

Mingyu Yang

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EDUCATION

University of Michigan, Ann Arbor, MI <i>Doctor of Philosophy in Electrical and Computer Engineering</i>	<i>Apr 2024</i> GPA: 4.0/4.0
University of Michigan, Ann Arbor, MI <i>Master of Science in Electrical and Computer Engineering</i>	<i>Apr 2019</i> GPA: 4.0/4.0
Beijing University of Technology, China & University College Dublin, Ireland <i>Bachelor of Engineering in Internet of Things</i>	<i>Jun 2017</i> GPA: 4.19/4.2

RESEARCH INTERESTS

Machine Learning, Deep Learning, Computer Vision, Adaptive Inference, Multi-Modality, Online Adaptation, Forecasting, Multi-Task Learning, Localization & Tracking, Digital Communications

TECHNICAL SKILLS

Python, PyTorch, MATLAB, SQL, C/C++, LaTeX, Github, R, Julia, HTML

PROFESSIONAL EXPERIENCE

Meta, Seattle, WA, Machine Learning Software Engineer Intern (PhD) <i>ML-based Business Manager (BM) Abuse & Compromise Detection using Activity Sequences</i>	<i>May 2022 – Aug 2022</i>
<ul style="list-style-type: none">Designed two data pipelines using Presto to prepare the dataset and perform data preprocessingProposed the first sequential model for abusive BM detection using CNN-based TIES model and achieved <u>1%</u> and <u>0.8%</u> improvement in AUROC and AUPRC compared with the non-sequential modelProposed the first end-to-end sequential model for BM compromise detection using CNN-based TIES model and outperformed the baseline (using the frequency of grams) by <u>57%</u> and <u>187%</u> in AUROC and AUPRCProposed the first learning-based method to interpret and visualize the importance of each business activity using the self-attention maps of a two-layer TransformerOnboarded 7 models to take actions (e.g., banhammer, business risk review) on BMs using Haxl	

RESEARCH EXPERIENCE

University of Michigan, Ann Arbor, MI <i>Consecutive Video Prediction with Error Information Feedback (on-going)</i>	<i>Jan 2018 - Present</i>
<ul style="list-style-type: none">Proposed a new task named consecutive video prediction, where one-shot video prediction is conducted for multiple rounds for real-world videos, creating overlaps between past predictions and current observationsProposed an error propagation network using ConvLSTM and two multiple error fusion modules to fuse the error information with the state-of-the-art video prediction frame work SimVPThe proposed method exhibits consistent improvement of short-term consecutive video prediction on KITTI and Caltech datasets compared to the isolated baselines	
<i>Efficient Computation Sharing for Multi-Task Visual Scene Understanding</i>	
<ul style="list-style-type: none">Proposed a novel weight and activation sharing scheme for Multi-task Visual Transformers, where each task can be trained individually without additional techniques to balance the lossesProposed to extend the computation sharing scheme to temporal domain to save more computationsThe proposed method achieves state-of-the-art performance among multi-tasking transformers on NYU-v2 and PASCAL dataset with <u>40.5%</u> and <u>65.7%</u> reduction in FLOPS for single image and video respectively	
<i>Efficient Visual Inertial Odometry (VIO) with Adaptive Modality Selection</i>	
<ul style="list-style-type: none">Proposed a novel deep learning-based VIO system that dynamically disables the visual modality based on the IMU readings and previous motion states to save the computationsDesigned a pose estimation network using LSTM and a policy network using the Gumbel-Softmax trick to provide differentiable discrete decisions at each time stepThe proposed method learned an interpretable policy with an integrate-and-fire pattern and achieved state-of-the-art performance on KITTI with only <u>20%</u> visual modality usage, providing <u>78.8%</u> reduction in FLOPS	

Deep Joint Source-Channel Coding (JSCC) with Adaptive Rate Control

- Proposed a deep JSCC model that supports multiple transmission rates using a single network based on the channel condition feedback and the image content
- Designed a SNR-adaptive module and a policy network with the **Gumbel-Softmax** trick to adaptively select the consecutive active features through a novel **thermometer-style mask**
- Experiments on CIFAR-10 show that the proposed scheme successfully learned an interpretable policy for different channel SNRs and image content, with 80% less memory usage and no loss of performance

Migrating Monarch Butterfly Localization and Tracking Using Multi-Modal Neural Networks

- Proposed a **multi-modal neural network** to estimate the likelihood for arbitrary location queries given one-day's measurement of light intensity and temperature from a migrating Monarch butterfly
- The proposed method could provide $\leq 1.7^\circ$ latitude error and $\leq 0.6^\circ$ 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, which decreased the error by 47.6% in simulated migration paths

SELECTED PUBLICATIONS

- Sara Shoouri, **Mingyu Yang**, Zichen Fan, et al. "Efficient Computation Sharing for Multi-Task Visual Scene Understanding", accepted to International Conference on Computer Vision (**ICCV**), 2023
- Yu Chen, **Mingyu Yang**, and Hun-Seok Kim. "Search for Efficient Deep Visual-Inertial Odometry through Neural Architecture Search", International Conference on Acoustics, Speech, and Signal Processing (**ICASSP**), 2023
- **Mingyu Yang**, Yu Chen, and Hun-Seok Kim. "Efficient Deep Visual and Inertial Odometry with Adaptive Visual Modality Selection", European Conference on Computer Vision (**ECCV**), 2022
- **Mingyu Yang**, and Hun-Seok Kim. "Deep Joint Source Channel Coding for Wireless Image Transmission with Adaptive Rate Control", International Conference on Acoustics, Speech, and Signal Processing (**ICASSP**), 2022
- **Mingyu Yang**, Chenghong Bian, et al. "OFDM-guided deep joint source channel coding for wireless multipath fading channels", IEEE Transactions on Cognitive Communications and Networking (**TCCN**), 2022
- Chenghong Bian, **Mingyu Yang**, Chin-Wei Hsu, et al. "Deep Learning Based Near-Orthogonal Superposition Code for Short Message Transmission", International Conference on Communications (**ICC**), 2022
- **Mingyu Yang**, Chenghong Bian, and Hun-Seok Kim. "Deep Joint Source Channel Coding for Wireless Image Transmission with OFDM", International Conference on Communications (**ICC**), 2021
- **Mingyu Yang***, Yao-Shan Hsiao*, and Hun-Seok Kim. "Super-Resolution Time-of-Arrival Estimation using Neural Networks", European Signal Processing Conference (**EUSIPCO**), 2020
- **Mingyu Yang**, Roger Hsiao, Gordy Carichner, et al. "Migrating Monarch Butterfly Localization Using Multi-Modal Sensor Fusion Neural Networks", European Signal Processing Conference (**EUSIPCO**), 2020
- **Mingyu Yang**, Li-Xuan Chuo, Karan Suri, et al. "iLPS: Local Positioning System with Simultaneous Localization and Wireless Communication", IEEE Conference on Computer Communications (**INFOCOM**), 2019

PATENT

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

REVIEWER SERVICE

- **IEEE Journals:** WCL, TWC, TCOM, TCCN, TGCN, JSAC, TMC
- **Conferences:** Globecom 2022, NIPS 2023, ICLR 2024, ICASSP 2024

AWARDS

- 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