Hyungjin Chung

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Research interests

Deep Learning, Diffusion models, Energy-based models,
Inverse problems, Computational Imaging, Compressed-sensing MRI

Education

KAIST Daejeon, Korea
PhD in Bio & Brain Engineering 2021.03 – Present
Advisor: Professors Jong Chul Ye

KAIST Daejeon, Korea
MA in Bio & Brain Engineering 2019.03 – 2021.02
Thesis: TomoGAN: Unsupervised Learning-based Reconstruction of Tomography
Advisor: Professors Jong Chul Ye

Korea University Seoul, Korea
BA in Biomedical Engineering 2015.03 – 2019.02

Honors and scholarships

KAIST Scholarship 2021.02 - Present
Korea Government Scholarship 2019.03 - 2021.02

Professional service

Advisory board member 2021.05 – Present
SNUHRad-AICON: SNUH-Radiology AI Collaboration Network

Journal reviewer
Medical Image Analysis, IEEE TMI, IEEE TCI, BMC bioinformatics, Medical Physics, Scientific Reports, BMC pregnancy and childbirth

Conference reviewer
MIDL (2021)

Publications

Unsupervised Deep Learning Methods for Biological Image Reconstruction and Enhancement
Mehmet Akçakaya, Burhaneddin Yaman, Hyungjin Chung, Jong Chul Ye,
IEEE SPM, 2021 (in press)

A Deep Learning Model for Diagnosing Gastric Mucosal Lesions Using Endoscopic Images: Development, Validation, and Method Comparison

Joon Yeul Nam*, Hyungjin Chung*, Kyu Sung Choi*, Hyuk Lee*,
Seung Jun Han, Tae Jun Kim, Hosim Soh, Eun Kang, Soo-Jeong Cho,
Jong Chul Ye, Jong Pil Im, Sang Gyun Kim, Yoon Jun Kim, Joo Sung Kim, Jung-Hwan Yoon, Hyunsoo Chung, Jeong-Hoon Lee
Gastrointestinal Endoscopy, 2021 **(*First author)**

Feature Disentanglement in generating three-dimensional structure from two-dimensional slice with sliceGAN
Hyungjin Chung, Jong Chul Ye
Nature Machine Intelligence, 2021

Missing Cone Artifacts Removal in ODT using Unsupervised Deep Learning in Projection Domain
Hyungjin Chung*, Jaeyoung Huh*, Geon Kim, Yong Keun Park, Jong Chul Ye
IEEE Transactions on Computational Imaging

Two-Stage Deep Learning for Accelerated 3D Time-of-Flight MRA without Matched Training Data
Hyungjin Chung, Eunju Cha, Leonard Sunwoo, Jong Chul Ye
Medical Image Analysis, 2021.

Deep learning STEM-EDX tomography of nanocrystals
Yoseob Han*, Jaeduck Jang*, Eunju Cha*, Junho Lee*, Hyungjin Chung*, Myoungho Jeong, Tae-Gon Kim, Byeong Gyu Chae, Hee Goo Kim, Shinae Jun, Sungwoo Hwang, Eunha Lee, Jong Chul Ye
Nature Machine Intelligence, 2021. **(*First author)**
Selected as 2021 March Issue Cover

Unpaired training of deep learning tMRA for flexible spatio-temporal resolution
Eunju Cha, Hyungjin Chung, Eung Yeop Kim, Jong Chul Ye.
IEEE Transactions on Medical Imaging, 2020.

Unpaired deep learning for accelerated MRI using optimal transport driven cycleGAN
Gyutaek Oh, Byeongsu Sim, Hyungjin Chung, Leonard Sunwoo, Jong Chul Ye.
IEEE Transactions on Computational Imaging, 2020.

Preprints

Score-based diffusion models for accelerated MRI

Hyungjin Chung and Jong Chul Ye
arXiv preprint arXiv:2110.05243

Simultaneous super-resolution and motion artifact removal in diffusion-weighted MRI using unsupervised deep learning
Hyungjin Chung, Jaehyun Kim, Jeong Hee Yoon, Jeong Min Lee, Jong Chul Ye
arXiv preprint arXiv:2105.00240

International Confernce

Deep learning fast MRI using channel attention in magnitude domain

Joonhyung Lee*, Hyunjong Kim*, Hyungjin Chung*, Jong Chul Ye
IEEE International Symposium on Biomedical Imaging, 2020.
(*First author)

Unsupervised Merge-Residual Learning for Time-of-Flight MRI
Hyungjin Chung, Eunju Cha, Leonard Sunwoo, Jong Chul Ye
IEEE International Symposium on Biomedical Imaging Workshop, 2020.

Patent

Accelerating method of conditional diffusion models for inverse problems using stochastic contraction and the apparatus thereof
Jong Chul Ye, Hyungjin Chung, Byeongsu Sim
Korea patent application, 2021.

Score-based Diffusion Model for Accelerated MRI and Apparatus thereof
Jong Chul Ye, Hyungjin Chung
Korea patent application, 2021.

Task-agnostic image processing method and apparatus using transformer and federated split learning
Jong Chul Ye, Hyungjin Chung, Gyutaek Oh, Sangjoon Park, Boah Kim, Jeongsol Kim
Korea patent application, 2021.

Crowd Deep Learning Method of Medical Artificial Intelligence and Apparatus thereof
Jong Chul Ye, Hyungjin Chung, Gyutaek Oh, Sangjoon Park
Korea patent application, 2021.

Unsupervised deep learning method for tomography for complete removal of missing cone artifact and apparatus therefore
Jong Chul Ye, Hyungjin Chung, JaeYoung Huh
Korea patent application, 2020.

Two-Stage unsupervised learning method for 3D Time-of-flight MRA reconstruction and the apparatus therefore
Jong Chul Ye, Hyungjin Chung, Eunju Cha, Leonard Sunwoo

Korea patent application, 2020.

Research experience

Unsupervised deep learning for compressed sensing MRI reconstruction
KAIST 2020.04 – 2021.02
Research project conducted in collaboration with Seoul National University Bundang Hospital.

Deep learning-based performance prediction of deep learning
KAIST 2020.03 – 2021.02
Project presented in VRPGP 2020

Development of reconstruction algorithm of STEM-EDX tomography
Samsung Electronics 2019.12 – 2020.11

Teaching experience

Head Teaching assistant, KAIST Fall 2021
BiS 800: Machine Learning for Medical Image Analysis

Teaching assistant, KAIST Spring 2021
BiS 301: Bioengineering Laboratory I

Teaching assistant, KAIST Fall 2020
BiS 452: Biomedical Imaging

Teaching assistant, KAIST Spring 2020
BiS 400, MAS 480 : Advanced Intelligence

Teaching assistant, KAIST Fall 2019
BiS 452: Biomedical Imaging

Teaching assistant, KAIST Spring 2020
BiS 301, : Bioengineering Laboratory I

Skills

Computational Imaging

- Compressed sensing MRI (CS-MRI)
- Computational tomography (CT)
- Inverse problems in vision
- Optical diffraction tomography (ODT)
- Microscopy
- Phase Retrieval

Deep Learning Framework
PyTorch, JAX, Tensorflow

Programming
Python, MATLAB, C++.