# PU YANG

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## About me

I am a PhD Student at the School of Mathematical Sciences, Peking University, where I work with Prof. Bin Dong. I am generally interested in inverse problem, reinforcement learning and large language model. My recent research interests are exploring the use of synthetic data in large language models.

## Education

**Peking University** Beijing, China
*Ph.D. major in Computational Mathematics* *Sep. 2021 – Present*

**Peking University** Beijing, China
*Undergraduate major in Mathematics* *Sep. 2017 – May. 2021*

## Publication

**L2SR: Learning to Sample and Reconstruct for Accelerated MRI via Reinforcement Learning**
*with Bin Dong*

- Published in Inverse Problem, 2024
- We propose an alternating training framework for jointly learning a good pair of samplers and reconstructors via deep reinforcement learning for accelerated MRI.

**A Tale of Tails: Model Collapse as a Change of Scaling Laws**
*with Elvis Dohmatob, Yunzhen Feng, Francois Charton, and Julia Kempe*

- Published in International Conference on Machine Learning (ICML 2024)
- We theoretically and empirically explore how the inclusion of synthetic data in training affects neural scaling laws in large language models, revealing potential risks of model collapse.

**Beyond Model Collapse: Scaling Up with Synthesized Data Requires Reinforcement**
*with Yunzhen Feng, Elvis Dohmatob, Francois Charton, and Julia Kempe*

- Under review as a conference paper in ICLR 2025
- We theoretically and empirically explore how feedback-augmented synthesized data can mitigate model collapse in fine-tuning large language models.

## Work experience

**AI Algorithm Internship** 2021 Spring
*In ByteDance* *Beijing, China*

- I am primarily responsible for designing algorithms for audio fingerprinting, which involves extracting fingerprint features, searching through a speech library, and parallel acceleration, among other tasks. My team utilizes contrastive learning and propose a new feature extraction model that is more suitable for audio data, resulting in faster retrieval speeds and higher accuracy.

## Skills

**Languages**: Python, C/C++, MATLAB
**Human Languages**: Chinese, English
**Development Tools**: Pytorch, Cluster (Linux)
**Other Tools**: Latex, Markdown
**Familiar Methods**: computational mathematics, common machine learning methods, deep learning theory, reinforcement learning, large language model

## Awards

### Scholarships
*in the undergraduate and doctoral program*

- College Scholarship, School-level
- Outstanding Research Award, University-level

### Modeling competition
*in the undergraduate program*

- MCM, Honorable Award

### Olympiad in Informatics (OI)
*in high school*

- NOIP, First Prize

### Mathematical Competition
*in high school*

- Peking University Summer Camp, Excellent camper (Admission to PKU)
- China Mathematics Competition, First Prize
- China Mathematics Olympiad, Silver Medal