Lambert Leong

ML/AI Health Researcher & Medical Data Scientist

Department of Radiology
University of Washington
lambert3@hawaii.edu
www.lambertleong.com/
LambertLeong *lambert-leong*

EXPERTISE

- **Deep Learning**: Convolutional Neural Networks (CNN), Variational Auto-Encoder (VAE), Self-Supervised Learning (SSL), Hyperparameter Optimization, Generative Medical Image Models
- **Machine Learning**: PCA, Linear/Logistic Regression, Tree-based and Ensemble Methods
- **Medical Imaging**: Radiomics/Biomarkers, Single & Dual 2D & 3D X-ray modalities, Privacy and Storage

EDUCATION

2023 **PhD, Bioengineering**, *University of Hawaii*, Honolulu, HI, USA. GPA 3.95/4.0
Dissertation: **"Reducing the Burden of Cancer with Artificial Intelligence"**
Advisor: Prof. John Shepherd

2018 **MS, Computer Science**, *University of Hawaii*, Honolulu, HI, USA. GPA 3.89/4.0
Thesis: **"A Heuristic for Optimizing the Physical Layout and Network Topology of Integrated 3D Multi-chip Systems Under Temperature Constraints"**
Advisor: Prof. Henri Casanova

2014 **BS, Biology**, *University of Oregon*, Eugene, OR, USA. GPA 3.2/4.0
Minor: Chemistry

EXPERIENCE

Current ***Postdoctoral Researcher***, *OncoRad*, University of Washington, Washington
- Developing biomarkers predictive of favorable cancer clnical trial outcomes through multi-modal, longitudinal image modeling.

2018 – 2023 ***Graduate Research Assistant***, *Shepherd Research Lab*, University of Hawaii Cancer Center, Hawaii
- Engineered a pipeline to extract raw medical data, enabling deep learning on quantitative body composition imaging. This innovation led to regression models outperforming previous benchmarks (R^2) by 15%.
- Pioneered X-ray physics informed VGG-16 perceptual loss functions, achieving quantitatively accurate generative medical images that can be analyised with commercial clinical software.
- Performed initial modeling which identified novel breast cancer imaging biomarkers. Final model exhibited 10% AUC improvement compared to previously published models.
- Crafted a preprocessing pipeline for spectral decomposition, pinpointing tissue traits within cancer clusters through convex hull computation.

Summer 2020 ***Machine Learning Research Intern***, *Anthropometry and Biomechanics Facility*, NASA, Texas
- Advanced visualization of bone and soft tissue on exterior 3D body scans by employing a genetic algorithms as a fitting error minimization heuristic for improved spacesuite design.
- Developed a Python implementation for a local system transpose, enabling the standarization of 3D scans to the same coordinates system.

2016 – 2018 ***Graduate Student Researcher***, *Concurrency Research Group*, University of Hawaii, Hawaii
- Devised a simulation harnessing a greedy algorithm, optimizing the 3D physical layout of multi-CPU architectures for optimal heat dissipation, culminating in an acceptance at DAC 2020.
- Leveraged task parallelism via MPI, achieving a 19X acceleration in simulation speeds versus single-thread implementation.

2015 – 2018 ***Research Scientist***, Eyegenix LLC, Hawaii
- Data-driven polymer design through regression modeling, culminating in successful polymer implantations during animal trials.
- Synthesized and presented scientific findings and advancements to stakeholders through rigorous monthly, quarterly, and annual reporting.

Summer 2017 ***Database Engineer***, *Social Science Research Institute*, University of Hawaii, Hawaii
- Designed and implemented a relational database to monitor recidivism rates for the state of Hawaii, by integrating data from multiple state databases, and defining the data model and relational schema.

FELLOWSHIPS

2023 ***CS Research Mentorship Program Fellowship***, Google

2022 ***AIM-AHEAD*** - *Artificial Intelligence/Machine Learning Consortium to Advance Health Equity and Researcher Diversity*, National Institutes of Health via University of Hawaii

HONORS & AWARDS

2023 ***Merit Based Awards for Research***, Graduate Student Organization, University of Hawaii

2023 ***Mirikitani Outstanding Dissertation Award***, University of Hawaii

2021 ***Trainee Travel Grant***, University of Hawaii Cancer Center

2020 ***Graduate Student Organization Grant***, University of Hawaii

2020 ***Trainee Travel Grant***, University of Hawaii Cancer Center

2019 ***Trainee Travel Grant***, University of Hawaii Cancer Center

PROJECTS

- **Photo Mosaic**
  Developed a high-resolution photomosaic generator program as a project to hone my software engineering skills. This project combined my expertise in computer vision and machine learning with my love of photography. I utilized k-nearest neighbors for efficient image retrieval, matching, and placement. Mosaic animations were optimized via dynamic programming, tree search algorithms, and parallel computing techniques, all within an object-oriented programming framework. See More!
- **Dynamic Health Data Visualization**
  Improved my skills in curating public health data from multiple sources, cleaning that data, and visualizing that data in an effective and compelling way. Dynamic graphs are the result and they include date annotations which better inform viewers of possible time dependent trends within health data. I integrate these data science concepts, plots, and best practices into my regular research workflow and presentations. See More!

NOTABLE PUBLICATIONS

2023 **Leong, Lambert T**, Michael C Wong, Yannik Glaser, Young E Liu, Brandon K Quon, Devon Cataldi, Peter Sadwoski, Steven B Heymsfield, and John A Shepherd. Deep learning furthers the understanding of local distributions of fat and muscle on body shape and health using 3d surface scans. *Nature Communications Medicine (Under Review)*. Nature Publishing Group, 2023.

2022 **Leong, Lambert T**, Michael C Wong, Yannik Glaser, Thomas Wolfgruber, Steven B Heymsfield, Peter Sadwoski, and John A Shepherd. Quantitative imaging principles improves medical image learning. *(Under Review) arXiv preprint arXiv:2206.06663*, 2022.

2022 Yannik Glaser, John Shepherd, **Leong, Lambert**, Thomas Wolfgruber, Li-Yung Lui, Peter Sadowski, and Steven R Cummings. Deep learning predicts all-cause mortality from longitudinal total-body dxa imaging. *Communications medicine*, volume 2, pages 1–12. Nature Publishing Group, 2022.

2021 Xun Zhu, Thomas K Wolfgruber, **Leong Lambert**, Matthew Jensen, Christopher Scott, Stacey Winham, Peter Sadowski, Celine Vachon, Karla Kerlikowske, and John A Shepherd. Deep learning predicts interval and screening-detected cancer from screening mammograms: a case-case-control study in 6369 women. *Radiology*, volume 301, pages 550–558. Radiological Society of North America, 2021.

2021 **Leong Lambert T**, Serghei Malkov, Karen Drukker, Bethany L Niell, Peter Sadowski, Thomas Wolfgruber, Heather I Greenwood, Bonnie N Joe, Karla Kerlikowske, Maryellen L Giger, et al. Dual-energy three-compartment breast imaging for compositional biomarkers to improve detection of malignant lesions. *Communications Medicine*, volume 1, pages 1–11. Nature Publishing Group, 2021.

2020 **Leong Lambert T** and Sean Wiere. Digit recognition from wrist movements and security concerns with smart wrist wearable iot devices. In *53rd Hawaii International Conference on System Sciences*. HICSS, 2020.

2019 Michihiro Koibuchi, **Leong Lambert**, Tomohiro Totoki, Naoya Niwa, Hiroki Matsutani, Hideharu Amano, and Henri Casanova. Sparse 3-d nocs with inductive coupling. In *2019 56th ACM/IEEE Design Automation Conference (DAC)*, pages 1–6. IEEE, 2019.

TOOLS & SKILLS

- **Programming Languages**: Proficient: Python | Experience with: Matlab, C, Java
- **ML/AI/Computer Vision**: TensorFlow, Keras, OpenCV, Scikit-learn, PyTorch, Blender
- **Big Data**: Pandas, DICOM, SQL
- **Fundamentals**: Git, Linux, Git, Conda, Docker