Hyungjin Chung

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Research interests

Deep Learning, Diffusion models, Inverse problems, Computational Imaging

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

Work Experience

Los Alamos National Laboratory — 2022.06 – 2022.08
Research intern, Applied math & Plasma physics group (T-5)
Host: Michael T. Mccann, Marc Klasky

Honors and scholarships

KAIST Scholarship — 2021.02 - Present
Korea Government Scholarship — 2019.03 - 2021.02

Awards

29th Samsung Humantech Paper Award — 2023.2
Gold Award: 1st in Signal Processing
2020-2022 BISPL Best Researcher Award — 2020-2022.12

Invited talks

Diffusion models for inverse problems — 2023.01
Inference & control group seminar, Donders Institute, Radboud Univ.: youtube
Diffusion models for inverse problems in imaging — 2022.08
LANL T-CNLS seminar, 2022

Deep learning-based MR reconstruction — 2022.06
45^{th} meeting, The Korean Society of Abdominal Radiology, 2022

Professional Service

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

Reviewer (selected)
NeurIPS, CVPR, IEEE TPAMI, IEEE TMI, IEEE TCI, Medical Image Analysis

ML conferences
*: Equal contribution

Diffusion Posterior Sampling for General Noisy Inverse Problems
Hyungjin Chung*, Jeongsol Kim*, Michael T. Mccann, Marc L. Klasky, Jong Chul Ye
*International Conference on Learning Representations (ICLR), 2023, *Spotlight**

Improving Diffusion Models for Inverse Problems using Manifold Constraints
Hyungjin Chung*, Byeongsu Sim*, Dohoon Ryu, Jong Chul Ye
Advances in Neural Information Processing Systems (NeurIPS), 2022

Come-Closer-Diffuse-Faster: Accelerating Conditional Diffusion Models for Inverse Problems through Stochastic Contraction
Hyungjin Chung, Byeongsu Sim, and Jong Chul Ye
IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), 2022

Workshops

Progressive Deblurring of Diffusion Models for Coarse-to-Fine Image Synthesis
Sangyun Lee, Hyungjin Chung, Jaehyeon Kim, Jong Chul Ye
Advances in Neural Information Processing Systems (NeurIPS) Workshop on score-based methods (SBM), 2022

Journal publications
*: Equal contribution

MR Image Denoising and Super-Resolution Using Regularized Reverse Diffusion
Hyungjin Chung, Eun Sun Lee, Jong Chul Ye
IEEE TMI, 2022

Low-dose sparse-view HAADF-STEM-EDX tomography of nanocrystals using unsupervised deep learning
Eunju Cha*, Hyungjin Chung*, Jaeduck Jang, Junho Lee, Eunha Lee, Jong Chul Ye
ACS Nano, 2022

Score-based diffusion models for accelerated MRI
Hyungjin Chung and Jong Chul Ye
Medical Image Analysis, 2021

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

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

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.
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

Solving 3D Inverse Problems using Pre-trained 2D Diffusion Models
Hyungjin Chung*, Dohoon Ryu*, Michael T. Mccann, Marc L. Klasky, Jong Chul Ye

arXiv preprint arXiv:2211.10655

Parallel Diffusion Models of Operator and Image for Blind Inverse Problems
Hyungjin Chung*, Jeongsol Kim*, Sehui Kim, Jong Chul Ye
arXiv preprint arXiv:2211.10656

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.

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

Teaching Assistant, KAIST Fall 2022
AI 619: AI for medical imaging and signals

Project leader, KAIST Spring 2022
AI 618: Generative models and unsupervised learning

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

References

Jong Chul Ye 2019.03 - current
Thesis advisor (KAIST) jong.ye@kaist.ac.kr

Michael T. McCann 2022.06 - 2022.08
Mentor (LANL) mccann@lanl.gov

Marc L. Klasky 2022.06 - 2022.08
Mentor (LANL) mklasky@lanl.gov