Kashu Yamazaki

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Research Interests

My interests are in robotics and machine learning. I am particularly interested in how we can replicate human intelligence and locomotion in machines. My recent works have focused on (i) vision-language representation for video understanding [2] [4] [6] (ii) human perception inspired vision models [7][9][12], and (iii) memory efficient network design [5] [11]. For future work, I would like to extend these works to visuomotor skill learning and 3D perception tasks for robotics.

Education

University of Arkansas, Fayetteville, AR

M.S., Computer Science and Computer Engineering — January 2021 – Present
Adviser: Dr. Thi Hoang Ngan Le

B.E., Mechanical Engineering — December 2020

- *Summa cum Laude*, with Honors in Engineering
- Minor in Computer Science
- Major GPA: 4.0/4, Minor GPA: 4.0/4, Cumulative GPA: 3.952/4

Patents

[1] Bai, M., Chen, Y., Liu, Y., Li, Y., and **Yamazaki, K.**, Soft Robotic Laparoscope for Minimally Invasive Intraperitoneal Photodynamic Therapy, USPTO, U.S. Provisional Patent Application No. 62/967825, 2020.

Publications

[2] **K. Yamazaki**, K. Vo, S. Truong, B. Raj, N. Le "VLTinT: Visual-Linguistic Transformer-in-Transformer for Coherent Video Paragraph Captioning," Thirty-Seventh AAAI Conference on Artificial Intelligence (AAAI), 2023.

[3] M. Tran, K. Vo, **K. Yamazaki**, A. Fernandes, M. Kidd, N. Le "AISFormer: Amodal Instance Segmentation with Transformer," The British Machine Vision Conference (BMVC), 2022.

[4] K. Vo, S. Truong[*1], **K. Yamazaki**[*1], B. Raj, M. Tran, N. Le "AOE-Net: Entities Interactions Modeling with Adaptive Attention Mechanism for Temporal Action Proposals Generation," International Journal of Computer Vision (**IF: 13.369**), 2022.

[5] **K. Yamazaki**, K. Vo, D. Bulsara, N. Le "Spiking Neural Networks and Their Applications: A Review," Brain Sciences, 2022.

[6] **K. Yamazaki**, S. Truong, K. Vo, M. Kidd, C. Rainwater, K. Luu, N. Le "VLCap: Vision-Language with Contrastive Learning for Coherent Video Paragraph Captioning," IEEE International Conference on Image Processing (ICIP), 2022.

[7] K. Vo, H. Joo[*1], **K. Yamazaki**[*1], S. Truong, K. Kitani,, M.-T. Tran, N. Le "AEI: Actors-Environment Interaction with Adaptive Attention for Temporal Action Proposals Generation," The British Machine Vision Conference (BMVC) - (**Oral Presentation-3.33%**), 2021.

[8] N. Le, V. Rathour[*1], **K. Yamazaki**[*1], K. Luu, and M. Savvides "Deep Reinforcement Learning in Computer Vision: A Comprehensive Survey," Artificial Intelligence Review (**IF: 8.139**), 2021.

[9] K. Vo, **K. Yamazaki**, S. Truong, M.-T. Tran, A. Sugimoto, and N. Le "ABN: Agent-Aware Boundary Networks for Temporal Action Proposal Generation," IEEE Access, 2021.

[10] N. Le, T. Bui, K. Vo-Ho, **K. Yamazaki**, K. Luu "Narrow Band Active Contour Attention Model for Medical Segmentation," Diagnostics, 2021.

[11] **K. Yamazaki**, N. Le, V. Rathour "Invertible Residual Network with Regularization for Effective Volumetric Segmentation," SPIE Medical Imaging, 2021.

[1] equal contribution

[12] V. Vo-Ho, N. Le, **K. Yamazaki**, A. Sugimoto, and M. Tran "Agent-Environment Network for Temporal Action Proposal Generation," IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), 2021

[13] Y. Li, Y. Liu, **K. Yamazaki**, M. Bai and Y. Chen, "Development of a Soft Robot-Based Photodynamic Therapy for Pancreatic Cancer," in IEEE/ASME Transactions on Mechatronics (**IF: 5.69**), 2021.

[14] N. Le, **K. Yamazaki**, K. Quach, D. Truong, and M. Savvides "A Multi-task Contextual Atrous Residual Network for Brain Tumor Detection & Segmentation," International Conference on Pattern Recognition (ICPR), 2020.

[15] N. Le, T. Le, **K. Yamazaki**, B. Toan, K. Luu "Offset Curves Loss for Imbalanced Problem in Medical Segmentation," International Conference on Pattern Recognition (ICPR), 2020.

[16] Y. Liu, **K. Yamazaki**, D. Zhang, Y. Li, M. Su, Q. Xie, Y. Chen, and M. Bai, "Minimally Invasive Intraperitoneal Photodynamic Therapy Using a New Soft Robot System," SPIE 11220, Optical Methods for Tumor Treatment and Detection: Mechanisms and Techniques in Photodynamic Therapy XXIX, 2020.

[17] E. Sirotkin, **K. Yamazaki**, and A. Miroshnichenko. "Gearbox Development for an Emergency Brake System of the Wind Turbine," IOP Conference Series: Earth and Environmental Science, Volume 459, Chapter 1., 2020.

Book Chapters

[18] K. Vo, **K. Yamazaki**, H. Hoang, M. Tran, N. Le "Neural Architecture Search for Medical Image Applications". Meta-Learning with Medical Imaging and Health Informatics Applications, 2023.

Research Experience

Artificial Intelligence and Computer Vision (AICV) Lab

Research Assistant (Supervisor: Dr. Thi Hoang Ngan Le)

Currently working on (i) the open-vocabulary setup for image segmentation to improve the generalization capability of a segmentation model, (ii) the low-level control of Unitree Go1 robot, and (iii) vision-language based control of robot. Worked on advanced topics in CV and NLP including:

- vision-language contrastive learning for video paragraph captioning (VPC) [2] [6]
- agent-aware temporal event proposal generation (TEPG) [7] [9] [12]
- novel transformer design [2] [3]
- memory-efficient 3D segmentation model [11]
- imbalanced class problem in medical images [15]
- reviews on reinforcement learning in computer vision [8]
- reviews on applications of spiking neural networks [5]

Medical and Soft Robotics Lab

Undergraduate Research Assistant (Supervisor: Dr. Yue Chen)

Worked for a year on topics including:

- soft robot development for photodynamic therapy of pancreatic cancer [13] and ovarian cancer [16]
- applied for a provisional patent for the soft robotic laparoscope [1]
- soft robotic gripper development for delicate object grasping

Industry Experience

TeirIV, Inc., May 2021 – Present

ML Engineering Intern

(i) Proposed unsupervised model evaluation protocol of semantic segmentation models based on a denoising-diffusion generative model for internal use. (ii) Implemented PointPillars with aleatoric uncertainty estimation for 3D object detection with point clouds for Autoware.

Deloitte Consulting, August 2022

Consultant Intern

Proposed a human resources strategy for an insurance company with a special focus on digital transformation (DX).

AWARDS

Reginald R. "Barney" and Jameson A. Baxter Graduate Fellowship	2021/2022
Blanche Bledsoe Rosecrans & Clarence J. Rosecrans, Sr. Memorial Scholarship	2019
Charles D. Brock Engineering Scholarship	2017-2019
William Charles Robinson E MES	2018/2019
Boles-Vaulx Scholarship	2018
University of Arkansas Academic Scholarship	2017
Ray L. Belknap Class Of 1919 Scholarship	2017
National College Network Tuition Advantage Award	2016

TEACHING EXPERIENCE

TA, *Applied Machine Learning Intensive*, **NACME-Google** Jun 2021

Taught students in an entry-level course in machine learning that aims to expose under-represented minority undergraduate students to advanced concepts and applications in AI/ML.

TA, *MEEG 2003* (Statics), **University of Arkansas** August 2017 – December 2018

Conducted a drill session of statics class for three semesters with emphasis on methods of analysis including virtual work method.

SERVICES

Conference Reviewer

- *Conference on Association for the Advancement of Artificial Intelligence* (AAAI), 2023
- *The International Conference on Machine Learning* (ICML), 2022
- *IEEE International Conference on Image Processing* (ICIP), 2022
- *The International Conference on Acoustics, Speech, & Signal Processing* (ICASSP), 2022, 2023

Professional Memberships

- Tau Beta Pi, The Engineering Honor Society (2017 - Present)

Mentoring

- *Taisei Hanyu*, Honors Second-year CS student (2022 - Present)
- *Hayden Threlfall*, Honors First-year Engineering Program student (2022 - Present)
- *Brady Morgan*, Honors First-year Engineering Program student (2022 - Present)

CERTIFICATIONS

- Certified Associate - Mechanical Design (CSWA), C-E68HURZWN4, 2017

COMPETENCES

Languages: Japanese (native), English (fluent)
Programming: Python (7 years), C/C++ (7 years), CUDA (3 years), Java (3 years)
Libraries and DevOps: PyTorch, ROS, Autoware, Docker, Git, SolidWorks

REFERENCES AVAILABLE TO CONTACT

Dr. Thi Hoang Ngan Le (e-mail: thile@uark.edu)

- Assistant Professor, Computer Science and Engineering, University of Arkansas
- ◇ 4183 Bell Engineering Center Fayetteville, AR 72701
- ⋆ *Dr. Le is my master's supervisor.*