Heyang Hua

My Personal CV

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📍 Tianjin, China

Education

Nankai University 2021 – Now
B.Sc. Candidate in Chern Class of Nankai Mathematics Tianjin, China

- Courses: Real Analysis, Complex Analysis, Functional Analysis, Advanced Algebra, Probability Theory

Academic Experience

Chen's Lab (https://biox-nku.cn) Summer 2021 - Now
Principal Investigator: Dr. Shengquan Chen

- Research on cell type annotation of scRNA-seq data, as well as batch effect integration and clustering of scATAC-seq data.

Academic Projects

- **A reference-guided cancer cell identification method for scRNA-seq data** Fall 2022 - Summer 2024
  - Lead developing a reference-guided cancer cell identification model (scCrab).
  - Conduct extensive analysis to evaluate the performance of scCrab.
  - Finish the manuscript for publication.
- **Batch effects correction of scATAC-seq data via regularized barycentric mapping** Summer 2023 - Fall 2024
  - Develop a deep learning framework for scATAC-seq data integration via rigorous barycentric mapping (Fountain).
  - Design and conduct various experiments to evaluate the performance of Fountain in various aspects.
  - Wrote the manuscript for publication.
- **Batch effects correction of cell painting data based on transfer learning** Fall 2023 - Now
  - Assist in writing the manuscript for publication.
- **Batch effects correction of scATAC-seq data via Non-negative Matrix Factorization** Spring 2024 - Now
  - Develop and perform comprehensive benchmark analysis of batch correction methods.
- **Ensemble learning for clustering in scATAC-seq data** Summer 2024 - Now
  - Develop a ensemble learing framework for cell clustering in scATAC-seq data.
  - Conduct extensive analysis to evaluate the performance of our model and baseline methods.

Community Service / Volunteering

School of Mathematical Sciences, Nankai University Tianjin, China
Core member of the academic development center Fall 2021 - Summer 2022
College administrative assistant Fall 2022 - Spring 2024
College Peer Mentor Spring 2024 - Now

Nankai University Tianjin, China
Editor of the Boling Academic Journal (university-level academic journal) Fall 2022 - Now
Teaching assistant for fundamentals of intelligent computing Fall 2022
Teaching assistant for data mining Summer 2023

- Team leader of summer social practice Fall 2023

Skills

- Software: MATLAB, Adobe Illustrator
- Programming languages: Python (scikit-learn, PyTorch, TensorFlow, Scanpy, SciPy), R (Bioconductor, ggplot2), Shell, LaTeX
- Interests: Machine Learning, Deep Learning, Optimization Theory, Operations Research, Topology

Publications

Publications

† Authors should be regarded as Joint First Authors.

- **Heyang Hua†**, Wenxin Long†, Yan Pan†, Siyu Li, Jianyu Zhou*, Haixin Wang*, Shengquan Chen*. scCrab: a reference-guided ensemble method for cancer cell identification via Bayesian neural networks. *Interdisciplinary Sciences: Computational Life Sciences, 2024, Online* (https://doi.org/10.1007/s12539-024-00655-6)
- Siyu Li†, Xinhao Zhuang†, Songbo Jia†, Songming Tang, Liming Yan, **Heyang Hua**, Yuhang Jia, Xuelin Zhang, Yan Zhang, Qingzhu Yang*, Shengquan Chen*. MultiKano: an automatic cell type annotation tool for single-cell multi-omics data based on Kolmogorov-Arnold network and data augmentation. *Protein & Cell, 2024, Accepted*
- Sijie Li†, **Heyang Hua†**, and Shengquan Chen*. Graph neural networks for single-cell omics data: a review of approaches and applications. *Briefings In Bioinformatics, 2025, Accepted*
- **Heyang Hua†**, Sijie Li†, Haitian Liang, and Shengquan Chen*. Facilitating single-cell chromatin accessibility research with a user-friendly database. *Frontiers of Computer Science, 2025, Accepted*
- Shuchen Zhu†, **Heyang Hua†**, Shengquan Chen*. Rigorous integration of single-cell ATAC-seq data using regularized barycentric mapping. *Submitted*
- Chengwei Yan†, Yu Zhang†, Jiuxin Feng†, **Heyang Hua**, Zhihan Ruan, Zhen Li, Siyu Li, Zhaoyang Yan, Pingjing Li, Shengquan Chen*, Jian Liu*. Triple effects corrected representation learning for Cell Painting data with cpDistiller. *Submitted to Nature Computional Science, under review*
- Rufeng Li, Yongkang Li, **Heyang Hua**, Zhen Li, Yu Zhang, Yufei Yao, Yungang Xu*, and Shengquan Chen*. Identification of cell type-specific differential features in single-cell and spatial omics data. *To be submitted*

Awards

- **Honorable Mention** in the 2022 Mathematical Contest in Modeling (MCM)
- **Finalist** for the Outstanding Winner Award in the 2023 Mathematical Contest in Modeling (MCM)
- **Second Prize** in the 2024 Nankai University Undergraduate Innovation and Research Excellence Project
- **Excellence Award** in the 6th Nankai University “President’s Cup” Innovation and Entrepreneurship Competition (2024)
- **Innovation Scholarship**, Shool of Mathematics (2,000 RMB, 2024)
- **Shiing-Shen Chern Future Star Award** (30,000 RMB, 2024)
- **Shiing-Shen Chern International Exchange Award** (90,000 RMB, 2024)
- **Third Prize** of the 2nd ”Kai Feng Cup” University Students’ Biomedicine Innovation Competition (5,000 RMB, 2024)