Jason Luce

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Professional Summary

Medical imaging ML scientist with more than 4 years of experience in radiotherapy imaging AI and computer vision, building deep learning systems for image synthesis and clinically grounded image-quality assessment. Led development and validation of a U-Net bone-suppression model for markerless lung tumor tracking using large phantom and patient datasets, resulting in a peer-reviewed publication. Designed and executed a blinded multi-rater CBCT observer study and developed CNN-based model observers for image-quality prediction, achieving 93% of predictions within one score category of expert consensus.

Technical Skills

- **Languages/Tools:** Python, C++, Linux, Git, HPC/Slurm, multi-GPU training.
- **ML Stack:** PyTorch, scikit-learn, NumPy, pandas.
- **ML/CV:** CNNs, U-Net, GANs, ordinal regression (CORAL loss).
- **Imaging**: CBCT, DICOM, denoising.

Professional Experience

Research Assistant - Department of Radiation Oncology, Loyola University Medical Center, Maywood, IL (2021 - Present)

- Developed a U-Net model for bone-suppressed radiographs enabling markerless lung tumor tracking; trained and evaluated on more than 7,000 image pairs (2,694 phantom and 4,499 patient pairs from 20 lung SBRT patients) using held-out splits, demonstrating performance comparable to conventional bone suppression.
- Trained CNN-based model observers using ordinal regression (CORAL loss) to predict 1 to 5 CBCT image-quality scores from multi-rater data (8,556 slices; 23 head-and-neck patients). Achieved strong agreement with expert consensus (QWK 0.76; MAE 0.39), with 93% of predictions within one score category.
- Designed and executed a blinded, randomized multi-rater CBCT observer study with leakage controls; computed inter-rater reliability and generated IRB-compliant, de-identified, reliability-weighted consensus labels for model-observer development.
- Instrumented model training with lightweight, custom experiment logging and artifact persistence; tracked learning curves and validation metrics, and saved best checkpoints, Grad-CAM visualizations, and prediction samples.

- Implemented a standardized evaluation pipeline that loads model checkpoints, runs inference on a fixed patient-level test split, computes agreement and error metrics, and exports standardized metric summaries and row-level predictions for consistent reporting.

Graduate Researcher - Materials Science & Engineering, University of Michigan, Ann Arbor, MI (2013 - 2021)

- Optimized and parallelized C++ and MPI code for multi-scale simulations, reducing runtime by more than 40%.
- Developed HPC performance engineering skills later applied to scalable deep learning experimentation and evaluation workflows.

Medical Imaging Research Intern - Loyola University Medical Center, Maywood, IL (2011 - 2013)

- Developed FFT-based image registration algorithm for radiotherapy setup alignment; achieved less than 0.1 mm mean rigid registration error.
- Created MATLAB and IDL tools for quantitative image analysis across multiple oncology studies.

Selected Publications

Luce, J., et al. Use of a Deep Learning Neural Network to Generate Bone-Suppressed Images for Markerless Lung Tumor Tracking. *Medical Physics* (2025). doi:10.1002/mp.17949

Luce, J., et al. A CNN-Based Model Observer for Human-Aligned Image Quality Assessment of Synthetic Cone-Beam CT. *Medical Physics* (under review, 2025).

Education

Ph.D. Computer Science, Loyola University Chicago, Chicago, IL (Expected 05/27).

M.S., Materials Science & Engineering, University of Michigan, Ann Arbor, MI (2016).

B.S., Physics/Math & Computer Science, DePaul University, Chicago, IL (2013), Summa Cum Laude.

Honors: Rollin M. Gerstacker Fellowship; Frank P. & Rita Frichle Scholarship; Air Medal; Aerial Achievement Medal.