Yunhao(Andy) Ge

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Education

University of Southern California *Los Angeles, USA*

PHD Candidate, ilab, Computer Science Department *Aug. 2019 - Present*

- Amazon ML Fellowship
- Annenberg Graduate Fellowship at University of Southern California
- Advisor: Prof. Laurent Itti

Stanford University *Stanford, USA*

Visiting PHD Studnet, Stanford Vision and Learning Lab (SVL), Computer Science Department *Dec. 2022 - Present*

- Advisor: Prof. Jiajun Wu

Shanghai Jiao Tong University *Shanghai, China*

MASTER OF SCIENCE, Robotics and Intelligence Group, Robotics Institute *Sep. 2016 - June 2019*

- Overall **Ranking 6th/210**
- Advisor: Prof. Weixin Yan & Huanhua Liao & Prof. Yanzheng zhao
- Honor: Outstanding Graduate Thesis Award

Shandong University *Jinan, China*

BACHELOR OF ENGINEERING, Control Engineering and Mechatronics *Sep. 2012 - June 2016*

- Overall **Ranking 1st/66**
- Honor: Outstanding Undergraduate Thesis Award

Research Interests

I'm interested in how could human efficiently teach AI to learn the human ability to perceive, understand, interact, and reason the physical world. My current research focuses include:
1) **Human-inspired Learning Algorithm**: Vision-Language Models, Lifelong Learning, Visual Reasoning
2) **Learning from Synthetic Data (Sim2Real)**: Using neural renderer (NeRF, Stable Diffusion, GAN) to synthesize realistic and physically plausible data to solve real-world Computer Vision and Robotics problems with minimal human supervision
3) **Reliable Deep Learning**: Robustness, Out-of-distribution (OOD) Detection, Interpretability

Selected Publications [Google Scholar]

[1] Building One-class Detector for *Anything*: Open-vocabulary Zero-shot OOD Detection Using Text-image Models

Yunhao Ge*, Jie Ren*, Jiaping Zhao, Kaifeng Chen, Andrew Gallagher, Laurent Itti, and Balaji Lakshminarayanan (*=equal contribution) arXiv preprint, 2023.

[2] Lightweight Learner for Shared Knowledge Lifelong Learning

Yunhao Ge, Yuecheng Li*, Di Wu*, Ao Xu*, Adam M. Jones, Amanda Sofie Rios, Iordanis Fostiropoulos, Shixian wen, Po-Hsuan Huang, Zachary William Murdock, Gozde Sahin, Shuo Ni, Kiran Lekkala, Sumedh Anand Sontakke and Laurent Itti (*=equal contribution as 2nd authors) PDF Code

*Transactions on Machine Learning Research (**TMLR**).*

[3] Improving Zero-shot Generalization and Robustness of Multi-modal Models

Yunhao Ge*, Jie Ren*, Andrew Gallagher, Yuxiao Wang, Ming-Hsuan Yang, Hartwig Adam, Laurent Itti, Balaji Lakshminarayanan, and Jiaping Zhao (*=equal contribution) PDF Code Project Page

*IEEE/ CVF International Conference on Computer Vision and Pattern Recognition (**CVPR**), 2023.*

[4] Neural-Sim: Learning to Generate Training Data with NeRF

Yunhao Ge, Harkirat Behl*, Jiashu Xu*, Suriya Gunasekar, Neel Joshi, Yale Song, Xin Wang, Laurent Itti, Vibhav Vineet (*=equal contribution as 2nd authors) PDF Code

*European Conference on Computer Vision (**ECCV**), 2022.*

[5] Contributions of Shape, Texture, and Color in Visual Recognition

Yunhao Ge*, Yao Xiao*, Zhi Xu, Xingrui Wang, Laurent Itti (*=equal contribution) PDF Code

*European Conference on Computer Vision (**ECCV**), 2022.*

[6] DALL-E for Detection: Language-driven Compositional Image Synthesis for Object Detection
Yunhao Ge, Jiashu Xu, Brian Nlong Zhao, Laurent Itti, Vibhav Vineet arXiv preprint, 2022.

[7] EM-guided Cut-Paste with DALL-E Augmentation for Image-level Weakly Supervised Instance Segmentation
Yunhao Ge, Jiashu Xu, Brian Nlong Zhao, Laurent Itti, Vibhav Vineet arXiv preprint, 2022.

[8] A Peek Into the Reasoning of Neural Networks: Interpreting with Structural Visual Concepts
Yunhao Ge, Yao Xiao, Zhi Xu, Meng Zheng, Srikrishna Karanam, Terrence Chen, Laurent Itti and Ziyan Wu
PDF Github Project Page
*IEEE/ CVF International Conference on Computer Vision and Pattern Recognition (**CVPR**), 2021.*

[9] Zero-shot Synthesis with Group-Supervised Learning
Yunhao Ge, Sami Abu-El-Haija, Gan Xin and Laurent Itti PDF Code Fonts Dataset Project Page
*International Conference on Learning Representations (**ICLR**), 2021.*

[10] Invariant Structure Learning for Better Generalization and Causal Explainability
Yunhao Ge, Sercan Ö. Arik, Jinsung Yoon, Ao Xu, Laurent Itti and Tomas Pfister arXiv preprint, 2022.

[11] Encouraging Disentangled and Convex Representation with Controllable Interpolation Regularization
Yunhao Ge, Zhi Xu, Yao Xiao, Gan Xin, Yunkui Pang and Laurent Itti PDF
*IEEE/CVF Winter Conference on Applications of Computer Vision (**WACV**), 2023.*

[12] Graph Autoencoder for Graph Compression and Representation Learning
Yunhao Ge*, Yunkui Pang*, Linwei Li, Laurent Itti (*=equal contribution) PDF Code Img2SceneGraph
*Neural Compression: From Information Theory to Applications–Workshop@ (**ICLR**), 2021.*

[13] Pose Augmentation: Class-agnostic Object Pose Transformation for Object Recognition
Yunhao Ge, Jiaping Zhao, Laurent Itti PDF Github
*European Conference on Computer Vision (**ECCV**), 2020.*

[14] Beneficial Perturbation Network for designing general adaptive artificial intelligence systems
Shixian Wen, Amanda Rios*, **Yunhao Ge*** and Laurent Itti (*=equal contribution) PDF
*IEEE Transactions on Neural Networks and Learning Systems (**TNNLS**), Jan 2021.*

[15] Unpaired MR to CT Synthesis with Explicit Structural Constrained Adversarial Learning
Yunhao Ge*, Dongming Wei*, Zhong Xue, Qian Wang, Xiang Zhou, Yiqiang Zhan, Shu Liao (*=equal contribution) PDF Code
*IEEE International Symposium on Biomedical Imaging (**ISBI**), 2019.*

[16] Synthesis and inpainting-based MR-CT registration for image-guided thermal ablation of liver tumors
Dongming Wei, Sahar Ahmad, Jiayu Huo, Wen Peng, **Yunhao Ge**, Zhong Xue, Pew-Thian Yap, Wentao Li, Dinggang Shen, Qian Wang PDF
*International Conference on Medical Image Computing and Computer-Assisted Intervention (**MICCAI**), 2019.*

[17] Unpaired Whole-body MR to CT Synthesis with Correlation Coefficient Constrained Adversarial Learning
Yunhao Ge, Zhong Xue, Tuoyu Cao, Shu Liao PDF Code
***SPIE-Medical Imaging**, 2019 [oral]*

Intern & Work Experience

Google Research *Los Angeles, CA, USA*
Student Researcher *May. 2022 - Dec. 2022*
- Research topic: Improving Zero-shot Generalization and Robustness of Multi-modal models
- Advisor: Jiaping Zhao, Jie Ren, Balaji Lakshminarayanan, Ming-Hsuan Yang

Google Cloud AI *Mountain View, CA, USA*
Student Researcher *Aug. 2021 - Jan. 2022*
- Research topic: Explainable Concept learning in structural data
- Advisor: Sercan Arik, Jinsung Yoon

Microsoft Research *Redmond,WA, USA*

Research Intern *May 2021 - Aug. 2021*

- Research topic: Automatic using generative models to to boost discriminative models
- Advisor: Vibhav Vineet, Neel Joshi

UII America, Inc *Boston, MA, USC*

Research Intern *May 2020 - Aug. 2020*

- Research topic: General Visual Reasoning Framework: A Peek Into the Reasoning of Neural Networks: Interpreting with Structural Visual Concepts
- Advisor: Ziyan Wu, Srikrishna Karanam

Flexiv Robotics *Shanghai, China*

Computer Vision Research Engineer *May 2019 - Aug. 2019*

- Research topic: Robotics adaptive massage based on human pose detection and tracking with a lightweight local human 3D pose detection framework
- Advisor: Cewu Lu, Shuyun Chong

United Imaging Intelligence *Shanghai, China*

Research Intern *June 2018 - Apr. 2019*

- Research topic: Unpaired Image Synthesis with Adversarial Learning
- Advisor: Dinggang Shen, Shu Liao

Honors & Awards

SCHOLARSHIPS

Amazon ML Fellowship (2022), USC-Amazon Center on Trustworthy AI *Aug. 2022*

Annenberg Project Grant for simulating human imagination, awarded annually to 10 PhD students across USC for high-impact projects *April 2022*

Annenberg Fellowship (PhD), University of Southern California *Aug. 2019*

National Scholarship (Graduate), top graduate nationwide *Nov. 2017*

National Scholarship (UnderGraduate), top undergraduate nationwide *Nov. 2015*

KaiYuan Motivational Scholarship, top 0.5% in Shanghai Jiao Tong University *Apr. 2018*

Presidential Scholarship, top 0.2% in Shandong University *Nov. 2015*

BaoGang Excellent student Scholarship, 4 Places per year at Shandong University *Nov. 2015*

First Prize Scholarship, three-year continuous *2013-2015*

CONTESTS

The first prize, 2017 ROBOMASTER **The World's Leading Robotics Competition** (Responsible for the design of electronic control in robotics) *Aug. 2017*

Rank 1st (preliminary competition), Tianchi: Precision medical competition-Artificial Intelligence Aided genetic risk prediction of diabetes **Pred-diabetes** *Dec. 2017*

The first prize, 9th International college students Ican innovation and entrepreneurship competition *Oct. 2015*

Patent & software

Automatic generation of explanations for algorithm predictions *US Patent*

Ziyan Wu, **GE Yunhao**, Meng Zheng, rikrishna Karanam, Terrence Chen US Patent App. 17525313. *May 2023*

Systems and methods for image processing *US Patent*

Shu Liao, **GE Yunhao**, WEI Dongming US Patent App. 16/729,303. *July 2020*

Pulmonary Nodular Assisted Detection System Based on AI(V1.0) *Software*

Bin Li, **Yunhao Ge** 2018SR037095 *Jan. 2018*

A two-layer barrier free parking robotics based on bionic manipulator *Patent for invention*

Yunhao Ge, Shangze Yang, Zheng Zhang, Weixin Yan, Yanzheng Zhao CN201610712048 *Jan. 2017*