Jun-Hyuk Kim

Research Scientist
jh131.kim@samsung.com | junhyukk.github.io
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Research Interests

I am interested in making visual data more valuable in various aspects based on deep learning. In particular, I have focused on developing learned image restoration and compression models for better visual quality and less capacity, respectively. Specifically, I have considered the following.

- **Architectures.** Convolutional neural network is the most popular architecture for various computer vision tasks. It is specialized for learning local information, but has limitations in modeling global information. I have designed architectures with attention mechanisms to fully utilize information in images.
- **Robustness.** Learned models should be robust against deviations of input images from the trained domain that can occur naturally (e.g., successive image compression) and intentionally (e.g., adversarial attack). I have investigated the vulnerability of learned models and proposed more robust models.
- **Perceptual quality.** Distortion measures (e.g., mean squared error) are widely used for both training and evaluation. However, it is known that there exists a trade-off between distortion and perceptual quality. I have studied objective functions for models to consider perceptual quality as well as distortion.

Education

Yonsei University, South Korea — Mar. 2015 – Aug. 2022
Ph.D., School of Integrated Technology, College of Engineering

Yonsei University, South Korea — Mar. 2012 – Feb. 2015
B.S., School of Integrated Technology, College of Engineering

Research Experiences

Samsung Advanced Institute of Technology (SAIT) — Oct. 2022 – Now
Research Scientist

NAVER AI Lab — Jun. 2021 – Nov. 2021
Research Intern

Selected Publications

Architectures

J.-H. Kim, S. Kim, W.-H. Lee, and D. Oh, "Diversify, contextualize, and adapt: Efficient entropy modeling for neural image codec," in *Advances in Neural Information Processing Systems (NeurIPS)*, 2024.

J.-H. Kim, B. Heo, and J.-S. Lee, "Joint global and local hierarchical priors for learned image compression," in *Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, 2022.

J.-H. Kim, J.-H. Choi, M. Cheon, and J.-S. Lee, "MAMNet: Multi-path adaptive modulation network for image super-resolution," *Neurocomputing*, vol. 402, pp. 38–49, 2020.

Robustness

J. Hwang, **J.-H. Kim**, J.-H. Choi, and J.-S. Lee, "Just one moment: Structural vulnerability of deep action recognition against one frame attack," in *Proceedings of the IEEE International Conference on Computer Vision (ICCV)*, 2021.

J.-H. Kim, S. Jang, J.-H. Choi, and J.-S. Lee, "Instability of successive deep image compression," in *Proceedings of the ACM International Conference on Multimedia (MM)*, 2020. **Oral presentation.**

J.-H. Choi, H. Zhang, **J.-H. Kim**, C.-J. Hsieh, and J.-S. Lee, "Evaluating robustness of deep image super-resolution against adversarial attacks," in *Proceedings of the IEEE International Conference on Computer Vision (ICCV)*, 2019.

Perceptual quality

H. Lee, M. Kim, **J.-H. Kim**, S. Kim, D. Oh, and J. Lee, "Neural image compression with text-guided encoding for both pixel-level and perceptual fidelity," in *Proceedings of the International Conference on Machine Learning (ICML)*, 2024.

J.-H. Choi, **J.-H. Kim**, M. Cheon, and J.-S. Lee, "Deep learning-based image super-resolution considering quantitative and perceptual quality," *Neurocomputing*, vol. 398, pp. 347–359, 2020.

Publications

Journal

J.-H. Kim, S. Jang, J.-H. Choi, and J.-S. Lee, "Successive learned image compression: Comprehensive analysis of instability," *Neurocomputing*, vol. 506, pp. 12–24, 2022.

J.-H. Choi, **J.-H. Kim**, M. Cheon, and J.-S. Lee, "Volatile-nonvolatile memory network for progressive image super-resolution," *IEEE Access*, vol. 9, pp. 37487–37496, 2021.

S.-E. Moon, **J.-H. Kim**, S.-W. Kim, and J.-S. Lee, "Prediction of car design and perception using EEG and gaze patterns," *IEEE Transactions on Affective Computing*, vol. 12, no. 4, pp. 843–856, 2021.

J.-H. Kim, J.-H. Choi, M. Cheon, and J.-S. Lee, "MAMNet: Multi-path adaptive modulation network for image super-resolution," *Neurocomputing*, vol. 402, pp. 38–49, 2020.

J.-H. Choi, **J.-H. Kim**, M. Cheon, and J.-S. Lee, "Deep learning-based image super-resolution considering quantitative and perceptual quality," *Neurocomputing*, vol. 398, pp. 347–359, 2020.

Conference

J.-H. Kim, S. Kim, W.-H. Lee, and D. Oh, "Diversify, contextualize, and adapt: Efficient entropy modeling for neural image codec," in *Advances in Neural Information Processing Systems (NeurIPS)*, 2024.

H. Lee, M. Kim, **J.-H. Kim**, S. Kim, D. Oh, and J. Lee, "Neural image compression with text-guided encoding for both pixel-level and perceptual fidelity," in *Proceedings of the International Conference on Machine Learning (ICML)*, 2024.

J. Lee, **J.-H. Kim**, and J.-S. Lee, "Demystifying randomly initialized networks for evaluating generative models," in *Proceedings of the AAAI Conference on Artificial Intelligence (AAAI)*, 2023.

J.-H. Choi, H. Zhang, **J.-H. Kim**, C.-J. Hsieh, and J.-S. Lee, "Deep image destruction: Vulnerability of deep image-to-image models against adversarial attacks," in *Proceedings of the International Conference on Pattern Recognition (ICPR)*, 2022.

J.-H. Kim, B. Heo, and J.-S. Lee, "Joint global and local hierarchical priors for learned image compression," in *Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, 2022.

J. Hwang, **J.-H. Kim**, J.-H. Choi, and J.-S. Lee, "Just one moment: Structural vulnerability of deep action recognition against one frame attack," in *Proceedings of the IEEE International Conference on Computer Vision (ICCV)*, 2021.

J.-W. Han, J.-H. Choi, **J.-H. Kim**, and J.-S. Lee, "Edge attention network for image deblurring and super-resolution," in *Proceedings of the IEEE International Conference on Systems, Man, and Cybernetics (SMC)*, 2021.

S. Nah et al. (including **J.-H. Kim**), "NTIRE 2021 challenge on image deblurring," in *Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition (CVPR) Workshops*, 2021.

J.-H. Choi, H. Zhang, **J.-H. Kim**, C.-J. Hsieh, and J.-S. Lee, "Adversarially robust deep image super-resolution using entropy regularization," in *Proceedings of the Asian Conference on Computer Vision (ACCV)*, 2020.

K.-H. Ahn, **J.-H. Kim**, J.-H. Choi, and J.-S. Lee, "Multi-scale adaptive residual network using total variation for real image super-resolution," in *Proceedings of the IEEE International Conference on Consumer Electronics Asia (ICCE-Asia)*, 2020.

M.-S. Choi, **J.-H. Kim**, J.-H. Choi, and J.-S. Lee, "Efficient bokeh effect rendering using generative adversarial network," in *Proceedings of the IEEE International Conference on Consumer Electronics Asia (ICCE-Asia)*, 2020.

J.-H. Kim, S. Jang, J.-H. Choi, and J.-S. Lee, "Instability of successive deep image compression," in *Proceedings of the ACM International Conference on Multimedia (MM)*, 2020. **Oral presentation.**

G.-W. Jeon, J.-H. Choi, **J.-H. Kim**, and J.-S. Lee, "LarvaNet: hierarchical super-resolution via multi-exit architecture," in *Proceedings of the European Conference on Computer Vision (ECCV) Workshops*, 2020.

K. Zhang et al. (including **J.-H. Kim**), "AIM 2020 challenge on efficient super-resolution: methods and results," in *Proceedings of the European Conference on Computer Vision (ECCV) Workshops*, 2020.

P. Wei et al. (including **J.-H. Kim**), "AIM 2020 challenge on real image super-resolution: methods and results," in *Proceedings of the European Conference on Computer Vision (ECCV) Workshops*, 2020.

J.-H. Kim, J.-H. Choi, J. Chang, and J.-S. Lee, "Efficient deep learning-based lossy image compression via asymmetric autoencoder and pruning," in *Proceedings of the IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, 2020. **Oral presentation.**

J.-H. Choi, **J.-H. Kim**, and J.-S. Lee, "SRZoo: An integrated repository for super-resolution using deep learning," in *Proceedings of the IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, 2020.

J.-H. Choi, H. Zhang, **J.-H. Kim**, C.-J. Hsieh, and J.-S. Lee, "Evaluating robustness of deep image super-resolution against adversarial attacks," in *Proceedings of the IEEE International Conference on Computer Vision (ICCV)*, 2019.

J.-H. Kim, J.-H. Choi, C.-H. Seo, J. Chang, and J.-S. Lee, "Deep learning-based super-resolution for digital comics," in *Proceedings of the SIGGRAPH Asia 2018 Posters*, 2018.

M. Cheon, **J.-H. Kim**, J.-H. Choi, and J.-S. Lee, "Generative adversarial network-based image super-resolution using perceptual content losses," in *Proceedings of the European Conference on Computer Vision (ECCV) Workshops*, 2018.

J.-H. Kim and J.-S. Lee, "Deep residual network with enhanced upscaling module for super-resolution," in *Proceedings of the IEEE Conference on Computer Vision (CVPR) Workshops*, 2018.

R. Timofte et al. (including **J.-H. Kim**), "NTIRE 2018 challenge on single image super-resolution: methods and results," in *Proceedings of the IEEE Conference on Computer Vision (CVPR) Workshops*, 2018.

S.-E. Moon, **J.-H. Kim**, S.-W. Kim, and J.-S. Lee, "Assessing product design using photos and real products," in *Proceedings of the CHI Conference on Extended Abstracts on Human Factors in Computing Systems*, 2017.

J.-H. Kim and J.-S. Lee, "Travel photo album summarization based on aesthetic quality, interestingness, and memorableness," in *Proceedings of the APSIPA Annual Summit and Conference*, 2016.

Awards and Honors

Merit Academic Paper Award 2020
2020-2 Yonsei Superior Paper Award

2nd Place Award (Region 1) 2018
PIRM 2018 Challenge on Perceptual Super-Resolution, ECCV Workshop

2nd Place Award (Region 2) 2018
PIRM 2018 Challenge on Perceptual Super-Resolution, ECCV Workshop

Graduate Fellowship 2015 – 2019
ICT Consilience Creative Program, Ministry of Science and ICT, South Korea

Undergraduate Fellowship 2012 – 2015
ICT Consilience Creative Program, Ministry of Science and ICT, South Korea