XIN MIAO LIN

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EDUCATION

Rochester Institute of Technology, Rochester, NY, USA *August 2020 - Present*
Ph.D. in Computer Science
Advisor: Dr. Matthew Wright

University of Massachusetts, Amherst, MA, USA *August 2018 - June 2020*
M.Sc. in Computer Science

McGill University, Montreal, QC, Canada *August 2014 - June 2018*
B.Sc. in Mathematics and Computer Science

RESEARCH TOPICS

Large language models, Cross-modality learning (text-to-image generation/editing/retrieval), model explainability and interpretability, video/image understanding, adversarial machine learning, model compression

PROJECTS & PUBLICATIONS

Catch Missing Details: Image Reconstruction with Frequency Augmented Variational Autoencoder
*Accepted by **CVPR 2023***
Advisor: Dr. Yikang Li, Dr. Mark Hsiao

- Developed a **new model FA-VAE** for better image reconstruction.
- Revealed insights on the importance of **frequency learning** in the reconstruction stage.
- Evaluated FA-VAE on diverse benchmarks and achieved **better reconstruction quality** than baselines.

On Model Explanations with Transferable Neural Pathways
Advisor: Dr. Yu Kong

- Developed a **new explanation paradigm** to generate neural pathways and interpret the decisions of neural network models through revealing important model's interior features.
- Proposed **new evaluation metrics** to assess more accurately the explainability of neural pathways from different angles.
- Designed a new paradigm of **neural pathway transferability** which leveraged the neural pathways explanations from a few samples to explain more globally other same-class samples.
- Evaluated the explanation paradigms on diverse datasets and showed **improvements on the faithfulness and interpretability** of neural pathways explanations.

Gradient Frequency Modulation for Visually Explaining Video Understanding Models
*Accepted by **BMVC 2021***
Advisor: Dr. Yu Kong

- Developed **Frequency-based Extreaml Perturbation (F-EP)** algorithm to visually explain the decisions of video understanding models through revealing important image features.
- Incorporated Discrete Cosine Transform (DCT) to **modulate the gradient maps** on the frequency spectrum domain for more interpretable and consistent explanations on the spatiotemporal level.
- Developed **Spatiotemporal Consistency (STC)** metric to more accurately evaluate the proportion of decision-related features located by explanations.

- Explored the **effects of different mixtures** of low- and high-frequency features preserved in the gradient maps on the spatiotemporal consistency and interpretability of visual explanations.

On The Effectiveness of Moving Target Defense Against Adversarial Black-Box Attacks on Neural Networks
Advisor: Dr. Liangliang Cao

- Developed a **defense algorithm** based on the **Moving Target Defense (MVT)** strategy for neural networks against black-box adversarial attacks on the image classification task.
- Explored different variants of MVT such as ensembling strategies and algorithmic operations for increasing defense robustness and efficiency.
- Benchmarked the defense algorithms on various datasets and showed **significant defense robustness improvement** compared to other defense methods.

RESEARCH & WORK EXPERIENCE

Amazon, Seattle, Washington *December 2023 - March 2024*
Applied Scientist Intern

- Developed the **text-to-image editing framework** for internal SOTA generation model.
- Designed **product showcase idea and demo** for facilitating customer use of the T2I editing framework.
- Presented the T2I editing model as an **interactive website** for internal development and use.

OPPO Research Center, Palo Alto, California *June 2022 - December 2022*
Research Scientist Intern

- Developed **image reconstruction models** for improving reconstruction accuracy with higher compression rate and memory efficiency.
- Developed **text-to-image generation model** with an attention-based mechanism to achieve better semantic attributes alignment in the generated images.
- Deployed the image reconstruction models for internal **user testing and product deployment**.
- Launched project on **cross-modality retrieval** and designed models to invert text and image modalities into a common latent space for more accurate retrieval.

Amazon AWS, Vancouver Canada *June 2020 - August 2020*
Software Engineer Intern

- Developed deep learning models in Python to predict the **database migration patterns** with consideration of customer impact and time efficiency.
- Launched **discussion sessions and panels** to garner feedback which is transformed into the model's features.
- Provided team with training on **model integration and deployment** with existing database infrastructure deployed using Java.

UMass IESL Lab, Amherst, MA *September 2019 - December 2019*
Research Assistant

- Worked on the **materials realization project** partnered with MIT Olivetti group.
- **Analyzed the training data** and provided feedback to improve annotation clarity.
- **Improved model prediction** when trained with improved annotation data.

Amazon AWS, Vancouver Canada *June 2019 - August 2019*
Software Engineer Intern

- Developed a **new webservice feature** in Java for AWS Oracle team for flexible cancellation of large database snapshots without harming customers' productivity and server response capabilities.

- Developed **unit tests and system tests** to evaluate the robustness and efficiency of the webservice feature.
- Led multiple team- and organization-level discussions to garner feedback on the project, presented the web-service feature, and received positive feedback.

TECH SKILLS

DL Tools PyTorch, Tensorflow, HuggingFace, WandB, OpenCV, Scikit-learn
Programming Languages and Environment Python, Java, C/C++, MATLAB, F#, Ocaml, JavaScript, CSS, HTML, Linux

ACADEMIC SERVICES

Conference Reviewer:
CVPR (2021 & 2022), ICCV (2021 & 2022), IJCAI (2021), ACM MM (2020, 2021 & 2022), AAAI (2021), ICMLA (2020), MLSP (2021)

Journal Reviewer:

- IEEE Robotics and Automation Letters (RA-L)
- Multimedia System Journal (MMSJ, Springer)
- IEEE Transactions on Neural Networks and Learning Systems