Yiwei Lyu

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Short Biography

I am currently a Ph.D. student in Computer Science and Engineering at University of Michigan, co-advised by Dr. Honglak Lee and Dr. Todd Hollon. Previously I received a B.S. in Computer Science and a M.S. in Machine Learning at Carnegie Mellon University, where I was advised by Dr. Louis-Philippe Morency.

My research interests are in multimodal machine learning and its applications in real world challenges. My current research focuses on applying multimodal machine learning on brain radiology, addressing the real world challenge of radiologist shortage by training strong multimodal representation models of Brain MRI and CTs through language supervision.

I received Honorable Mention for the 2021 CRA Outstanding Undergraduate Research Award, and I ranked top 200 in William Lowell Putnam Mathematical Competition (the most prestigious college math competition in North America) in 2017 and 2018. I also received best paper award at ACL Repl4NLP Workshop in 2023.

Research Interests

- Multimodal Machine Learning
- Computer Vision
- Natural Language Processing
- Healthcare applications of all of the above

Education

- (In Progress) Ph.D. Candidate in Computer Science and Engineering, University of Michigan, Ann Arbor, MI
  Ann Arbor MI, 2022-2027 (expected)
  Advisors: Dr. Honglak Lee, Dr. Todd Hollon
- M.S. in Machine Learning, Carnegie Mellon University, Pittsburgh, PA
  Pittsburgh PA, 2021-2022
  Research Advisor: Dr. Louis-Philippe Morency
- B.S. in Computer Science, Carnegie Mellon University, Pittsburgh, PA
  Pittsburgh PA, 2017-2021
  Minors in Mathematics and Machine Learning
  Graduated with University Honors
  Honors Senior Thesis: Towards Fine-grained Controllable Text Style Transfer (Spring 2021)
  Undergraduate Researcher with Paul Liang and Dr. Louis-Philippe Morency, MultiComp Lab (2020-2021)
  Undergraduate Researcher with Dr. Claire Le Goues, SquaresLab (2018-2020)
  Undergraduate Researcher with Dr. Guillaume Sartoretti, BioRobotics Lab (2017-2018)

Peer-Reviewed Publications

- Step-calibrated diffusion for biomedical optical image restoration
  Yiwei Lyu*, Sung Jik Cha*, Cheng Jiang, Asadur Chowdury, Xinhai Hou, Edward Harake, Akhil Kondepudi, Christian Freudiger, Honglak Lee, Todd C. Hollon
  AAAI 2025 [pdf] [code]
- An empirical study of CLIP fine-tuning with similarity clusters
  Shixuan Liu, **Yiwei Lyu**, Honglak Lee, Todd C. Hollon
  NeurIPS 2024 FiTML Workshop [pdf] [code]
- A self-supervised framework for learning whole slide representations

Xinhai Hou, Cheng Jiang, Akhil Kondepudi, **Yiwei Lyu**, Asadur Zaman Chowdury, Honglak Lee, Todd C. Hollon
NeurIPS 2024 AIM-FM Workshop [pdf]

- Super-resolution of biomedical volumes with 2D supervision
  Cheng Jiang, Alexander Gedeon, **Yiwei Lyu**, Eric Landgraf, Yufeng Zhang, Xinhai Hou, Akhil Kondepudi, Asadur Chowdury, Honglak Lee, Todd C. Hollon
  CVPR 2024 CVMI Workshop [pdf] [website] [code]
- Code Models are Zero-shot Precondition Reasoners
  Lajanugen Logeswaran, Sungryull Sohn, **Yiwei Lyu**, Anthony Z. Liu, Dong-Ki Kim, Dongsub Shim, Moontae Lee, Honglak Lee
  NAACL 2024 [pdf]
- TOD-Flow: Modeling the Structure of Task-Oriented Dialogues
  Sungryull Sohn*, **Yiwei Lyu***, Anthony Z. Liu, Lajanugen Logeswaran, Dong-Ki Kim, Dongsub Shim, Honglak Lee
  EMNLP 2023 [pdf] [code]
- Fine-grained Text Style Transfer with Diffusion-Based Language Models
  Yiwei Lyu, Tiange Luo, Jiacheng Shi, Todd C. Hollon, Honglak Lee
  ACL 2023 Repl4NLP Workshop, **Best Paper Award** [pdf] [code]
- Nano: Nested Human-in-the-Loop Reward Learning for Few-shot Language Model Control
  Xiang Fan, **Yiwei Lyu**, Paul Pu Liang, Ruslan Salakhutdinov, Louis-Philippe Morency
  ACL 2023 Findings [pdf] [code]
- High-Modality Multimodal Transformer: Quantifying Modality & Interaction Heterogeneity for High-Modality Representation Learning
  Paul Pu Liang, **Yiwei Lyu**, Xiang Fan, Jeffrey Tsaw, Yudong Liu, Shentong Mo, Dani Yogatama, Louis-Philippe Morency, Russ Salakhutdinov
  TMLR [pdf] [code]
- MULTIVIZ: Towards Visualizing and Understanding Multimodal Models
  Paul Pu Liang, **Yiwei Lyu**, Gunjan Chhablani, Nihal Jain, Zihao Deng, Xingbo Wang, Louis-Philippe Morency, Ruslan Salakhutdinov
  ICLR 2023 [pdf] [website] [code]
- DIME: Fine-grained Interpretations of Multimodal Models via Disentangled Local Explanations
  Yiwei Lyu, Paul Pu Liang, Zihao Deng, Ruslan Salakhutdinov, Louis-Philippe Morency
  AIES 2022 [pdf] [code]
- MultiBench: Multiscale Benchmarks for Multimodal Representation Learning
  Paul Pu Liang, **Yiwei Lyu**, Xiang Fan, Zetian Wu, Yun Cheng, Jason Wu, Leslie Chen, Peter Wu, Michelle A. Lee, Yuke Zhu, Ruslan Salakhutdinov, Louis-Philippe Morency
  NeurIPS 2021 Datasets and Benchmarks Track [pdf] [website] [code]
- StylePTB: A Compositional Benchmark for Fine-grained Controllable Text Style Transfer
  Yiwei Lyu*, Paul Pu Liang*, Hai Pham*, Eduard Hovy, Barnabás Póczos, Ruslan Salakhutdinov, Louis-Philippe Morency
  NAACL 2021 [pdf] [code]
- Leveraging program invariants to promote population diversity in search-based automatic program repair
  Zhen Yu Ding*, **Yiwei Lyu***, Christopher S. Timperley, Claire Le Goues
  ICSE 2019, International Workshop on Genetic Improvement [pdf] [code]

Fellowships, Honors, Awards

- **Best Paper Award** at Repl4NLP workshop at ACL 2023

- **CRA Outstanding Undergraduate Research Award Honorable Mention, 2021**
- CMU School of Computer Science University Honors, 2021
- Summer Undergraduate Research Fellowship, 2020
- CMU School of Computer Science Dean's List, 2017-2020
- William Lowell Putnam Mathematical Competition rank 193 in North America, 2018
- William Lowell Putnam Mathematical Competition **rank 107 in North America, 2017**
- Virginia Tech Regional Mathematics Contest top 20 of 700+, 2017

Teaching

- Graduate Student Instructor for University of Michigan EECS 545 (Introduction to Machine Learning)
    - Winter 2025 (Taught by Dr. Honglak Lee)
- Teaching Assistant for CMU 15-210 (Parallel and Sequential Data Structure and Algorithms)
    - Spring 2019 (Taught by Dr. Umut Acar and Dr. Daniel Sleator)
    - Fall 2019 (Taught by Dr. Charlie Garrod and Dr. Guy Blelloch)
    - Spring 2020 (Taught by Dr. Umut Acar and Dr. Marijn Heule)
    - Fall 2020 (Taught by Dr. Charlie Garrod and Dr. Guy Blelloch)

Internships

- Research Intern, LG AI (Fall 2023, Ann Arbor, MI)
- Research Intern, MultiComp Lab, Carnegie Mellon University (Summer 2021, Pittsburgh, PA)
  Advisors: Paul Liang, Dr. Louis-Philippe Morency
- Software Engineer Intern, Pinterest (Summer 2019, San Francisco, CA)

Academic Professional Service:

- AAAI 2026: PC member / Reviewer
- NeurIPS 2025 UniReps Workshop: Reviewer
- ACL Rolling Review: Reviewer for 2025 (February, July), 2024 (February, April, June), 2023(December)
- NeurIPS 2025 Dataset and Benchmark Track: Reviewer
- COLM 2025 SCALR Workshop: Reviewer
- COLM 2025: Reviewer
- ICML 2025: Reviewer
- NAACL 2025 Repl4NLP Workshop: Reviewer
- ICLR 2025: Reviewer
- AAAI 2025: PC member / Reviewer
- NeurIPS 2024 FiTML Workshop: Reviewer
- NeurIPS 2024 Dataset and Benchmark Track: Reviewer
- NeurIPS 2024: Reviewer
- COLM 2024: Reviewer
- JMLR: Reviewer
- ECCV 2024: Reviewer
- ACL 2024 Repl4NLP Workshop: Reviewer
- ICML 2024: Reviewer
- CVPR 2024: Reviewer
- ICLR 2024: Reviewer
- EMNLP 2023: Reviewer
- NeurIPS 2023 FMDM Workshop: Reviewer

- ICCV 2023 ASI workshop: PC member / Reviewer
- NeurIPS 2023 Dataset and Benchmark Track: Reviewer
- NeurIPS 2023: Reviewer
- ICCV 2023: Reviewer
- CVPR 2023: Reviewer
- Future Generation Computer Systems (FGCS journal): Reviewer
- ICDM 2022 FOMO-VL Workshop: Reviewer
- NeurIPS 2022 Dataset and Benchmark Track: Reviewer
- ICML 2022: Reviewer
- Multimodal Artificial Intelligence Workshop at NAACL 2021: PC member / Reviewer

Volunteering

- Arts of Science Summer Camp Instructor (2023)
- Western PA ARML Team Coach (2021-2022)

Skills

- Languages: English (fluent), Chinese (native)
- Programming Languages: Python, Java, C, C++
- Software: PyTorch, TensorFlow, Keras, Latex, MySQL
- Experience in using AWS and Amazon Mechanical Turk