Charley Yejia Zhang

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Education

University of Notre Dame Aug 2018 – Dec 2024 (expected)
Ph.D. and M.S. in Computer Science, Computer Vision AI Research *Notre Dame, IN*
GPA: 3.96/4.00, GRE: V160/170 Q170/170 W5.5/6.0

University of California, San Diego Sep 2013 – Dec 2017
B.S. in Computer Engineering, Machine Learning Specialization *La Jolla, CA*
GPA: 3.61/4.00, SAT M780/800 R790/800 W800/800

Experience

Alibaba DAMO AI Research Aug 2023 – May 2024
Computer Vision Research Co-op | Python, Bash, Pytorch, AliCloud, Spark, Flask, Docker *New York, NY*

- Developed and deployed a novel pathology image framework for end-to-end cancer prognosis with >10TB images.
- Improved multi-class cell segmentation with pretraining by 8% dice with distributed training and inference.
- Deployed the model to cloud leveraging Spark, Flask, and Docker; GB images processed within 15 sec of upload.

University of Notre Dame Aug 2018 – Present
Graduate Researcher, Computer Vision | Python, Bash, Pytorch *Notre Dame, IN*

- Introduced data-efficient computer vision approaches for image segmentation and self-supervised learning.
- Proposed shape-aware segmentation using implicit neural representations that improved data efficiency by 30%.
- Published three self-supervised approaches which all achieved state-of-the-art segmentation performances.
- Developed new transformer and CNN segmentation architectures, a data augmentation method with a vision foundation model SAM, and a label-efficient clinical male fertility classification pipeline.

Huawei Technologies Co. Jun 2016 – Aug 2016
Software Engineer Intern | Java, SQL, Tcl *Santa Clara, CA*

- Developed machine learning program that predicts future thread resource usage from large CPU dump files.
- Implemented Java application that analyzes real-time JVM logs to detect memory leaks during hardware testing.
- New SVM predictor was 50% more accurate than previous logic; Java app was integrated into internal test software.

Projects

Research Paper Manager | *Python, Flask, Typescript, React.js, Electron, AWS, SQL, OpenAI API*

- Implemented a cross-platform academic paper manager that allows for collaborative annotation and question-answering with LLMs for figures, equations, and text.
- Improved reading experience with article metadata auto-extraction, reference/figure popups, and Q&A.
- Allowed users to share written notes and their paper libraries with a sharable link.

Deep Medical Image Toolkit | *Python, Pytorch, Numpy, C++*

- Created a medical image analysis library to expedite data preparation pipelines for deep learning research in my lab.
- Saved >100 hours of labmates' time with automatic experiment management, inference, evaluation, and training.

Reddit Equities Digest | *Python, SQL, Plotly, Node.js, Reddit API*

- Built a Raspberry Pi app that monitors Reddit engagement for all stock tickers and summarizes them in daily emails.
- Visualized top stocks and introduced a scoring system that weighs posts by rewards, comments, and upvotes.

Technical Skills

Programming: Python, Java, C++, Javascript, Typescript, Matlab, Bash Scripting, SQL, Groovy
ML Packages: Pytorch, Numpy, Scikit-Learn, SciPy, OpenCV, Pandas, Tensorflow, Matplotlib, Plotly, WandB
Technologies: AWS, AliCloud, Docker, Flask, Spark, React.js, Node.js, Electron, Github
Tools: Jupyter, LaTeX, Fiji, QuPath, Adobe Illustrator, 3D Slicer, Neovim
Concepts: Artificial Intelligence, Machine Learning, Computer Vision, Neural Networks, CNNs, Transformers, Self-supervised Learning, Generative AI, GANs, Auto Encoders, API, Big Data, Agile Methodology, Cloud Computing

Fellowships and Honors

Deans' Fellowship. Granted full funding for 5 years, awarded annually to one CSE student. Aug 2018 – Aug 2023
Provost Honors. Awarded by UCSD Warren College. Sep 2013 – Dec 2017
Intel Science Talent Search, National Semifinalist. Proposed novel drug synthesis method. Mar 2013
Founder, Child Aid Nonprofit Raised $50k. Funded primary education for disadvantaged children. Jan 2013 – Present

Publications

(* indicates equal contribution)

- Nishchal Sapkota, **Charley Yejia Zhang**, Sirui Li, Peixian Liang, Zhuo Zhao, Danny Z. Chen, "SHMC-Net: A Mask-guided Feature Fusion Network for Sperm Head Morphology Classification." *IEEE International Symposium on Biomedical Imaging* (ISBI), 2024.
- Nishchal Sapkota, **Charley Yejia Zhang**, Susan M. Motch Perrine, Yuhan Hsi, Sirui Li, Meng Wu, Greg Holmes, Abdul R. Abdulai, Ethylin W. Jabs, Joan T. Richtsmeier, Danny Z. Chen, "ConUNETR: A Conditional Transformer Network for 3D Micro-CT Embryonic Cartilage Segmentation." *IEEE International Symposium on Biomedical Imaging* (ISBI), 2024.
- **Charley Yejia Zhang**, Pengfei Gu, Nishchal Sapkota, Danny Z. 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 Z. Chen, "Input Augmentation with SAM: Boosting Medical Image Segmentation with Segmentation Foundation Model." *Medical Image Computing and Computer Assisted Interventions*, *MedAGI Workshop* (MICCAI, Oral), 2023.
- Yizhe Zhang, Shuo Wang, **Charley Yejia Zhang**, Danny Z. Chen, "RR-CP: Reliable-Region-Based Conformal Prediction for Trustworthy Medical Image Classification." *Medical Image Computing and Computer Assisted Interventions*, *UNSURE Workshop* (MICCAI, Oral), 2023.
- Susan M. Motch Perrine, Nishchal Sapkota, Kazuhiko Kawasaki, **Charley Yejia Zhang**, Danny Z. 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 Z. Chen, "A Point in the Right Direction: Vector Prediction for Spatially-aware Self-supervised Volumetric Representation Learning." *IEEE International Symposium on Biomedical Imaging* (ISBI, Oral), 2023 (acceptance rate 15%).
- **Charley Yejia Zhang***, Pengfei Gu*, Hao Zheng, Peixian Liang, Danny Z. Chen, "ConvFormer: Combining CNN and Transformer for Medical Image Segmentation." *IEEE International Symposium on Biomedical Imaging* (ISBI, Oral), 2023 (acceptance rate 15%).
- Yizhe Zhang, Pengfei Gu, **Charley Yejia Zhang**, Chaoli Wang, Danny Z. Chen, "GrNT: Gate-regularized Network Training for Improving Multi-scale Fusion in Medical Image Segmentation." *IEEE International Symposium on Biomedical Imaging* (ISBI, Oral), 2023 (acceptance rate 15%).
- **Charley Yejia Zhang***, Xinrong Hu*, Nishchal Sapkota, Yiyu Shi, Danny Z. 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 Z. Chen, "Keep Your Friends Close and 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 Z. 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 Z. Chen, "A New Registration Approach for Dynamic Analysis of Calcium Signals in Organs." *IEEE International Symposium on Biomedical Imaging* (ISBI), 2018.
- Mengchun Ye, Andrew J.F. Edmunds, James A. Morris, David Sale, **Charley Yejia Zhang**, Jinquan 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.