Haoran Niu

Knoxville, Tennessee

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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.Sc. - 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).

PUBLICATIONS

Niu, H., Omitaomu, O. A., Langston, M. A., Anomaly detection in electronic health records across hospital networks: Integrating machine learning with graph algorithms, *IEEE Journal of Biomedical and Health Informatics*, pp. 1–14, 2025. DOI: 10.1109/JBHI.2025.3527752.

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*, vol. 150, p. 104 605, 2024, ISSN: 1532-0464. DOI: https://doi.org/10.1016/j.jbi.2024.104605.

Dojcsak, L., ... **Niu, H.,** Early-stage characteristics and potential predictors of ckd among us veterans: Fr-po951, *Journal of the American Society of Nephrology*, vol. 34, no. 11S, p. 669, 2023.

Niu, H., Anomaly detection on complex health information technology systems, 2023.

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   **Apr 28, 2025**

The International Workshop on Spatio-Temporal Data Mining from the Web (Held in conjunction with the 2025 ACM Web Conference), Sydney, Australia

Co-Organizer   **Oct 29, 2024**

The 2nd ACM SIGSPATIAL International Workshop on Advances in Urban-AI (Urban-AI 2024), Atlanta, USA

Program Committee   **Oct 29, 2024**

The 17th International Workshop on Computational Transportation Science (IWCTS 2024), Atlanta, USA

Invited Talk   **September 27, 2024**

Health Department of Biomedical Informatics (DBMI), University of California, San Diego, virtual lecture
Seminar Title: *Towards Effective Anomaly Detection in Electronic Health Records (EHR).*

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)