Intelligent Computational imaging Lab. (ICL)

About Principal Investigator

Se Young Chun (전세영)
Email: sychun@snu.ac.kr
Web: http://seyoungchun.wordpress.com/

Education

- ✓ Ph.D. in EE:Systems, University of Michigan - Ann Arbor (2009)
- ✓ M.S. in Mathematics, University of Michigan - Ann Arbor (2005)
- ✓ M.S.E. in EE:Systems, University of Michigan - Ann Arbor (2005)
- ✓ B.S.E. in EE, Seoul National University (SNU) (1999)

Experience

- ✓ **Associate Professor, ECE, SNU (2021-)**
- ✓ Assistant / Associate Professor, ECE & AI, UNIST (2013-2021)
- ✓ Postdoc, University of Michigan – Ann Arbor (2011-2013)
- ✓ Postdoc, Harvard Medical School (2009-2011)

Awards / Honors / Services

- ✓ The IEEE NPSS Bruce Hasegawa Young Investigator Medical Imaging Science Award (2015)
- ✓ The Cover Article in Journal of Nuclear Medicine (Aug 2012)
- ✓ Associate Editor of IEEE Transactions on Computational Imaging (2019-2022)
- ✓ Area Chair of IEEE ICASSP (2018, 2020)

About ICL

How can your smart phone yield a nice photo at night without heavy, expensive lenses? How can we reduce radiation dose for CT while maintaining image quality to detect small plaque that may cause heart attack?

Computational imaging (CI) is a key for advanced imaging systems that may have to work under non-ideal conditions such as deficient measurements, large motions or limited budget for precision physical apparatus.

Conventional CI often took model-based approaches that considered given physical apparatus and data acquisition process. Recently, machine learning opened a new door for CI so that dramatic performance advances have been made.

ICL (formerly, BMIPL or Bio-Medical Image Processing Lab.) aims to advance signal processing and machine learning for robust and high-performance CI systems (especially medical imaging) in non-ideal conditions. ICL is also interested in applications in CI and medical imaging with the goal of enhancing both applications and image qualities.

If you are interested in MS/PhD or intern positions at ICL, please read "prospective students" of my webpage before you contact (webpage: http://seyoungchun.wordpress.com/**).**

ICL Is Advancing Signal Processing & Machine Learning for Computational Imaging Under Non-Ideal Conditions.

Model-Based Medical Imaging

PET, SPECT, and CT are important medical imaging modaltities to fight against cancer, Alzheimer's disease, COVID-19, and so on. However, there are a number of factors to consider for yielding high quality images such as long acquisition time (thus, patient's motion occurs), high noise, scatter, attenuation, radiation and more. ICL aims to achieve exquisite medical image quality that has never been seen through advanced algorithms. We are investigating both precision physical models and modern machine learning for various medical imaging modalities.

A number of ICL's members have participated in various medical imaging projects and have yielded the following outcomes ([M]: MS, [P]: PhD students):

- ✓ Including JS Kim[M], WJ Hong[M], SY Chun, **Medical Image Analysis**, 2021.
- ✓ KY Kim[M], S Soltanayev[M], SY Chun, **IEEE J Sel Top Sig Proc**, 2020.
- ✓ SY Chun, MP Nguyen[M], TQ Phan[M], HV Kim[M] et al., **IEEE Trans Med Imaging** 39(5):1369-79, 2020.
- ✓ HV Kim[P], SY Chun et al., SNMMI 1348, 2019. **(2nd place at SNMMI Physics, Instrumental & Data Sciences Poster Award)**
- ✓ Including SY Chun, **NeuroImage** 172:874-85, 2018.
- ✓ MP Nguyen[M], SY Chun, **IEEE Trans Imag Proc** 2017.

Machine Learning For CI

Off-the-shelf machine learning algorithms are useful for CI, but there are numerous cases where one often must develop a new machine learning algorithm for CI under non-ideal conditions. ICL is contributing to both CI and machine learning communities by investigating signal processing & machine learning for CI and medical imaging.

ICL's members have participated in machine learning/ low-level computer vision projects and have achieved the following outcomes ([B]: BS, [M]: MS, [P]: PhD students):

- ✓ DW Park[P], DU Kang[M], JS Kim[M], SY Chun, **ECCV** 2020. **(Spotlight)**
- ✓ M Zhussip[M],S Soltanayev[M], SY Chun, **NeurIPS** 32:1465-75, 2019.
- ✓ M Zhussip[M], S Soltanayev[M], SY Chun, **CVPR** 10247-56, 2019.
- ✓ DW Park[M], SY Chun, **winner award**, CVPR NTIRE real image super resolution, 2019.
- ✓ DW Park[M], SY Chun, runner-up award, CVPR NTIRE image enhancement, 2019.
- ✓ DW park[M], SY Chun, runner-up award, CVPR NTIRE image dehazing, 2019.
- ✓ M Zhussip[M], DW Park[M], S Soltanayev[M], SY Chun, runner-up award, CVPR NTIRE real image denoising, 2019.
- ✓ S Soltanayev[M], SY Chun, **NeurIPS** 31:3261-71, 2018.
- ✓ DW Park[M], KY Kim[B], SY Chun, **3rd place award**, CVPR NTIRE single image super resolution: Tracks 2-4, 2018.