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EDUCATION

Boston University
--Master of Science in Robotics and Autonomy System Expected Dec 2024
Cumulative GPA: 3.73/4.0 (Relevant courses: Robot Learning, Motion Planning, Introduction to Robotics)
University of Macau Aug 2019 – Jun 2023
--Bachelor of Science in Computer Science
Cumulative GPA: 3.33/4.0 (Relevant courses: Computer Vision, Machine Learning, Artificial Intelligence)
Honors: Dean's honor list in three semesters

PUBLICATION

[1] Zhixing Hou*, Maoxu Gao*, Hang Yu*, Mengyu Yang, Chio-In IEON, SDP: Spiking Diffusion Policy for Robotic Manipulation with Learnable Channel-Wise Membrane Thresholds, ***ICRA, 2025***. [pdf] ***(Under review)***

[2] Peng Qin, Quanyi Hu, Hang Yu, An Internet of Electronic-Visual Things Indoor Localization System Using Adaptive Kalman Filter, ***IEEE Sensors Journal, 2023***. (Published)

ACCEPTED ABSTRACT

[1] Zhixing Hou*, Maoxu Gao*, Hang Yu*, Chio-In IEONG. SDP: Spiking Diffusion Policy for Robotic Manipulation with Learnable Channel-Wise Membrane Thresholds. ***Nature Conference on Neuromorphic Computing 2024, Beijing, Sept 30th (Poster)***

[2] Hang Yu*， Zhixing Hou*, Tianlin Liang , Maoxu Gao , Mengyu Yang , Chio-In IEONG. SDP: Spiking Diffusion Policy for Robotic Arm Action Generation. ***BME 2024, Shenzhen, Sep 19-22 (Oral)***

RESEARCH EXPERIENCE

Guangdong Institute of Intelligence Science and Technology May 2024– Currently
Research Assistant, Lab of Brain-Inspired Open-World Intelligence Computing

- Designed and implemented the diffusion-based visuomotor policy learning framework. Successfully integrated Spiking Neural Networks (SNN) to replace traditional CNN-based U-Net and Transformer models, resulting in enhanced biological plausibility and energy efficiency. This work advanced the application of neural network models in complex robotic manipulation tasks.
- Implemented a temporal spiking encoding block to convert static input data into pulse signals and a decoding block to transform temporal spike sequences back into static noise. These components were critical for enabling dynamic temporal data processing within Spiking Neural Networks (SNNs), improving the model's ability to handle robotic manipulation tasks efficiently and biologically plausibly.
- Actively developing and testing code for implementing temporal and spatial self-distillation techniques within Spiking Resnet, aiming to enhance the network's performance and efficiency in processing spatiotemporal data.
- Configured and utilized multiple types of robotic arms (e.g., Franka, UR5, Real-Man) and cameras (e.g., Microsoft Azure Kinect, Intel RealSense) for various robotic tasks. Proficient in setting up and integrating hardware through ROS, ensuring smooth communication between devices and efficient real-time control in complex environments.
- Played a key role in leading collaborative research projects, driving innovation through the development of new methodologies and solutions. Demonstrated excellent teamwork by effectively communicating research findings and coordinating tasks among team members.

Guangdong Institute of Technology Science and Technology Mar 2023– Jun 2023
Lab of Cognitive Computing and Decision-Making System

- Gained in-depth knowledge of AIGC technologies, with a focus on mastering the architecture and applications of Transformer networks.
- Proficiently utilized Stable Diffusion models to create detailed images and short videos, customizing outputs to match specific aesthetic requirements, including Chinese artistic styles.
- Collaborated with engineers to apply advanced AI technologies, such as Transformers, in 3D model animation, improving video smoothness and visual quality through efficient model integration.

RESEARCH EXPERIENCE

Spiking Deep Aggregation Network with Temporal and Spatial Self-Distillation Sept 2024 – Currently

- Implemented a deep aggregation network and converted it into a spiking neural network (SNN) to leverage the efficiency and biological plausibility of SNN models.
- Incorporated both spatial and temporal self-distillation mechanisms to improve network performance:
    - Temporal self-distillation: Configured different timesteps within the SNN and computed the loss between outputs at different timesteps to enhance temporal learning.
    - Spatial self-distillation: Integrated a weak classifier in the middle layers of the deep aggregation network, calculating the loss between the final output and the intermediate weak classifier to optimize spatial learning.
- Actively testing and refining these methods to improve model accuracy and reduce convergence time, with the aim of preparing the research for publication.

Robust and Efficient OCR System for Macau Entry/Exit Code Jun 2022 – May 2023

- Collaborated with a team of 2 engineers to develop the system.
- Created a font database based on the Macau Entry/Exit Code for more efficient identification of text on the code.
- Developed an English segmentation method based on the Macau Entry/Exit Code, which improved segmentation.
- Combined various popular image processing methods, such as Gaussian filtering, Fourier transform, and so on.

Maritime Image Segmentation Sep 2022 – Dec 2022

- Developed a real-time maritime image segmentation system by utilizing PyTorch and Keras.
- Developed a simple neural network model with Keras and trained the model with water surface images as well as ground truth to increase its accuracy.
- Added an LBP matrix to the training data, increasing the training data's dimension from three to four, and debugged the network to make the code work properly.

Black and white image colouring based on quaternion convolutional neural network Jan 2022 – Jun 2022

- Explored correlations between normal RGB three-color channels and the quaternion concept in normal convolutional neural networks.
- Transformed real number matrices to quaternion matrices, using quaternion's imaginary parts to replace RGB channels.

Implement Super High Resolution by Using Quaternion Convolutional Neural Network Nov 2021 – Apr 2022

- Applied an existing quaternion neural network specially adapted for high-resolution images and applied it to color image processing to train input data, using Python, PyTorch, and TensorFlow, etc.
- Adjusted scale-aware feature adaptation blocks and scale-aware up-sampling layer of the plug-in module to achieve arbitrary super-resolution of scalar.

COMPUTER SKILLS

Programming Languages: Python, C, C++, Java, MATLAB, SQL, Android Studio
Other Computer Skills: Tensorflow, PyTorch, ROS, Adobe Premiere Pro