Pilhyeon Lee

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Summary

Research Interest How to effectively train models with limited information in real-world scenarios
Current Focus Video Understanding, Multimodal Learning, Knowledge Distillation, Weakly-supervised Learning

Education

Yonsei University *Seoul, South Korea*
Ph.D. in Computer Science *Mar. 2018 - Aug. 2023*
- Dissertation title: "Learning Action Representations with Limited Information"
- Supervised by Prof. Hyeran Byun
- Overall GPA: 4.21/4.3

Chung-Ang University *Seoul, South Korea*
B.S. in Computer Science & Engineering *Mar. 2014 - Feb. 2018*
- Honors: Magna cum laude (Overall GPA: 4.18/4.5)

Experiences

Yonsei University *Seoul, South Korea*
Postdoctoral Researcher *Sep. 2023 - Present*
- Working with Prof. Hyeran Byun

Clova AI Research, NAVER Corp. *Seoul, South Korea*
Visiting Researcher *Feb. 2022 - Jan. 2023*
- Working with Dr. Taeoh Kim, Minho Shim, and Dongyoon Wee in the Video Understanding Group

Microsoft Research Asia *Beijing, China*
Research Intern *Dec. 2019 - Jun. 2020*
- Working with Dr. Jinglu Wang and Dr. Yan Lu in the Media Computing Group

Publications

(∗ : equal contributions, † : corresponding author)

Preprint / In submission

[P2] BAM-DETR: Boundary-Aligned Moment Detection Transformer for Temporal Sentence Grounding in Videos *2024*
Pilhyeon Lee†, Hyeran Byun
- Under review

[P1] Enhancing Fairness without Demographics through Dynamic Reweighting *2024*
Songho Park, **Pilhyeon Lee**, Seogkyu Jeon, Bei Liu, Jianlong Fu, Hyeran Byun
- Under review

International Journal

[J3] Expert-guided Contrastive Learning for Video-Text Retrieval *Jun, 2023*
Jewook Lee, **Pilhyeon Lee**, Sungho Park, Hyeran Byun
- Neurocomputing
- Impact Factor: 5.779 (JCR Top-30%)

[J2] Exploiting Shape Cues for Weakly Supervised Semantic Segmentation *Aug. 2022*
Sungpil Kho*, **Pilhyeon Lee***, Wonyoung Lee, Minsong Ki, Hyeran Byun
- Pattern Recognition (**PR**)
- Impact Factor: 8.518 (JCR Top-10%)

[J1] Exploiting Domain Transferability for Collaborative Inter-level Domain Adaptive Object Detection *May. 2022*
Mirae Do*, Seogkyu Jeon*, **Pilhyeon Lee***, Kibeom Hong, Yu-Seung Ma, Hyeran Byun
- Expert Systems With Applications (**ESWA**)
- Impact Factor: 8.665 (JCR Top-10%)

International Conference

[C11] AesPA-Net: Aesthetic Pattern-Aware Style Transfer Networks *Oct. 2023*

Kibeom Hong, Seogkyu Jeon, Junsoo Lee, Namhyuk Ahn, Kunhee Kim, **Pilhyeon Lee**, Daesik Kim, Youngjung Uh, Hyeran Byun

- IEEE/CVF International Conference on Computer Vision (**ICCV 2023**)
- 26.8 % acceptance rate

[C10] Improving Diversity in Zero-Shot GAN Adaptation with Semantic Variations *Oct. 2023*

Seogkyu Jeon, Bei Liu, **Pilhyeon Lee**, Kibeom Hong, Jianlong Fu, Hyeran Byun

- IEEE/CVF International Conference on Computer Vision (**ICCV 2023**)
- 26.8 % acceptance rate

[C9] Decomposed Cross-modal Distillation for RGB-based Temporal Action Detection *Jun. 2023*

Pilhyeon Lee, Taeoh Kim, Minho Shim, Dongyoon Wee, Hyeran Byun

- IEEE/CVF International Conference on Computer Vision and Pattern Recognition (**CVPR 2023**)
- 25.8 % acceptance rate

[C8] Fair Contrastive Learning for Facial Attribute Classification *Jun. 2022*

Sungho Park, Jewook Lee, **Pilhyeon Lee**, Sunhee Hwang, Dohyung Kim, Hyeran Byun

- IEEE/CVF International Conference on Computer Vision and Pattern Recognition (**CVPR 2022**)
- 25.3 % acceptance rate

[C7] Subject Adaptive EEG-based Visual Recognition *Nov. 2021*

Pilhyeon Lee, Sunhee Hwang, Seogkyu Jeon, Hyeran Byun

- The 6th Asian Conference on Pattern Recognition (**ACPR 2021**)

[C6] Learning Action Completeness from Points for Weakly-supervised Temporal Action Localization *Oct. 2021*

Pilhyeon Lee, Hyeran Byun

- IEEE/CVF International Conference on Computer Vision (**ICCV 2021**)
- **Oral presentation** (3.3 % acceptance rate)

[C5] Feature Stylization and Domain-aware Contrastive Learning for Domain Generalization *Oct. 2021*

Seogkyu Jeon, Kibeom Hong, **Pilhyeon Lee**, Jewook Lee, Hyeran Byun

- The 29th ACM International Conference on Multimedia (**MM 2021**)
- **Oral presentation** (9.2 % acceptance rate)

[C4] Continuous Face Aging Generative Adversarial Networks *Jun. 2021*

Seogkyu Jeon, **Pilhyeon Lee**, Kibeom Hong, Hyeran Byun

- IEEE International Conference on Acoustics, Speech and Signal Processing (**ICASSP 2021**)

[C3] Weakly-supervised Temporal Action Localization by Uncertainty Modeling *Feb. 2021*

Pilhyeon Lee, Jinglu Wang, Yan Lu, Hyeran Byun

- The 35th AAAI Conference on Artificial Intelligence (**AAAI 2021**)
- 21.0 % acceptance rate

[C2] Exploiting Transferable Knowledge for Fairness-aware Image Classification *Nov. 2020*

Sunhee Hwang*, Sungho Park*, **Pilhyeon Lee***, Seogkyu Jeon, Dohyung Kim, Hyeran Byun

- The 15th Asian Conference on Computer Vision (**ACCV 2020**)

[C1] Background Suppression Network for Weakly-supervised Temporal Action Localization *Feb. 2020*

Pilhyeon Lee, Youngjung Uh, Hyeran Byun

- The 34th AAAI Conference on Artificial Intelligence (**AAAI 2020**)
- **Spotlight presentation** (20.6 % acceptance rate)

Domestic Journal / Conference

Conference: 4 papers (in Korean)

Projects

Domain Generalization for Image and Video Understanding Robust to Unseen Domains *Yonsei Univ.*

Funded by National Research Foundation of Korea (NRF) *Mar. 2022 - Feb. 2025*

- Developed an object detection framework adaptable to unlabeled domains.
- Established a video grounding model given unseen natural language descriptions.
- Part of this work was summarized in a paper and accepted to Journal of Expert Systems with Applications.

Development of BCI based Brain and Cognitive Computing Technology for Recognizing User's Intentions using Deep Learning — *Yonsei Univ.*

Funded by Institute for Information & Communications Technology Planning & Evaluation (IITP) — *Apr. 2017 - Dec. 2023*

- Developed a system that detects drowsy driving using EEG signals.
- Designed a practical setting for EEG-based visual recognition and proposed subject-independent learning approaches.
- Part of this work was summarized in papers and accepted to ACPR 2021 and BCI 2021; 2022; 2023.

Study on Efficient Temporal Action Localization in Videos — *CLOVA AI Research*

Funded by Naver Corporation — *Feb. 2022 - Jan. 2023*

- Developed a new codebase for end-to-end temporal action localization.
- Designed a decomposed cross-modal knowledge distillation framework for RGB-based temporal action localization.
- This project financially supported the collaboration with the video understanding group at CLOVA AI Research.
- Part of this work was summarized in a paper and accepted to CVPR 2023.

Study on Audio, Video, 3d Map and Activation Map Generation System using Deep Generative Model — *Yonsei Univ.*

Funded by Institute for Information & Communications Technology Planning & Evaluation (IITP) — *Jul. 2019 - Dec. 2020*

- Developed a method to generate more precise temporal class activation map from untrimmed videos.
- This project financially supported the abroad internship at Microsoft Research Asia.

Fundamental Study of Vision Algorithms for Comprehensive and Thorough Understanding of Videos — *Yonsei Univ.*

Funded by National Research Foundation of Korea (NRF) — *Aug. 2017 - Dec. 2020*

- Developed a new framework for weakly-supervised temporal action localization.
- Part of this work was summarized in a paper and accepted to AAAI 2020.

Development of Long-range and Multi-person Tracking Method — *Yonsei Univ.*

Funded by Samsung Electronics Co., Ltd. — *May. 2020 - Nov. 2020*

- Developed a framework for action recognition based on pose and RGB streams.

Background Modeling for Weakly-supervised Temporal Action Localization — *Microsoft Research Asia*

Funded by Institute for Information & Communications Technology Planning & Evaluation (IITP) — *Dec. 2019 - Jun. 2020*

- Proposed a new background modeling approach to overcome the difficulty in rejecting background frames for weakly-supervised temporal action localization.
- This work was summarized in a paper and accepted to AAAI 2021.

Deep Learning based Object Detection for Image Analysis — *Yonsei Univ.*

Funded by Samsung Electronics Co., Ltd. — *May. 2018 - Dec. 2018*

- Built an object detection benchmark containing unusual factory scenes and reproduced the state-of-the-art object detection methods.

Inter-cultural Korean Music Discovery based on Pluralistic Music Emotion — *Chung-Ang Univ.*

Funded by National Research Foundation of Korea (NRF) — *Jun. 2017 - Feb. 2018*

- Assisted research on improving classification performance on multi-label data via instance selection algorithm.

Honors & Awards

2023	**Doctoral Colloquium**, Korean Conference on Computer Vision (KCCV)
2021	**Outstanding Research Paper Award**, Graduate School of Yonsei University
2021	**Winner**, Naver PhD Fellowship Award
2021	**Finalist**, Qualcomm Innovation Fellowship Korea
2021	**Excellent Paper Award**, The Joint Conference of LG AI Research and Korean Artificial Intelligence Association
2021	**Excellent Paper Award**, The Conference of Korean Artificial Intelligence Association
2020	**Best Paper Award**, The Joint Conference of Microsoft and Korean Artificial Intelligence Association
2018	**Graduation Honors Award**, Chung-Ang University
2015 - 2018	**Academic Excellence Scholarship**, Chung-Ang University

Presentation

Weakly-supervised Learning in Computer Vision

- Invited talk at Chung-Ang University, 2024. (Hosted by Prof. Chanho Eom)

Learning to Localize Actions with Limited Information

- Doctoral Colloquium at Korean Conference on Computer Vision (KCCV), 2023.

Learning Action Completeness from Points for Weakly-supervised Temporal Action Localization

- ICCV Oral talk, 2021.
- Qualcomm Innovation Fellowship Korea (QIFK), 2021.
- Korean Conference on Computer Vision (KCCV), 2022.
- Oral presentation at the 1st AI Workshop in Yonsei University, 2022.

Background Suppression Network for Weakly-supervised Temporal Action Localization

- AAAI Spotlight talk, 2020.
- Korean Conference on Computer Vision (KCCV), 2020.

Professional Activities

Reviewers for International Conferences

- International Conference on Computer Vision and Pattern Recognition (CVPR) 2023-2024
- European Conference on Computer Vision (ECCV) 2022; 2024
- International Conference on Computer Vision (ICCV) 2023
- Annual Conference on Neural Information Processing Systems (Neurips) 2023
- International Conference on Learning Representations (ICLR) 2024
- International Conference on Machine Learning (ICML) 2024
- AAAI Conference on Artificial Intelligence (AAAI) 2024
- Asian Conference on Computer Vision (ACCV) 2024
- Winter Conference on Applications of Computer Vision (WACV) 2023

Reviewers for International Journals

- IEEE Trans. on Pattern Analysis and Machine Intelligence (TPAMI)
- IEEE Trans. on Image Processing (TIP)
- IEEE Trans. on Multimedia (TMM)
- IEEE Trans. on Neural Networks and Learning Systems (TNNLS)
- International Journal of Computer Vision (IJCV)
- Pattern Recognition (PR)
- IEEE Access
- Neural Processing Letters
- ACM Trans. on Multimedia Computing, Communications, and Applications

Patents

Video Period Detection Method and System Thereof

Apr. 2024

Hyeran Byun, **Pilhyeon Lee**, Seogkyu Jeon

- Korea patent (applied) No. 10-2024-0049208

Learning Device and Method for Text-to-Video Retrieval

Feb. 2024

Hyeran Byun, Jewook Lee, **Pilhyeon Lee**, Seogkyu Jeon

- Korea patent (applied) No. 10-2024-0027652

Electronic Apparatus for Performing Fair Classification and Operating Method Thereof

Feb. 2024

Hyeran Byun, Sungho Park, Seogkyu Jeon, **Pilhyeon Lee**

- Korea patent (applied) No. 10-2024-0027974

Brain Wave-based Visual Recognition System

May. 2023

Hyeran Byun, **Pilhyeon Lee**, Seogkyu Jeon, Minjung Shin

- Korea patent (applied) No. 10-2023-0062781

Method and Device for Segmenting Objects in Images Using Artificial Intelligence

Jun. 2022

Hyeran Byun, Sanghuk Lee, Cheolhyun Mun, Jewook Lee, **Pilhyeon Lee**

- Korea patent (applied) No. 10-2022-0072630
- U.S. patent (applied) No. 18/085,046

Method for Learning Action Completeness from Points based on Weakly-supervised Temporal Action Localization

Jun. 2022

Hyeran Byun, **Pilhyeon Lee**, Jewook Lee

- Korea patent (applied) No. 10-2022-0071767

Visual Recognition Method Using Deep Learning Model with Brain Wave Signal and Analysis Apparatus

Jun. 2022

Hyeran Byun, **Pilhyeon Lee**, Jewook Lee, Minjung Shin, Seogkyu Jeon

- Korea patent (applied) No. 10-2022-0070974

Learning Device for Video-text Question Answering *Jun. 2022*

Hyeran Byun, Jewook Lee, **Pilhyeon Lee**, Sungho Park

- Korea patent (applied) No. 10-2022-0070445

Learning Method and Device for Domain Generalization *May. 2022*

Hyeran Byun, Seogkyu Jeon, Kibeom Hong, **Pilhyeon Lee**, Jewook Lee

- Korea patent (applied) No. 10-2022-0063899

CAM-based Weakly Supervised Learning Object Localization Device and Method *Sep. 2021*

Hyeran Byun, Sanghuk Lee, Cheolhyun Mun, **Pilhyeon Lee**, Jewook Lee

- U.S. patent (applied) No. 17/520,077
- Japan patent (applied) No. 2021-196551
- Korea patent (applied) No. 10-2021-0125952

Apparatus and Method for Detecting Subject-independent Fatigue State Based on Brain Signal of Drivers *Jan. 2021*

Hyeran Byun, Sunhee Hwang, Sungho Park, **Pilhyeon Lee**, Jewook Lee, Dohyung Kim

- Korea patent (applied) No. 10-2021-0002145

Learning Method for Fair Image Classification and Device for Classifying Image Fairly *Feb. 2021*

Hyeran Byun, Sunhee Hwang, Sungho Park, **Pilhyeon Lee**, Seogkyu Jeon, Dohyung Kim

- Korea patent (applied) No. 10-2021-0020521

Method and Device for Extracting Video Feature *Nov. 2020*

Hyeran Byun, Jewook Lee, **Pilhyeon Lee**, Kibeom Hong

- Korea patent (applied) No. 10-2020-0153515 (registered) No. 10-2501723

Apparatus and Method for Detecting Action Frame Based on Weakly-supervised Learning through Background Modeling via Uncertainty Estimation *Sep. 2020*

Hyeran Byun, **Pilhyeon Lee**, Jewook Lee

- Korea patent (applied) No. 10-2020-0122806 (registered) No. 10-2395089

Method and Apparatus for Detecting Action Frame Based on Weakly-supervised Learning through Background Frame Suppression *Nov. 2019*

Hyeran Byun, **Pilhyeon Lee**

- PCT patent (applied) No. PCT/KR2020/012645
- Korea patent (applied) No. 10-2019-0151551 (registered) No. 10-2201353

Framework for Generating an Image Reconstructing Brain Activity of a Subject *Sep. 2018*

Hyeran Byun, Kibeom Hong, Sunhee Hwang, Gui-Young Son, Jewook Lee, **Pilhyeon Lee**, Sungho Park, Minsong Ki

- Korea patent (applied) No. 10-2018-0107014 (registered) No. 10-2089014

Skills

Programming	Python, OpenCV, C/C++, Java, LaTeX
Deep Learning	Pytorch, Tensorflow
Language	Korean, English