#), undergraduate student at XJTU, 2019, now PhD student at XJTU.
- [Alex Singh](#), undergraduate student at CMU, 2019, now AI Engineer at Tesla.
- Zhenxi Zhu, undergraduate student at BUPT, 2019, now PhD student at Nanjing University.
- [Eric Wang](#), undergraduate student at UW-Madison, 2021, now research assistant at UCSD.
- [Gabriel Gozum](#), undergraduate student at UW-Madison, 2021, now perception engineer at Applied Intuition.
- [Tian Bian](#), PhD student at CUHK, 2021, now PhD student at CUHK.
- [Leitian Tao](#), undergraduate student at WHU, 2022, now PhD student at UW-Madison.
- [Sheriff Issaka](#), undergraduate student at UW-Madison, 2024, now data scientist at Zafar & ICU Data Science Labs.
- [Seongheon Park](#), PhD student at UW-Madison, present.

Service

Reviewer for

- ICML, NeurIPS, ICLR
- CVPR, ECCV, ICCV
- WACV, AAAI, IJCAI, MICCAI
- TMLR, Nature Communications, IJCV, TCSVT, TMM, TIP

**Additional
Information**

Language skills

- Native speakers of Mandarin with professional English speaking capability .

Programming skills

- Proficient with Python, TensorFlow, PyTorch. Familiar with C, Matlab, C++.