

# Yineng Chen

+86-18108620531 | yineng\_chen@outlook.com | <https://chernyn.github.io>

## EDUCATION

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- School of Mathematics and Statistics, Wuhan University**, Wuhan, China 09/2020-06/2024
- Major: Mathematics and Applied Mathematics GPA: 3.79/4.0
  - Bachelor of Science degree (To be conferred in June 2024)
- Department of Mathematics, University of California, Berkeley**, USA 01/2023-05/2023
- Courses taken: *Introduction to Partial Differential Equations*, *Experimental Courses in Mathematics*, *Introduction to Topology and Analysis-Graduate Level* (12 credits obtained)

## PUBLICATION

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- [1] **Chen Y**, Li Z, Zhang L, et al. *Bidirectional looking with a novel double exponential moving average to adaptive and non-adaptive momentum optimizers*, International Conference on Machine Learning. PMLR, 2023: 4764-4803.
- [2] Li Z, Gong R, **Chen Y**, et al. *Fine-grained position helps memorizing more, a novel music compound transformer model with feature interaction fusion*, Proceedings of the AAAI Conference on Artificial Intelligence. 2023, 37(4): 5203-5212.

## RESEARCH EXPERIENCE

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**Sigma Lab, Wuhan University**, Wuhan, China 06/2022-09/2022

**Project:** Bidirectional Looking with A Novel Double Exponential Moving Average to Adaptive and Non-adaptive Momentum Optimizers **Advisor:** Prof. Zuchao Li

- Studied the role of historical information and future information during the optimization of neural networks, reviewed the structure of past optimizers, and tried to propose a novel optimizer framework
- Proposed a novel DEMA method for backward-looking part and introduced a dynamic weight method based on the Lookahead Strategy for forward-looking part.
- Applied the optimizer framework to both adaptive and non-adaptive optimizers and provided the algorithms
- Performed ablation studies to test the effectiveness of our method, and conducted experiments on several benchmarks, demonstrating its outstanding performance.

**Sigma Lab, Wuhan University**, Wuhan, China 07/2022-08/2022

**Project:** Fine-Grained Position Helps Memorizing More, a Novel Music Compound Transformer Model with Feature Interaction Fusion **Advisor:** Prof. Zuchao Li

- Conducted research based on the existing compound Transformer, to discover that the correlation between tokens of compound words may be ignored in a music sequence
- Consideration of absolute position, relative position, and absolute relative interaction was introduced to improve the Transformer model's awareness of the position information
- Drew from RoPE's idea of applying rotation to the queries and keys in the complex space, encoding relative positions
- Added two additional dual absolute encoding terms to avoid the confusion caused when keys and queries of two near tokens are similar in value, and finally proposed RoAR position encoding

**Teran's Group, University of California, Davis**, USA 06/2023-present

**Project:** Machine Learning Method in Muscle Simulation **Advisor:** Prof. Joseph Teran

- Experimented with the quasistatic neural network to learn the difference between linear-blend skinning and physics-based simulation results
- Generated 500 frames of elbow samples to explore the reason of the undesirable training deviation in the initial few frames.
- Tuned the PCA component to remove the noise while maintaining the important structure information
- Incorporated activation parameter into the training data to enhance the fidelity of simulation results to real-world scenarios
- Will add another parameter to control the body shape, with the aim of generating simulation results across various body types

**School of Mathematics and Statistics, Wuhan University**, Wuhan, China 09/2023-present

**Project:** Undergraduate Thesis: Finite Element Computing **Advisor:** Prof. Huoyuan Duan

- Replicated the codes of finite difference method for elliptic, parabolic, and hyperbolic equations, as well as finite element method with rectangular and triangular meshes as a preparation work
- Apply Raviart-Thomas finite element and Brezzi-Douglas-Marini finite element for Maxwell equations, and get the error and convergence rate of the methods

## OTHER INFORMATION

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- Professional skills: Python, MATLAB, C++, LaTeX, Microsoft Office, Linux
- Honors&Awards: Outstanding Student, First-Class Scholarship for Freshmen, Second-Class Scholarship, etc.