

# Kaifeng LYU

## Personal Information

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**Name:** Kaifeng Lyu (or Kaifeng Lv)    **Chinese Name:** 吕凯风  
**E-mail:** vfleaking@gmail.com  
klyu@cs.princeton.edu

## Education

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**Sep 2021 – now: Computer Science Department, Princeton University**

Ph.D. student in Computer Science.

I am supposed to enroll in the CS PhD program of Princeton University in Sep 2019, but my US visa application was under administrative processing for two years for no reason (!)

**Advisor:** Prof. Sanjeev Arora    **GPA:** 4.0/4.0

**Sep 2015 – July 2019: Institute for Interdisciplinary Information Sciences (IIIS), Tsinghua University**

B.Eng. in Computer Science and Technology.

Studied in Yao Class (a special Computer Science class directed by Prof. Andrew C. Yao).

**GPA:** 3.79/4.0    **Rank:** 3/32    (before Fall 2018)

**Yao Award, Silver Medal** (Top 3 out of 32 in Yao Class).

## Experiences

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**July 2018 – Sep 2018: Visiting Student at Princeton University**    *Advisor: Prof. Sanjeev Arora*

Theoretical analysis of Batch Normalization in deep learning

**Feb 2018 – May 2018: Visiting Student at MIT**    *Advisor: Prof. Ryan Williams, Student Mentor: Lijie Chen*

Fine-grained complexity of finding approximate solutions for poly-time solvable problems.

**Mar 2016 – Aug 2016: Research Intern at Megvii (Face++) Inc.**    *Mentor: Dr. Gang Yu*

Design models to solve the image segmentation problem.

## Publications

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(Contribution order by default; Asterisk \* stands for equal contribution.)

- **Why (and When) does Local SGD Generalize Better than SGD?**  
Xinran Gu\*, Kaifeng Lyu\*, Longbo Huang, Sanjeev Arora.  
Accepted at *the 11th International Conference on Learning Representations (ICLR 2023)*.
- **Understanding the Generalization Benefit of Normalization Layers: Sharpness Reduction**  
Kaifeng Lyu, Zhiyuan Li, Sanjeev Arora.  
Accepted at *the 36th Conference on Neural Information Processing Systems (NeurIPS 2022)*.
- **On the SDEs and Scaling Rules for Adaptive Gradient Algorithms**  
Sadhika Malladi\*, Kaifeng Lyu\*, Abhishek Panigrahi, Sanjeev Arora.  
Accepted at *the 36th Conference on Neural Information Processing Systems (NeurIPS 2022)*.
- **New Definitions and Evaluations for Saliency Methods: Staying Intrinsic, Complete and Sound**  
Arushi Gupta\*, Nikunj Saunshi\*, Dingli Yu\*, Kaifeng Lyu, Sanjeev Arora.  
Accepted at *the 36th Conference on Neural Information Processing Systems (NeurIPS 2022)*.
- **Gradient Descent on Two-layer Nets: Margin Maximization and Simplicity Bias**  
Kaifeng Lyu\*, Zhiyuan Li\*, Runzhe Wang\*, Sanjeev Arora.  
Accepted at *the 35th Conference on Neural Information Processing Systems (NeurIPS 2021)*.
- **Towards Resolving the Implicit Bias of Gradient Descent for Matrix Factorization: Greedy Low-Rank Learning**  
Zhiyuan Li, Yuping Luo, Kaifeng Lyu. (Alphabetical order)  
Accepted at *the 9th International Conference on Learning Representations (ICLR 2021)*.

- **Reconciling Modern Deep Learning with Traditional Optimization Analyses: The Intrinsic Learning Rate**  
Zhiyuan Li\*, **Kaifeng Lyu\***, Sanjeev Arora.  
Accepted at *the 34th Conference on Neural Information Processing Systems (NeurIPS 2020)*.
- **Gradient Descent Maximizes the Margin of Homogeneous Neural Networks**  
**Kaifeng Lyu**, Jian Li.  
Accepted as an **Oral Paper** at *the 8th International Conference on Learning Representations (ICLR 2020 Oral)*.
- **Theoretical Analysis of Auto Rate-Tuning by Batch Normalization**  
Sanjeev Arora, Zhiyuan Li, **Kaifeng Lyu**. (Alphabetical order)  
Accepted at *the 7th International Conference on Learning Representations (ICLR 2019)*.
- **Fine-grained Complexity Meets IP= PSPACE**  
Lijie Chen, Shafi Goldwasser, **Kaifeng Lyu**, Guy N. Rothblum, Aviad Rubinfeld. (Alphabetical order)  
Accepted at *the 2019 ACM-SIAM Symposium on Discrete Algorithms (SODA 2019)*.
- **Single-Source Bottleneck Path Algorithm Faster than Sorting for Sparse Graphs**  
Ran Duan, **Kaifeng Lyu** and Yuanhang Xie. (Alphabetical order)  
Accepted at *the 45th International Colloquium on Automata, Languages, and Programming (ICALP 2018)*.
- **Learning Gradient Descent: Better Generalization and Longer Horizons**  
**Kaifeng Lv\***, Shunhua Jiang\*, Jian Li.  
Accepted at *the 34th International Conference on Machine Learning (ICML 2017)*.

## Open Source Project

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**Aug 2014 – now:** Universal Online Judge (UOJ)

<https://uoj.ac>

A popular online judge system for OI (Olympiad in Informatics) in China.  
Open-sourced since 2016 (<https://github.com/vfleaking/uoj>).

## Selected Honors

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- NeurIPS Top Reviewers Award, 2022.
- Gordon Y.S. Wu Fellowships in Engineering, 2021.
- NeurIPS Outstanding Reviewer Award, 2021 (Top 8%).
- 1st Place, ACM-ICPC Asia EC-Final Contest, 2015 (with Yuhao Du, Lijie Chen).
- 1st Place, ACM-ICPC Asia Hefei Regional Contest, 2015 (with Yuhao Du, Lijie Chen).
- Freshman Scholarship, Tsinghua University, 2015.
- Gold Medal (2nd Place), Chinese National Olympiad in Informatics, 2014.
- Gold Medal (5th Place), Asia-Pacific Informatics Olympiad, 2013.

## Professional Services

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- Reviewer in ICML (2020, 2021, 2022, 2023), NeurIPS (2020, 2021, 2022), ICLR (2022,2023), COLT (2020), AAI (2020), KDD (2022).
- Organizer, Yao Class Seminar, Tsinghua (Fall 2019, Fall 2020, Spring 2021)

## Programming Skills

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- Proficient at C++/Python/PHP programming.
- Proficient at PyTorch/Tensorflow.