

Hongki Lim

hongki@umich.edu
<https://limhongki.github.io>

Education

University of Michigan, Ann Arbor Sep 2015 - May 2020
PhD Candidate, Electrical Engineering and Computer Science (Expected)
Advised by Jeffrey Fessler and Yuni Dewaraja

Inha University Feb 2006 - Aug 2012
Bachelor of Science in Electrical Engineering

Research Interest

Machine learning; Deep learning; Inverse problem; Medical image reconstruction; Medical image analysis

Journal Papers

- [1] **Hongki Lim**, Yuni Dewaraja, and Jeffrey Fessler. A PET reconstruction formulation that enforces non-negativity in projection space for bias reduction in Y-90 imaging. *Phys. Med. Biol.*, 63(3):035042, Feb. 2018.
- [2] **Hongki Lim**, Jeffrey Fessler, Scott Wilderman, Allen Brooks, and Yuni Dewaraja. Y-90 SPECT maximum likelihood image reconstruction with a new model for tissue-dependent bremsstrahlung production: A proof-of-concept study. *Phys. Med. Biol.*, 63(11):115001, Jun. 2018.
- [3] **Hongki Lim**, Il Yong Chun, Yuni Dewaraja, and Jeffrey Fessler. Improved low-count quantitative PET reconstruction with a variational neural network. *IEEE Trans. Med. Imag.*, ?. 2019. Submitted
- [4] Il Yong Chun, Zhengyu Huang*, **Hongki Lim*** and Jeffrey Fessler. Momentum-Net: Fast and convergent iterative neural network for inverse problems. Jul. 2019. Submitted

(The asterisks (*) indicate equal contributions.)

Conference Proceedings and Abstracts

- [1] **Hongki Lim**, Yuni Dewaraja, and Jeffrey Fessler. Y-90 SPECT maximum likelihood image reconstruction with a new model for tissue-dependent bremsstrahlung production. *J. Nuc. Med. (Abs. Book)*, 58(s1):746, May 2017. **Oral**
- [2] **Hongki Lim** and Yuni Dewaraja. Impact of Tc-99m SPECT reconstruction methods on lung shunt and lesion/normal liver activity quantification in radioembolization. *J. Nuc. Med. (Abs. Book)*, 58(s1):1032, May 2017. **Poster**
- [3] **Hongki Lim**, Yuni Dewaraja, and Jeffrey Fessler. Reducing bias in Y-90 PET images by enforcing non-negativity in projection space. *Proc. IEEE Nuc. Sci. Symp. Med. Im. Conf.*, pp. 1-4, 2017. **Oral**
- [4] **Hongki Lim**, Neal Clinthorne, Maurizio Conti, Jeffrey Fessler, and Yuni Dewaraja. Quantitative Y-90 PET for dosimetry in radioembolization. *Eur. J. Nuc. Med. Mol. Imaging*, 44(s2):S398, Oct. 2017. **Poster**

- [5] **Hongki Lim**, Kyungsang Kim, Quanzheng Li, Jeffrey Fessler, and Yuni Dewaraja. Bias reduction in Y-90 PET with reconstruction that relaxes the non-negativity constraint. *J. Nuc. Med. (Abs. Book)*, 59(s1): 580. 2018. **Oral**
- [6] **Hongki Lim**, Jeffrey Fessler, and Yuni Dewaraja. Joint dual photopeak image reconstruction in Lu-177 SPECT. *Eur. J. Nuc. Med. Mol. Imaging*, (Vol. 45, pp. S95-S96), Oct. 2018. **Oral**
- [7] Il Yong Chun, **Hongki Lim**, Zhengyu Huang, and Jeffrey Fessler. Fast and convergent iterative signal recovery using trained convolutional neural networks. *Proc. Allerton*, pp. 155-159, Oct. 2018.
- [8] Se Young Chun, **Hongki Lim**, Jeffrey Fessler, and Yuni Dewaraja. On Parameter Selection for Joint Spectral Reconstruction in Y90 SPECT. *Proc. IEEE Nuc. Sci. Symp. Med. Im. Conf.*, pp. 1-4, 2018.
- [9] **Hongki Lim**, Zhengyu Huang, Jeffrey Fessler, Yuni Dewaraja, and Il Yong Chun. Application of trained Deep BCD-Net to iterative low-count PET image reconstruction. *Proc. IEEE Nuc. Sci. Symp. Med. Im. Conf.*, pp. 1-4, 2018. **Oral**
- [10] **Hongki Lim**, Il Yong Chun, Jeffrey Fessler, and Yuni Dewaraja. Improved low count quantitative SPECT reconstruction with a trained deep learning based regularizer. *J. Nuc. Med. (Abs. Book)*, 60(s1): 42., 2019 **Oral**
- [11] Haowei Xiang, **Hongki Lim**, Jeffrey Fessler, and Yuni Dewaraja. SPECT/CT scatter correction using deep learning: implementation in Y-90 imaging. *Proc. IEEE Nuc. Sci. Symp. Med. Im. Conf.*, Oct. 2019. To appear.
- [12] **Hongki Lim**, Yuni Dewaraja, and Jeffrey Fessler. Joint low-count PET/CT segmentation and reconstruction with paired variational neural networks. *Proc. SPIE Medical Imaging: Phys. Med. Im.*, Feb. 2020. To appear. **Oral**

Research and Work Experience

- University of Michigan** Aug 2016 - Present
Advised by Prof. Jeffrey Fessler and Prof. Yuni Dewaraja
 Medical imaging research, including projects on image reconstruction methods for emission tomography.
- University of Michigan** May 2016 - Aug 2016
Advised by Prof. Chenliang Xu
 Computer vision research, including projects on variants of LSTM and video understanding.
- Qualcomm Internship** Feb - Jun 2015
Computer Vision Group, Corporate Research & Development
 Built datasets and evaluated Snapdragon computer vision engine. Investigated the feasibility of Snapdragon computer vision engine's new features. Analyzed competitors computer vision applications. Wrote one patent draft for internal patent competition.
- Samsung Electronics Associate** Jul 2012 - Mar 2014
Technology Planning Group, Strategic Planning Team, System LSI Division
 Established R&D roadmaps of video compression, network on chip and software solutions. Examined the necessity of license/royalty payment when adopting software solutions. Performed competitor analysis on their research areas. Managed technology transfer progress between Samsung Electronics divisions. Prioritized R&D project plans according to necessity, resources and profits

Samsung Electronics Internship

Dec 2011 - Feb 2012

Technology Planning Group, Strategic Planning Team, System LSI Division

Assisted industry-university collaboration by drafting interim reports. Researched rival companies' manufacturing processes. Assessed Korean minor companies' capability for outsourcing relevant technologies

Korean Air Force Sergeant

Jul 2009 - Aug 2011

Avionics Maintenance Battalion

Embedded security code for the identification check in aircraft avionic system.

Teaching Experience**University of Michigan** *Undergraduate Research Opportunity Program*

Sep 2016 - Dec 2016

Advised undergraduate students to engage in image processing related research activities

Scientific Service

Journal Reviews: IEEE Transactions on Medical Imaging (IEEE-TMI)

Affiliations

- IEEE, Student Member
- Society of Nuclear Medicine and Molecular Imaging, Associate Member
- European Association of Nuclear Medicine, Junior Member

Relevant Coursework and Skills

Coursework (UMich): •Machine Learning •Nonlinear Programming •Matrix Methods for Signal Processing and Machine Learning •Foundations of Computer Vision •Advanced Topics In Computer Vision •Image Processing •Probability and Random Processes •Estimation, Filtering, and Detection •Medical Imaging •Optimization Methods in Statistics

MOOC: •Neural Networks and Deep Learning •Improving Deep Neural Networks: Hyperparameter tuning, Regularization and Optimization •Structuring Machine Learning Projects •Convolutional Neural Networks

Programming Language: Matlab, Python, C++

Deep Learning frameworks: TensorFlow, PyTorch, Caffe

Course Projects

High Dynamic Range Image Tone Mapping Using a Local Edge-Preserving Multiscale Decomposition *Report*

Image Processing, Prof. Jeff Fessler

Winter 2016

Proposed the joint base-detail decomposition by considering additional constraints on detail layers.

Image Captioning Using Attention Based Recurrent Neural Networks *Report*

Advanced Topics in Computer Vision, Prof. Jason Corso

Winter 2016

Proposed to exploit the spatial transformer network and gated recurrent network for image captioning.

Critiques and Implementation on Recent Image Captioning Methods *Report*

Foundations of Computer Vision, Prof. Jason Corso

Fall 2015

Reproduced the method in "Deep visual-semantic alignments for generating image descriptions" published in CVPR 2015.

Awards & Scholarships

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|---|-------------------|
| IEEE NSS/MIC Trainee Grant | 2017, 2018 |
| Rackham Conference Travel Grant | 2016, 2017, 2018 |
| Awarded Second Place, EECS 556: Image Processing <i>Article</i> | Apr 2016 |
| Awarded Scholarship for High Score on TOEIC | Fall 2011 |
| Awarded First Place Prize at Control System Design Contest | Fall 2008 |
| Awarded Scholarship from School of Logistics | Spring 2007 |
| Awarded Semester High Honors | Spring, Fall 2006 |

Extracurricular Activities

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|-----------------------------------|--------------------------|
| Intervarsity Christian Fellowship | 2006 - 2008, 2015 - 2017 |
| Soccer, Music Composition | Current |