Haoran Niu

Knoxville, Tennessee

📞 (865)341-0247 ✉ niuh@ornl.gov 🆔 ORCID 🎓 GoogleScholar

EDUCATION

University of Tennessee, Knoxville   **Aug 2017 − Aug 2023**
Ph.D. - Computer Engineering - GPA - 3.78/4.0   *Knoxville, TN, USA*

Xi'an Jiaotong University   **Aug 2014 − June 2017**
M.S. - Electrical Engineering - Percentage - Top 10%   *Xi'an, China*

PROFESSIONAL EXPERIENCE

Oak Ridge National Laboratory (ORNL)   **Nov 2023 − Present**
Postdoctoral Research Associate, Computational Sciences and Engineering Division
Mentor: Dr. Olufemi A. Omitaomu (omitaomuoa@ornl.gov)

- Design algorithms and methods for the study of stability and safety of Department of Veterans Affairs (VA) healthcare systems.
- Formulate innovative AI methods for improving the resolution of climate data.
- Design methodologies for indoor anomaly detection to prevent nuclear proliferation.

Oak Ridge National Laboratory (ORNL)   **Sep 2019 − Aug 2023**
Visiting Researcher, Computational Sciences and Engineering Division
Mentor: Dr. Olufemi A. Omitaomu (omitaomuoa@ornl.gov)

- Pioneered higher-order network representation-based anomaly detection algorithms.
- Engineered tensor network representations for discrete sequence data, introducing an effective anomaly detection approach based on this concept.
- Conceptualized a unique time-series anomaly detection framework using machine learning and voting strategies.
- Formulated an innovative method for anomaly detection using time-series data using machine learning models.

University of Tennessee, Knoxville (UTK)   **Aug 2017 − Aug 2023**
Graduate Research Assistant,
Electrical Engineering & Computer Science (EECS) Department
Advisor: Dr. Michael A. Langston (langston@tennessee.edu)

- Designed novel methods for detecting system-level abnormal events integrating ML-based methods with advanced graph algorithms.
- Assessed our proposed network-wide anomaly detection method using extensive large-scale datasets.
- Performed a comprehensive study on the microbial population of End-stage Renal Disease (ESRD) patients, employing advanced statistical techniques and high-performance graph algorithms.
- Executed analytical computations for the ESRD project utilizing High-Performance Computing (HPC).

University of Tennessee, Knoxville (UTK)   **Aug 2017 − Aug 2019**
Graduate Teaching Assistant,
Electrical Engineering & Computer Science (EECS) Department

- ECE451 Computer Architecture (Assisted teaching, Lab lecturer).
- COSC560 Computer Software System (Assisted teaching, Lab lecturer).

Shenzhen Hpmont Technology Co., Ltd.   **Aug 2015 − Oct 2015**
Software Development Intern   *Shenzhen, China*

- Executed simulations of Pulse-width Modulation controls for high-speed Permanent Magnet Synchronous Motors.
- Improved the communication program for a general frequency converter controller, facilitating communication between a microcontroller (specifically, MSP430) and Digital Signal Processor microcontrollers, using C programming language.

PUBLICATIONS

Niu, H., Omitaomu, O. A., Langston, M. A., EHR-BERT: A BERT-based model for effective anomaly detection in electronic health records, *Journal of Biomedical Informatics*, p. 104 605, 2024.

Niu, H., Omitaomu, O. A., Langston, M. A., Detecting anomalous sequences in electronic health records using higher-order tensor networks, *Journal of Biomedical Informatics*, vol. 135, p. 104 219, 2022. DOI: 10.1016/j.jbi.2022.104219.

Cao, Q., **Niu, H.,** Higher-order Markov Graph based Bug Detection in Cloud-based Deployments, in *2022 IEEE International Performance, Computing, and Communications Conference (IPCCC)*, IEEE, 2022, pp. 153–160.

Omitaomu, O. A., **Niu, H.,** Artificial intelligence techniques in smart grid: A survey, *Smart Cities*, vol. 4, no. 2, pp. 548–568, 2021. DOI: 10.3390/smartcities4020029.

Feng, Y., **Niu, H.**, Wang, F., SocialCattle: IoT-based mastitis detection and control through social cattle behavior sensing in smart farms, *IEEE Internet of Things Journal*, vol. 9, no. 12, pp. 10 130–10 138, 2021. DOI: 10.1109/JIOT.2021.3122341.

Niu, H., Omitaomu, O. A., Cao, Q. C., Adaptive anomaly detection for dynamic clinical event sequences, in *2020 IEEE International Conference on Big Data (Big Data)*, IEEE, 2020, pp. 4919–4928.

Niu, H., Omitaomu, O., Cao, Q., Anomaly detection in sequential health care data using higher-order network representation, in *2020 Institute of Industrial and Systems Engineers (IISE) Annual Conference*, IISE, 2020.

Niu, H., Omitaomu, O. A., Cao, Q. C., Machine committee framework for power grid disturbances analysis using synchrophasors data, *Smart Cities*, vol. 4, no. 1, pp. 1–16, 2020. DOI: 10.3390/smartcities4010001.

Niu, H., Li, J., Zhao, Y., Smartbullets: A cloud-assisted bullet screen filter based on deep learning, in *2020 29th International Conference on Computer Communications and Networks (ICCCN)*, IEEE, 2020, pp. 1–2.

TECHNICAL REPORTS

Omitaomu, O., **Niu, H.**, Ozmen, O., Klasky, H., Olama, M. M., "Hazards Detection in Health IT: Hazard Analytics Development," Oak Ridge National Lab.(ORNL), Oak Ridge, TN (United States), Tech. Rep., 2023.

Omitaomu, O., Ozmen, O., **Niu, H.**, Klasky, H., Olama, M. M., "ICAPA-HD: Hazard Detection Methods for Improving Overdose Prevention," Oak Ridge National Lab.(ORNL), Oak Ridge, TN (United States), Tech. Rep., 2021.

PROFESSIONAL ACTIVITIES

Program Committee   **November 13, 2023**
The 1st ACM SIGSPATIAL International Workshop on Advances in Urban-AI (Urban-AI 2023)

Student Representative/Member   **Nov 2, 2021**
The 4th ACM SIGSPATIAL Workshop on Advances on Resilient and Intelligent Cities (ARIC 2021)

Conference Oral Presentation   **Dec 10 - Dec 13, 2020**
2020 IEEE International Conference on Big Data, Virtual venue
Presentation Title: Adaptive Anomaly Detection for Dynamic Clinical Event Sequences.

Conference Oral Presentation   **Oct 31 - Nov 3, 2020**
2020 IISE Annual Conference, New Orleans, Virtual venue
Presentation Title: Anomaly Detection in Sequential Health Care Data using Higher-Order Network
Representation.

AWARDS, FELLOWSHIPS, & SCHOLARSHIPS

Min H. Kao EECS Excellent GRA, University of Tennessee, Knoxville   **May 2023**
- Nomination

Min H. Kao EECS Fellowship, University of Tennessee, Knoxville   **Aug 2017**
- A stipend of $6,000 per year with a graduate fee waiver

Department First-class Scholarship, Xi'an Jiaotong University   **Aug 2014 - July 2016**
- A stipend of 8,400 RMB per year with a graduate fee waiver

TECHNICAL SKILLS

Programming Languages: Python (Advanced), C++ (Intermediate), Java (Basic), JavaScript (Basic)

Machine Learning Frameworks: Scikit-learn (Advanced), TensorFlow (Intermediate), PyTorch
(Intermediate)

Distributed Systems: Apache Spark (Intermediate), Hadoop (Intermediate)

Database Technologies: MySQL (Intermediate), MongoDB (Basic)

Web Technologies: Flask (Advanced), HTML/CSS (Basic), Angular (Basic)

Other Tools and Technologies: LaTeX (Advanced), Jupyter Notebooks (Advanced), HPC (Intermediate),
Git (Intermediate), Bash scripting (Intermediate)