Hengyue Liang

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━━━ SUMMARY

- Ph.D. candidate (*expected to graduate at the end of Aug. 2024*) in the Department of Electrical and Computer Engineering, University of Minnesota.
- Research experiences: AI in healthcare (powered by computer vision, image/video analysis), trustworthiness/robustness of deep learning models, machine learning, deep learning, computer vision, 3D assets reconstruction.
- Programming language: Python, Matlab (proficient); C++, C, SQL (some experience).

━━━ EDUCATION

Ph.D, Electrical and Computer Engineering   **Sep. 2018 - Aug. 2024 (expected)**
University of Minnesota, Twin Cities, Minneapolis, MN

Master of Science, Electrical Engineering   **Sep. 2015 — Jun. 2017**
Chalmers University of Technology, Göteborg, Sweden

Bachelor of Engineering, Electrical Engineering   **Sep. 2011 — Jun. 2015**
Shanghai Jiao Tong University, Shanghai, China

━━━ WORK EXPERIENCE

Applied Scientist Intern   **May. 2023 - Sep. 2023**
Manager: Prateek Singhal | Mentor: Jianwei Feng   *Amazon*

- Reconstructing realistic head avatars with monocular video input via NeRF based methods. I was able to increase the training speed of similar SOTA work by ~ 5 times, improved the quality of the reconstructed mesh details, and improved the quality and accuracy of explicitly controllable expressions and poses.

Applied Scientist Intern   **Jun. 2021 - Sep. 2021**
Manager & Mentor: Vivek Yadav   *Amazon*

- The project is to generating realistic talking head motions for virtual animated avatar based on audio input. The deliverables are deployed in current Amazon system of virtual conference platform.

━━━ RESEARCH EXPERIENCE

Graduate Research Assistant   **Dec. 2020 - Present**
Advisor: Ju Sun   *Department of Computer Science and Engineering*

- Trustworthy AI:
  - Robustness (adversarial and natural) with a focus in computer vision.
  - Constrained deep learning problems, contributor of the constraint deep-learning optimization solver `PyGranso` (see `https://ncvx.org/`).
  - Selective classification to make reliable predictions, in order to help deep learning models be applied to more safety-critical real-world applications.
- AI in healthcare (powered by computer vision):
  - Video-based automatic tic (Tourette Syndrome) detection for diagnostic assistants — I was the main contributor to the video analysis and motion detection algorithm in the preliminary study. This project has received a research grant $\sim$ of 3.5 million dollars funded by the National

Institutes of Health (NIH) from 2023 to 2027.

Graduate Research Assistant   **Sep. 2018 - Dec. 2020**
Advisor: Changhyun Choi   *Department of Electrical and Computer Engineering*

- Robotics:
  - Robotic (visual) perception and manipulation problems through deep learning/reinforcement learning.

Publications

[1] **Hengyue Liang**, Le Peng and Ju Sun. "Selective Classification under Distribution Shifts". In preparation for Transaction of Machine Learning Research (TMLR).

[2] **Hengyue Liang**, Buyun Liang , Le Peng, Ying Cui, Tim Mitchell and Ju Sun. "Optimization and Optimizers for Adversarial Robustness". In preparation for Transaction of Machine Learning Research (TMLR). Preprint: `https://arxiv.org/abs/2303.13401`.

[3] Christine Conelea, **Hengyue Liang**, Megan DuBois, Brittany Raab, Mia Kellman, Brianna Wellen, Suma Jacob, Sonya Wang, Ju Sun and Kelvin Lim. "Automated Quantification of Eye Tics using Computer Vision and Deep Learning Techniques". Accepted to "Movement Disorders", the official Journal of Movement Disorder Society (MDS), MDS-23-0240.R1.

[4] Le Peng, **Hengyue Liang**, Gaoxiang Luo, Taihui Li and Ju Sun. "Rethink Transfer Learning in Medical Image Classification." Accepted to British Machine Vision Conference (BMVC), 2024 (Oral). Project Page: `https://sun-umn.github.io/Transfer-Learning-in-Medical-Imaging/`

[5] **Hengyue Liang**, Buyun Liang, Ying Cui, Tim Mitchell and Ju Sun. "Implications of Solution Patterns on Adversarial Robustness". Accepted to "Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR) Workshops, 2023, pp. 2392-2399".

[6] **Hengyue Liang**, Buyun Liang, Ying Cui, Tim Mitchell and Ju Sun. "Optimization for Robustness Evaluation beyond ℓ_p Metrics". Accepted to "ICASSP 2023-2023 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)". DOI:10.1109/ICASSP49357.2023.10095871. Preprint: `https://arxiv.org/abs/2210.00621`.

[7] Buyun Liang, Ryan Devera, **Hengyue Liang**, Qizhi He and Ju Sun. "On Optimization and Optimizers in Neural Structural Optimization". In preparation for Transaction of Machine Learning Research (TMLR).

[8] Hengkang Wang, Taihui Li, Zhong Zhuang, Tiancong Chen, **Hengyue Liang** and Ju Sun. "Early stopping for deep image prior". Accepted to "Transactions on Machine Learning Research (TMLR)". Preprint: `https://arxiv.org/pdf/2112.06074.pdf/`

[9] Taihui Li, Zhong Zhuang, **Hengyue Liang**, Le Peng, Hengkang Wang and Ju Sun. "Self-Validation: Early Stopping for Single-Instance Deep Generative Priors". Accepted to British Machine Vision Conference (BMVC), 2022. Project page: `https://sun-umn.github.io/Self-Validation/`

[10] **Hengyue Liang**, Xibai Lou, Yang Yang, and Changhyun Choi. "Learning Visual Affordances with Target-Orientated Deep Q-Network to Grasp Objects by Harnessing

Environmental Fixtures." Accepted to "2021 IEEE International Conference on Robotics and Automation (ICRA), DOI: 10.1109/ICRA48506.2021.9561737". Project Page: `https://sites.google.com/umn.edu/ki-dqn/`

[11] Yang, Yang and Yuanhao, Liu and **Hengyue, Liang**, Xibai, Lou and Changhyun Choi. "Attribute-Based Robotic Grasping with One-Grasp Adaptation". Accepted to "2021 IEEE International Conference on Robotics and Automation (ICRA), DOI: 10.1109/ICRA48506.2021.9561139". Project Page: `https://sites.google.com/umn.edu/attributes-grasping`

[12] Yang, Yang, **Hengyue Liang** and Changhyun Choi. "A deep learning approach to grasping the invisible." Accepted to "IEEE Robotics and Automation Letters (RA-L), Volume: 5, Issue: 2, 2020, pp. 2232-2239, DOI: 10.1109/LRA.2020.2970622". Project Page: `https://sites.google.com/umn.edu/grasping-invisible/`

POSTERS

- Midwest Machine Learning Symposium   *May. 2023*
  - Toward trustworthy AI — robustness and beyond
  - When Deep Learning Meets Nontrivial Constraints

HONORS & AWARDS

- Cisco Research Graduate Awardee   *Jan. 2022 — Sep. 2022*
- Excellent Master Thesis Award, Department of Electrical Engineering, Chalmers   *Jun. 2017*
  (Thesis link)
- Chalmers 'Avancez' Scholarship for international students   *Aug. 2015 — Jun. 2017*

Professional Activities & Service

Journal Reviewer
- IEEE Robotics and Automation Letters (RA-L 2020).

Conference Reviewer
- The IEEE / CVF Computer Vision and Pattern Recognition Conference (CVPR 2024).
- Conference on Neural Information Processing Systems (NeurIPS 2024 AdvML workshop)
- IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS, 2020).
- IEEE International Conference on Robotics and Automation (ICRA 2019, 2020, 2021).

Conference Organizer
- Assistant Session Chair for the 2023 SIAM International Conference on Data Mining (SDM23).