Changyeon Lee

Email: cyeon219@yonsei.ac.kr

Education

- **University of Maryland, College Park** — College Park, Maryland, United States
  Incoming M.S. Student in Computer Science
- **Yonsei University** — Seoul, Republic of Korea
  B.S. in Computer Science — *Feb 2018 - Feb 2025*
  - Graduated *Summa Cum Laude* (Top 1% in the College of Computing)
  - Honored as the Bachelor's Degree Graduation Representative of the university, receiving the diploma and *Summa Cum Laude* award from the president.
  - Delivered the commencement speech for the College of Computing.
  - Absences
    - Spring 2024 (Visiting Research Intern at Purdue University)
    - Fall 2020 - Spring 2022 (Military Service at Republic of Korea Air Force)
    - Spring 2020 (Data Scientist at HDC)
- **Chungnam Science High School** — Gongju-si, Chungcheongnam-do, Republic of Korea
  School for gifted student in natural science and engineering — *Feb 2016 - Jan 2018*
  - Graduated one year early with honors.

Research Interests

Image/Video Understanding and Generation, Multimodal Representation Learning, Efficient & Trustworthy ML

Work Experience

- **Miraflow AI** — Kirkland, Washington, United States
  Founding Machine Learning Engineer (Working with Aerin Kim) — *Mar 2024 - Present*
  - Developing solutions for lip-sync video generation.
  - Managed the entire pipeline from data collection and preprocessing to model architecture design, optimization, and deployment in production.
  - Collaborated with front-end and back-end engineers to integrate the model into the service, contributing to service improvements and potential user-facing interactions.
  - Led research on efficient diffusion-based deepfake image detection (DistilDIRE) as part of an initiative by TrueMedia.org.
  - Contributed to a survey paper on deepfake generation and detection, as well as a research project on a multi-modal in-the-wild benchmark for deepfakes, collaborating with machine learning engineers at TrueMedia.

- **IITP K-SW Square, Purdue University** — West Lafayette, Indiana, United States
  Visiting Research Intern (Advisor: Eric T. Matson) — *Mar 2024 - Jun 2024*
  - Led research on a Counter Unmanned Aerial System (CUAS) by integrating multiple modalities and machine learning techniques, designing a real-world machine learning solution optimized for a resource-constrained, data-scarce environment.
  - Collected and annotated image and audio data, trained machine learning models, and optimized them for real-world deployment.
  - Integrated a real-time data transmission pipeline using WebRTC to enhance processing efficiency and communication.
  - Fully sponsored by the IITP, an organization under Ministry of Science and ICT of the Republic of Korea, in collaboration with Department of Computer and Information Technology of Purdue University.

- **Computational Intelligence & Photography Lab, Yonsei University** — Seoul, Republic of Korea
  Research Intern (Advisor: Seon Joo Kim) — *Jul 2022 - Jun 2024*
  - Participated in *Deep View* Project (led by Republic of Korea government agency (ETRI)).
    Task : Space-Time Video Super Resolution (STVSR)
    - Integrated a MeMViT-inspired approach to enhance the STVSR architecture, expanding its temporal axis view to improve video processing capabilities.

- Participated in 'Controllable Object Centric Learning' and 'Online Temporal Action Localization (On-TAL)' research.
- Controllable Object-Centric Representation Learning
  - Conducted a compositional image generation task to demonstrate that our proposed object-centric learning framework effectively binds object properties.
  - Generated synthetic datasets under varying conditions for training and evaluating our framework using the CLEVR dataset generator.
  - Validated the scalability of our proposed framework by utilizing larger encoder and decoder models for assessment.
- Online Temporal Action Localization
  - Measured the performance of benchmark models across multiple datasets to establish a foundation for comparing the performance of our proposed model in online action localization in videos.
  - Conducted a user study using Amazon Mechanical Turk (AMT) to assess the effectiveness of our proposed model through human evaluation.

- **Hyundai Development Company (HDC)** Seoul, Republic of Korea
  Data Scientist *May 2020 - Aug 2020*
  - Played a critical role in developing a machine learning model for the estimation of an adequate apartment lotting-out price by analyzing the actual transaction price data of apartments.
  - Designed a feature engineering process using XGBoost feature importance (drop-out, pick-up) and correlation analysis.

- **Data Engineering Lab, Yonsei University** Seoul, Republic of Korea
  Research Intern *Jul 2019 - Feb 2020*
  - Conducted an image captioning project using Transformer.

Publications

- **Deepfake-Eval-2024: A Multi-Modal In-the-Wild Benchmark of Deepfakes Circulated in 2024**
  Nuria Alina Chandra, Ryan Murtfeldt, Lin Qiu, Arnab Karmakar, Hannah Lee, Emmanuel Tanumihardja, Kevin Farhat, Ben Caffee, Sejin Paik, ***Changyeon Lee****, Jongwook Choi, Aerin Kim, Oren Etzioni*
  Under Review

- **Cost-Efficient and Effective Counter Unmanned Aerial System via Visual-Acoustic Sensing**
  Changyeon Lee*, Dongju Yu*, Soyeon Cho*, Dane W. Hindsley, Halaevalu F. Patterson, Megan A. Clecak, Eric T. Matson*
  IEEE International Conference on Robotic Computing (IRC) 2024

- **DistilDIRE: A Small, Fast, Cheap and Light Diffusion Synthesized Deepfake Detection**
  Yewon Lim,* ***Changyeon Lee****, Aerin Kim, Oren Etzioni*
  ICML 2024 Workshop on Foundation Models in the Wild

- **The Tug-Of-War Between Deepfake Generation and Detection**
  Hannah Lee, ***Changyeon Lee****, Kevin Farhat, Lin Qiu, Steve Geluso, Aerin Kim, Oren Etzioni*
  ICML 2024 Workshop on Data-centric Machine Learning Research

- **Towards Interpretable Controllability in Object-Centric Learning**
  Jinwoo Kim, Janghyuk Choi*, Jaehyun Kang,* ***Changyeon Lee****, Ho-Jin Choi, Seon Joo Kim*
  CVPR 2024 Workshop on Causal and Object-Centric Representations for Robotics

(* denotes equal contribution)

Honors & Awards

- Summa Cum Laude, Yonsei University
- Undergraduate Capstone Research Popularity Award, Yonsei University (Fall 2023, Fall 2024)
- Highest Honors, Yonsei University (Fall 2023)
- Honors, Yonsei University (Spring 2018, Fall 2018)

Scholarships

- Merit-Based Scholarship, Yonsei University (Spring 2019, Spring 2023, Fall 2023, Fall 2024)
- Merit-Based Scholarship, Jung-Hun Foundation (Fall 2023, Fall 2024)

Extracurricular Activities

- **Google Developer Student Club (GDSC Yonsei)** — Seoul, Republic of Korea
  AI/ML Member — *Sep 2024 - Dec 2024*
- **Yonsei Artificial Intelligence Academic Club (YAI)** — Seoul, Republic of Korea
  Executive Member (Advisor: Seon Joo Kim) — *Sep 2018 - Feb 2020* & *Jul 2022 - Aug 2022*
  - Conducted a reinforcement learning project using DQN and Soft Q-Learning algorithms through the development of a personally devised game environment using Python (Deep RL)
  - Led the RL team and organized a study group on reinforcement learning.
  - Hosted education sessions related to artificial intelligence.

Military Service

- **Republic of Korea Air Force (ROKAF)** — Republic of Korea
  Staff Sergeant — *Aug 2020 - May 2022*
  - Honorably discharged as Staff Sergeant from Republic of Korea Air Force (ROKAF).
  - Received Republic of Korea Air Force Achievement Award.

Skills Summary

- Languages: Korean (Native), English (Fluent)
- Programming Languages: Python, C++, Java, SQL
- Frameworks & Libraries: PyTorch, TensorFlow, OpenCV, Scikit-learn, SciPy, XGBoost, Pymoo
- Tools & Technologies: Git, Docker, FFmpeg, Oracle, PostgreSQL, MySQL
- Cloud Platforms: Amazon Web Services, Google Cloud Platform