

Tianle Cao

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Skills

Languages: Python, C++, C#, MATLAB

Skills: 3D Computer Vision (pose estimation; sfm), Tone mapping, Self-Supervised Learning (SSL), Foundation Models, Parameter efficient fine-tuning (PEFT), Image Processing, Analysis (segmentation/detection) & Reconstruction

Frameworks & Tools: Linux, Docker, CI/CD, MLOps, OpenCV, PyTorch, HuggingFace, OpenMMLab, TensorRT

Familiar With: Neural Radiance Fields (NeRF), 3D Gaussian Splatting (3D GS), Image Signal Processing (ISP)

Experience

Algorithm Engineer, Noah Medical Corporation, CA

Jan 2024 – Now

- **Deep Learning Based Fiducial Marker Detection for Improved Pose Estimation**

- Built automated data pipeline including data retrieval, downloading, splitting, and label generation, driving rapid algorithmic iteration from prototype to production
- **Improved detection recall (+11 pts) and precision (+15 pts) in challenging visual conditions (imperfect contrast, blurring artifacts); Reduced pose estimation failure rate by >10x**
- **Owned the full deployment lifecycle**, integrating the optimized model into the core production C++ camera pipeline through ONNX, TensorRT and model compression for real-time efficiency, and backed by comprehensive stress testing and performance profiling

- **3D Reconstruction Image Quality Improvement**

- **Cross-functional collaboration** with Software, Product, and Clinical teams to define project requirements, validate the algorithm, and ensure seamless product integration.
- **Built image quality root cause analysis pipeline and identified fundamental pose estimation gaps**
- **Implemented a robust product solution** (with C++) that **reduced pose estimation error by 10x**, improving image quality to vendor comparable and met runtime/performance requirements

- **Metal Artifact Reduction for Tomosynthesis**

- Analyzed tomosynthesis-related complaints and **presented a comprehensive review of image quality factors**
- Identified and justified **metal artifact as the biggest gap** preventing users from identifying the lesion
- **Prototyped** reconstruction solution, demonstrating **improved lesion visibility in ~1/3 of challenging cases**

Graduate Research Assistant, UCLA, CA

Sept 2018 – Sept 2023

- **3D Image Reconstruction & Low-rank Tensor Modeling for Spatio-temporal Imaging**

- Developed and optimized an alternating low-rank tensor reconstruction algorithm, utilizing joint estimation of temporal subspaces and spatial coefficients to process multi-dimensional imaging data.
- Developed hybrid PARAFAC and Tucker low-rank tensor modeling pipeline that enhanced image reconstruction quality and quantification precision.
- Accelerated quantitative 3D image mapping by over 2x compared to baselines

Undergrad Research Assistant, Tsinghua University, Beijing

Sept 2017 – Sept 2018

- **Deep Learning for Image Reconstruction**

- Built and trained a deep residual neural network (ResNet) in TensorFlow for the high-quality reconstruction of highly under-sampled imaging data.
- Formulated and integrated a custom data consistency loss function
- Outperformed traditional compressed sensing and baseline deep learning methods, with superior structural similarity index (SSIM) and peak signal-to-noise ratio (PSNR).

Education

Ph.D. in Medical Imaging, UCLA, USA

Sept 2018 – Sept 2023

B.S. in Biomedical Engineering, Tsinghua University, China

Aug 2014 - Jun 2018