

Bowei Tian

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EDUCATION

Wuhan University, Wuhan, CHN

09/2020-06/2024

Bachelor of Engineering in **Information Securities**, expected in June 2024

- Cumulative GPA: **3.90/4**; Average Score: **91.3/100**
- Scholarship: Second Class Scholarship (06/2023)

PUBLICATIONS

- **Bowei Tian**, R. Du, Y. Shen. FairViT: Fair Vision Transformer via Adaptive Masking. Submitted to ICASSP.
- X. Gong*, **Bowei Tian***, M. Xue, Y. Wu, Y. Chen, Q. Wang. An Effective and Resilient Backdoor Attack Framework against Deep Neural Networks and Vision Transformers. Submitted to TDSC.
- X. Gong, **Bowei Tian**, M. Xue, Y. Chen, Q. Wang, M. Sun. MEGATRON: Backdooring Vision Transformers with Invisible Triggers. A preprint paper.
- M. Xue, Y. Zeng, S. Gu, Q. Zhang, **Bowei Tian**, C. Chen. SDE: Early Screening for Dry Eye Disease with Wireless Signals. In Ubicomp/IMWUT.
- 田博为, 曹雨欣, 王骞, 龚雪鸾, 沈超, 李琦. Adversarial sample defense methods and devices based on model inversion methods 基于模型反演方法的对抗样本防御方法和设备. CHN Patent.
- 曹雨欣, 田博为, 王骞, 龚雪鸾, 沈超, 李琦. A Deep Neural Network Model Inversion attack defense method and device 一种深度神经网络模型反演攻击防御方法及设备. CHN Patent.

RESEARCH EXPERIENCE

UCI Shen's Lab, University of California, Irvine

06/2023-Present

Research Assistant for Prof. Yanning Shen, Fairness on Vision Transformers

06/2023-Present

- Aimed to improve the fairness-accuracy tradeoff of vision transformers
- Experimental results show the proposed methods achieve higher accuracy than alternatives, 6.72% higher than the best alternative while reaching a similar fairness result.
- Submitted to International Conference on Acoustics, Speech and Signal Processing (ICASSP).

Network Information System Security & Privacy (NIS&P) Lab, Wuhan University

04/2022-Present

Research Assistant for Prof. Qian Wang, Backdoor on Transformers

10/2022-Present

- Intended to limit the scope of trigger to raise the stealthiness of backdoor in transformers and manipulate the attention mechanism called "Attention diffusion" to improve attack elasticity.
- Created Python codes based on PyTorch/Colab to realize scope limitation and attention diffusion.
- Achieved high stealthiness and efficiency, surpassing the baselines in Vision Transformers by 25%+.
- Planning to submit the paper in December 2023.

Research Assistant for Prof. Qian Wang, Backdoor against Neural networks

04/2023-07/2023

- Extend proposed QoE attack method of Deep Neural Networks (DNN).
- It is shown that we can increase the attack success rate much when the poison ratio is low and achieve a high QoE of the backdoored samples.
- Submitted to IEEE Transactions on Dependable and Secure Computing (TDSC).

Research Assistant for Dr. Meng Xue, Dry Eye Disease Detection

01/2023-05/2023

- Proposed to use radar, a more convenient, contactless and ubiquitous way, to detect Screening dry eye disease.
- Analyzed the structure of focal loss based Transformer model in Colab to detect dry eye disease.

- Ran various kind of ablation studies, reorganizing codes and implementing functions such as data enhancement, dataset splitting, model fine-tuning.
- A paper titled “SDE: Early Screening for Dry Eye Disease with Wireless Signals” is accepted in Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (IMMUT).

Research Assistant for Prof. Qian Wang, Model Inversion Defense

04/2022-01/2023

- Utilized Python to design API for several large scale databases (including ImageNet, CIFAR-10, and GTSRB).
- Established and analyzed codes of GAN model raised in the latest model inversion paper MIRROR (NDSS’22).
- Produced two patents: *Adversarial Sample Defense Methods and Devices based on Model Inversion Methods* and *A Deep Neural Network Model Inversion attack defense method and device*.

SELECTED PROJECTS

Game Development: Pac-Man

07/2021

- Designed a role play game that allows users to play against the ghost (AI) and eat as many beans as possible in a maze
- Utilized C programming language and A* algorithm to traverse all the location of the maze to avoid the ghost and set direction for movement to eat beans
- Achieved a high score that defeated 90%+ rivals

SKILLS

- Programming Language: C/C++, Python, MATLAB