Charley Yejia Zhang

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Professional Summary

- Final year PhD student performing interdisciplinary machine learning research with a focus on biomedical imaging and computer vision. Projects involve achieving state-of-the-art performances in limited annotation settings on many real-world tasks (e.g., anatomical structure segmentation, insect tracking, automated diagnostics).
- Effective agile software developer with industry internship experience contributing to internal production systems, and over 8 years of coding projects for research, teaching, and clubs.
- Cogent planner and team leader. Over $50k raised by a personally founded non-profit to support underprivileged students in rural China. Elected to Notre Dame's Graduate Student Board in 2021. Received top class ratings as head TA for 2 semesters. Collaborated extensively across 6 institutions and 3 countries.

Education

Notre Dame, IN
Aug 2018 – Present
Expected Dec 2023

University of Notre Dame
Doctor of Philosophy, Computer Science and Engineering (CSE)
GPA 3.96/4.0, GRE V160/170 Q170/170 W5.5/6
Doctoral Advisor Dr. Danny Chen

La Jolla, CA
Sep 2013 – Dec 2017

University of California, San Diego (UCSD)
Bachelor of Science, Computer Engineering with a Machine Learning Specialization
GPA 3.61/4.0, SAT M780/800 R790/800 W800/800

Experience

New York, NY
Aug 2023 – Present

Alibaba DAMO Academy
Medical Image AI Research Scientist Intern

- Developing novel approaches for pathology image analysis for Pancreatic cancer outcome prediction. The project uses modern architectures for cell segmentation, custom graph neural networks for spatial feature aggregation, and end-to-end prognosis prediction.

Notre Dame, IN
Dec 2018 – Present

University of Notre Dame
Graduate Research Assistant, Department of Computer Science and Engineering

- Research deep learning & computer vision methods to address high annotation costs in biomedical image analysis, computer-aided diagnostics, and computational biomedicine.
- Developed three approaches to improve model feature learning without labels for more effective medical image analysis (e.g., skin lesion recognition, heart MRI segmentation) using self-supervised techniques [ISBI'23 Oral & two in BIBM'22, 20% acceptance rate].
- Designed 2 state-of-the-art machine learning frameworks for cell segmentation with limited data constraints for intercellular calcium signaling [ISBI'18] and human sperm morphology analysis [ISBI'22].
- Collaborated with the Life Sciences departments at Penn State and the University of Regensburg to create novel deep-learning-based tracking algorithms for over 50TB of raw insect videos for disease dynamics and interactive behavior analysis; currently, a journal paper is under review and another is to be submitted late 2023.
- Proposed a novel shape-aware medical image segmentation framework that adopts implicit neural representations, demonstrating superior performance with 10x fewer model parameters, less labeled data, and better cross-data robustness [MICCAI'23].

Notre Dame, IN
Aug 2018 – May 2019

University of Notre Dame
Head Teaching Assistant, Department of Computer Science and Engineering

- Trained & coordinated grad & undergrad TAs, gave lectures, held office hours & discussion sessions, and timely scored assignments & exams for 2 semesters of "Theory of Computing." Top 10% in computer science composite class ratings.

Santa Clara, CA
Summer 2016

Huawei Technologies Co.
Software Engineering Intern

- Programmed a Java application that processes JVM run-time data to recognize memory leak sources; was integrated into internal hardware-testing systems.
- Developed a program that reads large CPU dump files, analyzes individual thread data, and predicts future thread resource usage. New predictor was 80% faster, and 50% more accurate than the previous system.

Works & Publications

(* indicates equal contributions.)

- **Charley Yejia Zhang**, Pengfei Gu, Nishchal Sapkota, Danny Ziyi Chen, "SwIPE: Efficient and Robust Medical Image Segmentation with Implicit Patch Embeddings." *Medical Image Computing and Computer Assisted Interventions* (MICCAI), 2023.
- Yizhe Zhang, Tao Zhou, Shuo Wang, Peixian Liang, **Charley Yejia Zhang**, Danny Ziyi Chen, "Input Augmentation with SAM: Boosting Medical Image Segmentation with Segmentation Foundation Model." *Medical Image Computing and Computer Assisted Interventions, MedAGI Workshop Oral* (MICCAI), 2023.
- Yizhe Zhang, Shuo Wang, **Charley Yejia Zhang**, Danny Ziyi Chen, "RR-CP: Reliable-Region-Based Conformal Prediction for Trustworthy Medical Image Classification." *Medical Image Computing and Computer Assisted Interventions, UNSURE Workshop Oral* (MICCAI), 2023.
- Susan M. Motch Perrine, Nishchal Sapkota, Kazuhiko Kawasaki, **Charley Yejia Zhang**, Danny Ziyi Chen, Mizuho Kawasaki, Emily L. Durham, Yann Heuze, Laurence Legeai-Mallet, Joan T. Richtsmeier, "Embryonic Cranial Cartilage Defects in the Fgfr3Y367C/+ Mouse Model of Achondroplasia." *Anatomical Record Journal*, 2023.
- **Charley Yejia Zhang**, Pengfei Gu, Nishchal Sapkota, Hao Zheng, Peixian Liang, Danny Ziyi Chen, "A Point in the Right Direction: Vector Prediction for Spatially-aware Self-supervised Volumetric Representation Learning." *IEEE International Symposium on Biomedical Imaging* (ISBI), 2023 (oral, acceptance rate 15%).
- Pengfei Gu*, **Charley Yejia Zhang***, Hao Zheng, Peixian Liang, Danny Ziyi Chen, "ConvFormer: Combining CNN and Transformer for Medical Image Segmentation." *IEEE International Symposium on Biomedical Imaging* (ISBI), 2023 (oral, acceptance rate 15%).
- Yizhe Zhang, Pengfei Gu, **Charley Yejia Zhang**, Chaoli Wang, Danny Ziyi Chen, "GrNT: Gate-regularized Network Training for Improving Multi-scale Fusion in Medical Image Segmentation." *IEEE International Symposium on Biomedical Imaging* (ISBI), 2023 (oral, acceptance rate 15%).
- **Charley Yejia Zhang***, Xinrong Hu*, Nishchal Sapkota, Yiyu Shi, Danny Ziyi Chen, "Unsupervised Feature Clustering Improves Contrastive Representation Learning for Medical Image Segmentation." *IEEE International Conference on Bioinformatics and Biomedicine* (BIBM), 2022 (acceptance rate 20%).
- **Charley Yejia Zhang**, Nishchal Sapkota, Pengfei Gu, Yaopeng Peng, Hao Zheng, Danny Ziyi Chen, "Keep Your Friends Close & Enemies Farther: Debiasing Contrastive Learning with Spatial Priors in 3D Radiology Images." *IEEE International Conference on Bioinformatics and Biomedicine* (BIBM), 2022 (acceptance rate 20%).
- **Charley Yejia Zhang**, Jingjing Zhang, Xiaomin Zha, Yiru Zhou, Yunxia Cao, Danny Ziyi Chen, "Improving Human Sperm Head Morphology Classification with Unsupervised Anatomical Feature Distillation." *IEEE International Symposium on Biomedical Imaging* (ISBI), 2022.
- Peixian Liang, Jianxu Chen, Pavel Brodskiy, Qinfeng Wu, **Charley Yejia Zhang**, Yizhe Zhang, Lin Yang, Jeremiah Zartman, Danny Ziyi Chen, "A New Registration Approach for Dynamic Analysis of Calcium Signals in Organs." *IEEE International Symposium on Biomedical Imaging* (ISBI), 2018.
- Mengchun Ye, Andrew JF Edmunds, James A Morris, David Sale, **Charley Yejia Zhang**, Jin-Quan Yu, "A Robust Protocol for Pd (ii)-catalyzed C-3 Arylation of (1 H) Indazoles and Pyrazoles: Total Synthesis of Nigellidine Hydrobromide." *Chemical Science Journal*, 2013.

Skills

Programming. *Proficient*: Python; *Intermediate*: Java, C/C++, Matlab, Bash.
Packages. Pytorch, TensorFlow, Scikit-Learn, OpenCV, NumPy, SciPy, Pandas, Matplotlib, Jupyter.
Tools. Git/Github, LaTeX, Adobe Illustrator, FIJI/ImageJ, 3D Slicer, Weights & Biases.

Fellowships and Honors

Aug 2018 – Aug 2023	**Deans' Fellowship**. 5-year full funding awarded to one Notre Dame CSE student per year.
Jul 2018	**Founded Child Aid Nonprofit & Raised $50k**. Fund education for disadvantaged children.
Sep 2013 – Dec 2017	**7x Provost Honors**. Awarded by Warren College at UCSD.
Mar 2013	**Intel Science Talent Search**. National Semifinalist.