ETHAN LEE

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EDUCATION

Hangzhou Dianzi University   **Hangzhou, China**
Bachelor of Engineering in Network Engineering   *09/2020 – 06/2024*
Overall GPA: 4.40/5.0; 89.12/100
Scholarships & Awards: Zhejiang Provincial Scholarship, Top 2% (Two times, 2021-2022); First-class Outstanding Student Scholarship, Top 3% (Five times, 2021-2023); Intelligent Base Scholarship, Ministry of Education-Huawei (2022); Special (Student Work) Scholarship (2021-2023); National-level Project for Innovation and Entrepreneurship of College Students (2023), Provincial Outstanding Graduate, Top 2% (2024); School Outstanding Graduate (2024); Outstanding Student Leader (2021-2022)
Programming Languages: Python (PyTorch, Pandas, NumPy), C/C++, Golang, Java, Rust, JavaScript

PUBLICATION & PATENT

- Gao, M., Liu, Z., Jiao, P., **Li, W.** A Multivariate Time Series Anomaly Detection Method Based on Granger Causality. (Patent)
- Gao, M., **Li, W.**, Liu, Z., Jiao, P. Input-Output Graph Learning for Time Series Anomaly Detection in Cyber-Physical Systems. (Under Submission)
- **Li, W.**, Gao, M., Jiao, P., Liu, Z., Du, M. PGTransformer: Pair Graphs Transformers for Anomaly Detection in Multivariate Time Series. (Under Submission)

PRACTICAL EXPERIENCE

Zhejiang Yuanyi Intelligent Technology Co.Ltd   **Hangzhou, China**
Algorithm Development Internship   *05/2024-06/2024*
- Implemented facial motion capture and dynamic rendering using deep learning models, combining Voice Clone and War2Lip for text-to-speech and synchronized lip movement for audio-visual consistency.
- Optimized the image-to-video process, working with the algorithm team to enhance model performance and real-world application.
- Developed automation workflow for Voice Clone and War2Lip models in collaboration with the algorithm team.
- Assisted in setting up Python, environment management, CUDA, and GPU drivers, resolving compatibility issues.

RESEARCH EXPERIENCE

PGTransformer: Pair Graphs Transformers for Anomaly Detection in Multivariate Time Series   **Hangzhou, China**
First author and Researcher | Supervised by Dr. Mengzhou Gao   *07/2024 –Present*
- Developed a core model that integrates the Graph and Transformer by leveraging the similarity between the Graph Adjacency matrix and the Attention Map in the Transformer, achieving SOTA performance on classical industrial datasets with improvements of 41.53% in F1 score, 20.13% in AUC-ROC, and 14.87% in VUS-ROC compared to the classical anomaly detection model GDN.
- Designed and implemented a dual-channel architecture to aggregate temporal and variable information, overcoming the limitations of traditional models. The architecture combines a Graph layer for variable relationships and a Transformer layer for temporal dynamics, enhancing adaptability to complex time series data.
- Improved anomaly detection efficiency by using Python to call a Rust extension library developed with PyO3, reducing processing time from 60-90 seconds to under 5 seconds per metric, saving nearly 90% of computation time.
- Deployed the project and conducted experimental runs, including ablation studies for analysis, while implementing a webhook to automatically send and save training results upon completion.
- Conducted comparison and evaluation of baseline and benchmark models and performed parameter tuning and model optimization.

Anomaly Detection Based on Transformer via Variable and Temporal Dimensions (TranVT)   **Hangzhou, China**
Graduation Design | Supervised by Dr. Mengzhou Gao   *12/2023 – 07/2024*
- Developed a variant Transformer model named TranVT, which integrates both Variable and Temporal dimensions to enhance anomaly detection and achieved a full score.
- Restructured the project codebase by organizing training and testing entry points, utility functions, neural layers, and modular model components into dedicated packages, improving readability and maintainability for future development.
- Implement both reconstruction-based and prediction-based anomaly detection models, testing classical industrial datasets on both modes to achieve strong results, enhancing the robustness of our experiments.

Multi-terminal Synchronized Password Manager Software based on One-time Pad   **Hangzhou, China**
Core Developer | Supervised by Dr. Yingpei Zeng   *10/2022 – 06/2024*
- Developed a password management local server and remote server using Golang, offering secure, efficient, and user-friendly services.
- Led the team in adopting a separation-of-concerns approach by using Ajax for front-end data requests, simplifying code management and enhancing development efficiency.
- Categorized functions into modular toolkits to achieve code decoupling, enabling streamlined maintenance.
- Implemented near-true random password generation by compiling and utilizing the "quickrdrand" library in Golang, selecting encryption key starting indices through multiple random iterations.
- Created a password exchange service using RSA encryption, integrated it with the OPT system, and deployed it via Docker.
- Deployed databases and servers in separate Docker containers, enhancing migration capabilities and facilitating efficient redeployment.

Input-Output Graph Learning for Time Series Anomaly Detection in Cyber-Physical Systems   **Hangzhou, China**
Research assistant | Hangzhou Dianzi University   *07/2023 –01/2024*
- Developed separate input and output graphs based on time series data from sensors and actuators to address the real-world challenge of their differing physical significance.
- Took the initiative to improve traditional GNN models by integrating CNNs as encoding layers for input and output nodes, significantly enhancing the utilization of hidden information.
- Implemented the CUSUM algorithm as the anomaly detection method for the project to improve performance.
- Introduced a loss constraint between the previous and current time steps to aid model convergence, leading to improved anomaly detection performance (F1 score increased from 0.75 to 0.78).
- Conducted ablation studies on the model structure to evaluate the impact of various components.

Voting System Based on Paillier Homomorphic Encryption and Blockchain Storage   **Hangzhou, China**
Core Developer | Supervised by Dr. Qiuyun Lv   *11/2022 – 12/2022*
- Generated Paillier key pairs using the go-go-gadget-paillier library and optimized interface for seamless integration into future projects.
- Wrapped the Paillier algorithm for enhanced usability and streamlined implementation.
- Designed an SSH-inspired authentication model leveraging the non-public nature of RSA private keys.
- Stored voting data on a blockchain post-election to ensure ballot integrity and prevent tampering.
- Led the team in using Git and GitHub for code management and version control, ensuring collaborative efficiency.