Hyeongmin Lucas Lee

ML Research Scientist (Ph.D.) at Twelve Labs, Seoul, Korea

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Research Interest

I'm interested in all the phenomena that happen in videos. I like to explore and use them to create valuable technologies.

- Machine Learning & Computer Vision
- Video Foundation Models
- Video Understanding & Representation Learning
- Self-supervised Learning
- Video Processing & Enhancement
- Video Frame Interpolation
- Video Compression
- 3D Vision

Education

Mar.2018 – Aug.2023 **INTEGRATED M.S./PH.D. Course in Electrical and Electronic Engineering**
Yonsei University, Seoul, Korea
- Image and Video Pattern Recognition LAB
- Supervised by Prof. Sangyoun Lee
- GPA: 4.24/4.3

Mar.2014 – Feb.2018 **B.S. in Electrical and Electronic Engineering**
Yonsei University, Seoul, Korea
- Graduated **Cum Laude**
- GPA: 3.96/4.3

Work Experience

July.2023 - Present **Twelve Labs**, Seoul, Korea
ML Research Scientist
- Working on the Foundation Models for Video Understanding

May.2021 - Nov.2021 **Adobe Research**, San Jose, CA (Remote)
Research Intern
- Working with Dr. Simon Niklaus and Dr. Oliver Wang
- Research on Video Stabilization

Publications

2023 [1] **Hyeongmin Lee**, Taeoh Kim, Hanbin Son, Sangwook Baek, Minsu Cheon, and Sangyoun Lee, "A Nonlinear, Regularized, and Data-Independent Modulation for Continuously Interactive Image Processing Network," *International Journal of Computer Vision (**IJCV**)*, 2023.

[2] Sangjin Lee*, **Hyeongmin Lee***, Chajin Shin, and Sangyoun Lee, "Exploring Discontinuity for Video Frame Interpolation," *IEEE/CVF Conference on Computer Vision and Pattern Recognition (**CVPR**) (**Highlight; Top 10% of Accepted Papers**)*, 2023.

2022 [3] Chajin Shin, **Hyeongmin Lee**, Hanbin Son, Sangjin Lee, Dogyoon Lee, and Sangyoun Lee, "Expanded Adaptive Scaling Normalization for End to End Image Compression," *European Conference on Computer Vision (**ECCV**)*, 2022.

[4] Hanbin Son, Taeoh Kim, **Hyeongmin Lee**, and Sangyoun Lee, "Enhanced Standard Compatible Image Compression Framework based on Auxiliary Codec Networks," *IEEE Transactions on Image Processing (**TIP**)*, 2022.

2021 [5] Dogyoon Lee, Jaeha Lee, Junhyeop Lee, **Hyeongmin Lee**, Minhyeok Lee, Sungmin Woo, and Sangyoun Lee, "Regularization Strategy for Point Cloud via Rigidly Mixed Sample," *IEEE/CVF Conference on Computer Vision and Pattern Recognition (**CVPR**)*, 2021.

2020 [6] Taeoh Kim*, **Hyeongmin Lee***, MyeongAh Cho*, Hoseong Lee, Dong heon Cho, and Sangyoun Lee, "Learning Temporally Invariant and Localizable Features via Data Augmentation for Video Recognition," *European Conference on Computer Vision Workshops (**ECCVW**) (**Oral**)*, 2020.

[7] **Hyeongmin Lee**, Taeoh Kim, Tae-young Chung, Daehyun Pak, Yuseok Ban, and Sangyoun Lee, "AdaCoF: Adaptive Collaboration of Flows for Video Frame Interpolation," *IEEE/CVF Conference on Computer Vision and Pattern Recognition (**CVPR**)*, 2020.

[8] Sangjin Lee, **Hyeongmin Lee**, Taeoh Kim, and Sangyoun Lee, "Extrapolative-Interpolative Cycle-Consistency Learning for Video Frame Extrapolation," *IEEE International Conference on Image Processing (**ICIP**)*, 2020.

2019 [9] MyeongAh Cho, Tae-young Chung, **Hyeongmin Lee**, and Sangyoun Lee, "N-RPN : Hard Example Learning for Region Proposal Networks," *IEEE International Conference on Image Processing (**ICIP**)*, 2019.

[10] Taeoh Kim, **Hyeongmin Lee**, Hanbin Son, and Sangyoun Lee, "SF-CNN : A Fast Compression Artifacts Removal via Spatial-to-Frequency Convolutional Neural Networks," *IEEE International Conference on Image Processing (**ICIP**)*, 2019.

2018 [11] **Hyeongmin Lee**, Taeoh Kim, Eungyeol Song, and Sangyoun Lee, "CollaboNet: Collaboration of Generative Models by Unsupervised Classification," *IEEE International Conference on Image Processing (**ICIP**)*, 2018.

[12] Eungyeol Song, **Hyeongmin Lee**, Jaesung Choi, and Sangyoun Lee, "AHD: Thermal Image-based Adaptive Hand Detection for Enhanced Tracking System," *IEEE Access*, 2018.

* indicates equal contribution. Click the titles to move to the paper links

Patents

2021 **Apparatus for compressing image, learning apparatus and method thereof**
Korea Patent no.10-2245682, Apr. 2021

2021 **Apparatus and method for interpolating frames based on multiple flows**
Korea Patent no.10-2201297, Jan. 2021

Projects

Jul.2022 – Jun.2023 **Development of Enhanced Deep Video Compression Framework**
Samsung Research

Jun.2021 – May.2022 **Development of Deep Learning-based Video Frame Interpolation Algorithm for Game and AR Videos**
Samsung Electronics Mobile Division

Jun.2021 – May.2022 **Deep Learning-based E2E Video Codec Research**
Samsung Research

May.2021 – Nov.2021 **Fast Video Stabilization**
Adobe Research

Apr.2020 – Dec.2020 **Development of Data Augmentation-based AI Algorithm for Image Enhancement**
Samsung Research

May.2019 – Dec.2019 **Locally Controllable Deep Neural Network Algorithm Development**
Samsung Research

Apr.2018 – Dec.2018 **Development of Compact Deep Networks for Image Processing**
Samsung Research

Apr.2017 – Dec.2017 **Broadcasting Device Controlling & Editing Technology using Personal Voice/Gesture Recognition**
Institute for Information & Communications Technology Promotion (IITP), Ministy of Science

Honors & Awards

2021 **5th Next Generation Engineering Leader Award of NAEK**
National Academy of Engineering of Korea (NAEK)

2020 **Visual Inductive Priors for Data-Efficient Action Recognition Challenge**
1st Visual Inductive Priors for Data-Efficient Deep Learning Workshop
- European Conference on Computer Vision (ECCV) Workshop
- **4th Place**

2018 **Honor Graduation Award**
Electrical & Electronic Engineering, Yonsei University
- Cum Laude

2014 - 2017 **Honor Student Award**
Electrical & Electronic Engineering, Yonsei University
- The Highest Honor Student Award (2014-1)
- Honor Student Award (2014-2, 2015-1, 2015-2, 2017-1, 2017-2)

Invited Talks

- **AdaCoF: Adaptive Collaboration of Flows for Video Frame Interpolation**
  - GPU Technology Conference (GTC), *NVIDIA, Oct.2020*
- **Introduction to Image Translation**
  - Junior Seminar, *Electrical & Electronic Engineering, Yonsei University, Nov.2020*
- **Complex and discontinuous motion compensation for video frame interpolation**
  - Multimodal Weekly Webinar, *Twelve Labs, Feb.2024*

Peer Reviews

- IEEE Open Journal of Signal Processing (2021)
- IEEE/CVF Conference on Computer Vision and Pattern Recognition (2022)
- European Conference on Computer Vision (2022)
- IEEE/CVF Conference on Computer Vision and Pattern Recognition (2023)
- IEEE/CVF Conference on Computer Vision and Pattern Recognition (2024)

Activities

Oct.2019 - Present **Member of PR12**
Deep Learning paper reading group in Tensorflow KR (In Korean)
- Season 3 (Oct.2019-Jan.2021)
- Season 4 (Mar.2021-Aug.2022)
- Season 5 (Sep.2022-Present)

Mar.2019 - Nov.2021 **SNU AI Study**
Offline AI Study Group at Seoul National University
- Season 6 (Mar.2019-Jul.2019)
- Season 7 (Feb.2020-May.2020)
- Season 8 (Organizer) (Sep.2020-Dec.2020)
- Season 9 (Organizer) (Jan.2021-Apr.2021)
- Season 10 (Organizer) (Aug.2021-Nov.2021)

Mar.2018 – Dec.2018 **Teaching Assistant**
Electrical and Electronic Engineering, Yonsei University
- (2018-1) Digital Signal Processing
- (2018-2) Signal and System

Dec.2019 – Dec.2020 **Young Engineers' Honor Society (YEHS)**
Organization under The National Academy of Engineering of Korea (NAEK)
- Deputy Department Head of Academic Exchange Dpt. (Dec.2017 – Dec.2018)
- Department Head of Academic Exchange Dpt. (Dec.2018 – Dec.2019)
- President (Dec.2019 – Dec.2020)

Last Updated: Feb, 2024