MINGYU YANG

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EDUCATION

University of Michigan, Ann Arbor, MI, USA   *Seq 2019 - Dec 2024*
Doctor of Philosophy in Electrical and Computer Engineering   GPA: 4.0/4.0
Advisor: *Prof. Hun-Seok Kim*

University of Michigan, Ann Arbor, MI, USA   *Sep 2017 - Apr 2019*
Master of Science in Electrical and Computer Engineering   GPA: 4.0/4.0
Major: Signal & Image Processing and Machine Learning

Beijing University of Technology, Beijing, China
University College Dublin, Dublin, Ireland   *Sep 2013 - June 2017*
Bachelor of Engineering in Internet of Things.   GPA: 4.19/4.2

WORK EXPERIENCE

University of Michigan, Ann Arbor, MI   *Jan 2018 - Dec 2024*
Graduate Student Research Assistant

· Design efficient and powerful deep joint source-channel coding (JSCC) techniques for wireless semantic communications using dynamic neural networks and diffusion models.
· Design efficient deep visual-inertial odometry (VIO) models using dynamic neural networks and neural architecture search while maintaining the tracking performance.
· Develop efficient multi-task learning frameworks by exploring task-wise and temporal-wise sparsity.
· Design powerful localization techniques for RF-based wireless indoor positioning and sunlight-based Monarch butterfly tracking.

Samsung Research America, Mountain View, CA   *May 2024 - August 2024*
Research Intern - AI Center

· Explored **time series foundation models (TSFM)** and their usage in time series classification.
· Performed multiple fine-tuning techniques (e.g., **Linear Probing, Full Fintuning, LoRA**, etc) on multiple cutting-edge **transformer-based** TSFMs such as Moment, UniTS, and Chronos.
· Proposed a learnable input normalization layer and an external channel mixing module, which boosted TSFMs' downstream performance by 9.88% on popular multivariate time series classification datasets.

Meta, Seattle, WA   *May 2022 - August 2022*
PhD Software Engineer Intern

· Worked on ML solutions for Business Manager (BM) Abuse and Compromise Detection using user activity sequences.
· Managed two data pipelines with **Presto** to prepare the dataset and perform data pre-processing.
· Developed the first sequential model for abusive BM detection and BM compromise detection using **CNN-based TIES model**, and achieved 1% and 57% improvement in AUROC respectively.
· Developed the first end-to-end sequential model for BM compromise detection using CNN-based TIES model and outperformed the baseline (frequency of grams) by 57% and 187% in AUROC and AUPRC.
· Proposed the first learning-based method to interpret the importance of different business activities using a two-layer **Transformer**.

SELECTED RESEARCH EXPERIENCE

High realism Wireless Image Transmission with Conditional Diffusion Models

Proposed a two-stage Joint Source-Channel Coding (JSCC) framework that enables high-realism image transmission via conditional diffusion process.

· Designed a controllable module to fine-tune the **Stable Diffusion** model at the receiver side, which takes multimodal spatial and textual features from the received signals as the conditions.

· The proposed method enables realistic image reconstruction even at 0.008 symbols/pixel, with 43.8% and 61.4% reduction in LPIPS and FID score on the Kodak dataset.

SAM-guided Pseudo-Label Enhancement for Multimodal 3D Semantic Segmentation

· Proposed a novel scheme to generate reliable pseudo labels for multimodal 3D semantic segmentation domain adaptation using the 2D prior knowledge from the **Segment Anything Model (SAM)**.

· Developed a 3D-aware pseudo-label propagation strategy to tackle the 2D-3D misalignment issue.

· The proposed method exhibits a 6.07% improvement in mIoU when adapting from A2D2 to Semantic KITTI.

Adaptive Modality Selection for Efficient Deep Visual Inertial Odometry

· Proposed a novel deep learning-based **Visual Inertial Odometry** system that dynamically disables the visual modality based on the IMU readings and previous motion states to save the computations.

· Designed a pose estimation network using **LSTM** and a policy network using the **Gumbel-Softmax**.

· The proposed method learned an interpretable policy and achieved state-of-the-art performance on KITTI with only 20% visual modality usage, providing 78.8% reduction in FLOPS.

Efficient Computation Sharing for Multi-Task Visual Scene Understanding

· Proposed a novel computation sharing scheme for **Multi-task Visual Transformers**, where each task (semantic segmentation, depth estimation, edge detection) can be trained individually without balancing the losses.

· Proposed to extend the computation sharing scheme to temporal domain to save more computations.

· The proposed method achieves SOTA performance among multi-tasking transformers on NYU-v2 and PASCAL dataset with 40.5% and 65.7% reduction in FLOPS for single image and video respectively.

OFDM-guided Deep Joint Source-Channel Coding with Adaptive Rate Control

· Developed the first deep Joint Source-Channel Coding (JSCC) framework that works with OFDM modules and generative models such as **PatchGAN** to enhance image quality.

· Pioneered to use the **Gumbel-Softmax** trick to support multiple transmission rates using one single model.

· The proposed method exhibits 2.5-4 dB SNR gain for equivalent image quality compared to conventional baselines. Plus, it learns an interpretable policy for dynamic bandwidth allocation, with 80% less memory usage and no performance loss.

Multi-Modal Migrating Monarch Butterfly Localization using Light Intensity and Temperature

· Designed the first **multi-modal late fusion** framework to estimate the location of a migrating Monarch butterfly given light intensity and temperature measurements.

· The proposed method provides $< 1.7°$ latitude error and $< 0.6°$ longitude error through maximum likelihood estimation, outperforming the baseline thresholding method by 80%.

· Extended the method with **Particle Filtering & Smoothing** to perform further optimization for the entire path.

PREPRINTS

1. Diffusion-Aided Joint Source Channel Coding For High Realism Wireless Image Transmission
Under Review
Mingyu Yang, Bowen Liu, Boyang Wang, Hun-Seok Kim

PUBLICATIONS

14. SAM-guided Pseudo Label Enhancement for Multi-modal 3D Semantic Segmentation
International Conference on Robotics and Automation (ICRA) 2025
Mingyu Yang, Jitong Lu, Hun-Seok Kim

13. Efficient Computation Sharing for Multi-Task Visual Scene Understanding
International Conference on Computer Vision (ICCV) 2023
Sara Shoouri, Mingyu Yang, Zichen Fan, Hun-Seok Kim

12. Search for Efficient Deep Visual-Inertial Odometry Through Neural Architecture Search
IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP) 2023
Yu Chen, Mingyu Yang, Hun-Seok Kim

11. Efficient Deep Visual and Inertial Odometry with Adaptive Visual Modality Selection
European Conference on Computer Vision (ECCV) 2022
Mingyu Yang, Yu Chen, Hun-Seok Kim

10. Siamese Learning-based Monarch Butterfly Localization
IEEE Data Science and Learning Workshop (DSLW) 2022
Sara Shoouri, Mingyu Yang, Gordy Carichner, et al.

9. Deep Joint Source Channel Coding for Wireless Image Transmission with Adaptive Rate Control
IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP) 2022
Mingyu Yang, Hun-Seok Kim

8. Tracking the Migration of the Monarch Butterflies with the World's Smallest Computer
GetMobile: Mobile Computing and Communications, 2022
Inhee Lee, Roger Hsiao, Gordy Carichner, Chin-Wei Hsu, Mingyu Yang, et al.

7. OFDM-guided Deep Joint Source Channel Coding for Wireless Multipath Fading Channels
IEEE Transactions on Cognitive Communications and Networking (TCCN), 2022
Mingyu Yang, Chenghong Bian, Hun-Seok Kim

6. Deep Learning Based Near-Orthogonal Superposition Code for Short Message Transmission
IEEE International Conference on Communications (ICC) 2022
Chenghong Bian, Mingyu Yang, Chin-Wei Hsu, Hun-Seok Kim

5. Deep Joint Source Channel Coding for Wireless Image Transmission with OFDM
IEEE International Conference on Communications (ICC) 2021
Mingyu Yang, Chenghong Bian, Hun-Seok Kim

4. mSAIL: Milligram-Scale Multi-Modal Sensor Platform for Monarch Butterfly Migration Tracking
International Conference On Mobile Computing And Networking (Mobicom) 2021
Inhee Lee, Roger Hsiao, Gordy Carichner, Chin-Wei Hsu, Mingyu Yang, et al.

3. Super-Resolution Time-of-Arrival Estimation using Neural Networks
European Signal Processing Conference (EUSIPCO) 2020
Mingyu Yang*, Yao-Shan Hsiao*, Hun-Seok Kim

2. Migrating Monarch Butterfly Localization Using Multi-Modal Sensor Fusion Neural Networks
European Signal Processing Conference (EUSIPCO) 2020
Mingyu Yang, Roger Hsiao, Gordy Carichner, Katherine Ernst, et al.

1. iLPS: Local Positioning System with Simultaneous Localization and Wireless Communication
IEEE International Conference on Computer Communications (INFOCOM) 2019
<u>Mingyu Yang</u>, Li-Xuan Chuo, Karan Suri, Lu Liu, Hao Zheng, Hun-Seok Kim

PATENTS

"Low-Power, Long-Range RF Localization System And Method", Application US16654547

REVIEWER SERVICE

IEEE Journals: WCL, TWC, TCOM, TCCN, TGCN, JSAC, TMC, TSP, CL, TCAST
Conferences: Globecom '22, NIPS '23'24, ICLR '24'25, ICASSP '24, ICRA '24'25, CVPR '24'25, ICML '24'25, AAAI '24'25

PROJECT EXPERIENCE

Point Cloud Completion with Transformer	*2021*
Drift-Aware Predictive Coding for Adaptation in Changing Environments	*2020*
Classify MEG signals into Musicians and Non-Musicians using graph-based CNN	*2019*
Semantic Image Inpainting with Generative Models	*2018*
A Map Construction Robot Based on ORB-SLAM	*2018*

TEACHING ASSISTANT

Beijing University of Technology, EEEN3003J, Signals and Systems	*2017*
Beijing University of Technology, EEEN3006J, Communication Theory	*2017*
Beijing University of Technology, COMP2003J, Data Structure and Algorithms	*2017*

ACHIECEMENTS

Beijing University of Technology, Best 10 Graduates	*2017*
Beijing University of Technology, President Scholarship (10/27000)	*2016*
Beijing University of Technology, National Scholarship (Top 1%)	*2016*
Beijing University of Technology, Kitagawa Scholarship (Top 5%)	*2014 - 2016*
Beijing University of Technology, University-level Science and Technology Practice Award	*2016*