Aming Wu

wuaming@knu.ac.kr | Computer Science & Engineering

EDUCATION

Kyungpook National University (Ph.D.) South Korea
Computer Science & Engineering Sep. 2020 - Present

Texas State University TX, USA
Visiting Scholar Sep. 2021 - Sep. 2022

The Education University of Hong Kong (M.S.) Hong Kong, China
Mathematics and Technology Sep. 2018 - Oct. 2019

University of Wollongong Wollongong, Australia
Exchange Student Dec. 2018 - Apr. 2019

Jiangxi University of Finance and Economics (B.S.) Jiangxi, China
Information Management and System Sep. 2014 - Jul. 2018

PROFESSIONAL EXPERIENCE

Guangzhou Shirui Electronic Technology Co., Ltd | Requirements Analyst Oct. 2019 - May 2020

- Contributed to information technology construction projects and requirement analysis, designed innovative solutions, and delivered stable information technology products.
- Played a key role in information system testing and diligent quality monitoring, ensuring top-notch performance and adherence to rigorous quality standards.
- Assumed responsibility for daily operations, vigilant monitoring, and proficient information system troubleshooting, ensuring smooth functionality.

Suning.com Co., Ltd. | Front-End Web Development Intern Jun. 2017 - Sep. 2017

- Assisted front-end production and meticulous refinement of website pages, ensuring seamless alignment with design drafts and maintaining consistent page styles.
- Collaborated with product managers and interaction designers to devise website update strategies, actively contributing to developing technical implementation plans.
- Coordinated integration plans between the website and backend database with backend R&D team members, ensuring smooth and efficient functionality.

RESEARCH EXPERIENCE

Log Anomaly Detection Feb. 2023 - Jun. 2023

- **Masked and Re-mask Graph Reconstruction:** Implemented mask and re-mask graph autoencoder (GAE) to reconstruct graph features, offering novel insights into masking and re-masking GAEs' potential for anomaly detection.
- **Dynamic GAT Structure for Sequence Modeling:** Developed a dynamic graph attention mechanism (GAT) with gated recurrent units (GRU) to capture sequential dependencies among neighboring log events. Successfully addressed challenges posed by multi-source log events and sequence variations.
- **Leveraged Pre-train and fine-tuned strategies** for the formulated generative self-supervised method in log analysis. Extensive experimentation on real-world datasets showcased excellent performance (Accuracy and F1 exceed 97%).

Earthquake Detection for CrowdQuake system of Low-Cost Sensors Mar. 2021 - Dec. 2022
Stage 1: *Earthquake Detection using the stronger S Wave.*

- IoT Sensor Deployment and Management: Provide an overview of the **CrowdQuake system** and led the nationwide deployment of **over 6,000 low-cost MEMS acceleration sensors**, replacing smartphones for IoT data collection in Korea. Implemented intelligent management using K-means clustering for efficient sensor operations.
- Distributed System for Large-scale Sensor Data Processing: Developed a distributed data processing system with two frameworks (batch processing and stream processing) to meet diverse data requirements and minimize processing delays.
- Real-time Earthquake Detection: Implemented a deep learning-based earthquake detection approach, Multi-layer CNN (MCNN), for detecting earthquakes.

Stage 2: *Advancing Transformer-Based via Simultaneous Separate Analysis of P and S Waves*

- Analyzed the characteristics of cross-domain datasets and applied them to multiple deep learning models through offline and online settings.
- Designed the transformer-based variant, TFEQ, to simultaneously explore detection performance on the P and S waves in the heterogeneous IoT environment.
- Validated the detection accuracy and stability of different deep learning models using confusion matrix and MC dropout. In the same instance, results demonstrated that TFEQ outperformed other models on the P and S waves.

Earthquake data Augmentation using GAN Sep. 2020 - Mar. 2021

- Processed and analyzed the features and limitations of low-cost sensor MEMS data and evaluate the feasibility of seismic data generation.
- Integrated Wasserstein Distance (WD) and spectral normalization (SN) to propose a novel Data Generation Model (DGM), EQGAN. Generated high-quality earthquake data recorded by approximate acceleration sensors.
- Assessed EQGAN's generation ability using visual representation, frequency domain, and autocorrelation schemes and designed a new quantitative error evaluation scheme based on HTS theory, demonstrating EQGAN's stability and high efficiency.

Recommendation Task based on Federated Learning Jun. 2022 - Dec. 2022

- Employed the unique multi-head attention mechanism to fuse feature cross information to obtain enriched feature embedding expression and reduce the risk of a data breach of local users.
- Enhanced the performance of federated distillation using Wasserstein distance (WD) and regular terms to assess data differences between student and teacher models.
- Introduced an ALR strategy using a hybrid optimizer (Adam and SGD) to optimize the objective function and enhance the model's overall efficiency (Accuracy rises by approximately 10%).

TECHNICAL SKILLS

- Programming Languages: Python, C, C++, Java, Javascript
- Web: HTML, CSS, React
- Tools & Libraries: MySQL, MATLAB, TensorFlow, PyTorch

PUBLICATION

- **Aming Wu** and Young-Woo Kwon, "AD-TIN: Edge Anomaly Detection for Temporal Interaction Networks using Multi-representation Attention," The IEEE/ACM International Conference on Social Networks Analysis and Mining (ASONAM 2023), Marrakesh, Morocco, Nov. 2023. (Acceptance Rate: 17.2%)
- **Aming Wu** and Young-Woo Kwon, "Enhancing Recommendation Capabilities Using Multi-Head Attention-based Federated Knowledge Distillation," in IEEE Access, Mar. 2023.

- **Aming Wu** and Young-Woo Kwon, "MAFD: A Federated Distillation Approach with Multi-head Attention for Recommendation Tasks," The 38th ACM/SIGAPP Symposium On Applied Computing, Tallinn Estonia, Mar. 2023.
- Dohan Kim, **Aming Wu** and Young-Woo Kwon, "Comparison of Meta-Heuristic Algorithms for Task Scheduling in Distributed Stream Processing," 27th IEEE Pacific Rim International Symposium on Dependable Computing (PRDC 2022), Nov. 2022.
- **Aming Wu**, Jangsoo Lee, Irshad Khan, and Young-Woo Kwon, "CrowdQuake+: Data-driven Earthquake Early Warning via IoT and Deep Learning," IEEE International Conference on Big Data (IEEE BigData 2021), Dec. 2021
- **Aming Wu**, Juyong Shin, Jae-Kwang Ahn, and Young-Woo Kwon, "Augmenting Seismic Data Using Generative Adversarial Network for Low-Cost MEMS Sensors " IEEE Access, Dec. 2021

HONORS and AWARD

- Jul. 2019 Bronze Award in U-STEMist Scheme of Hong Kong
- 2016 - 2017 National Scholarship; Merit Student of JUFE; First Scholarship of JUFE
- Dec. 2016 Second Award in the National College Student Mathematical Modeling Competition (Jiangxi Province)
- 2015 - 2016 Top Ten Excellent League Member; First Scholarship of JUFE
- Jun. 2016 Bronze Award in National College Student Entrepreneurship Competition (Jiangxi Province)
- 2014 - 2015 Excellent Student Cadre; Third Scholarship of JUFE