Jiashu Wu

Ph.D. University of Chinese Academy of Sciences

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Education

University of Chinese Academy of Sciences — Beijing & Shenzhen, China
Doctor of Philosophy in Computer Science — Sept 2021 - Jun 2024
Research topic: Domain adaptation-based IoT intrusion detection, Advisor: Prof. Yang Wang, **GPA: 3.98** (91.7)
Faculty: Shenzhen Institute of Advanced Technology, Chinese Academy of Sciences

University of Melbourne — Melbourne, Australia
Master of Information Technology (with Distinction) — Mar 2019 - Dec 2020
Major: Artificial Intelligence, Advisor: Prof. Rui Zhang, **GPA: 4.0** (88.1, First Class Honour, top 2%)

University of Sydney — Sydney, Australia
Bachelor of Science — Feb 2016 - Dec 2018
Double Major: Computer Science, Financial Mathematics & Statistics, Advisor: Prof. Simon Poon
GPA: 3.96 (86.5, High Distinction, top 2%)

Beijing Institute of Technology — Beijing, China
Major: Software Engineering, transferred to USYD in 2016 (Verifiable via Chsi.com) — Sept 2015 - Jan 2016

Research Interests

Tackling IoT intrusion detection via domain adaptation. Design accurate and efficient algorithms for knowledge-scarce scenarios to analyse millions of network data. Challenges including domain heterogeneities and the avoidance of under-transfer and negative-transfer.

Key skills: Network big data analytics, data pattern recognition, intrusion detection (IDS), feature engineering, transfer learning, statistical analysis, performance optimisation, Python programming, academic paper and patent writing.

Project and Internship Experience

Project and Internship topics: Network big data analytics, transfer learning, big data caching optimisation, data stream analysis, secure and efficient data storage, etc.

Applications: Information security, big data analytics & storage, IoT, data analytics, etc. Below are selected projects.

Research on IoT Intrusion Detection via Domain Adaptation Approach
Ph.D. research topic; Internship at BIT during Nov 2019 - Feb 2020

- Tackle IoT intrusion detection via domain adaptation. Propose 5 algorithms targeting scenarios with diverse data scarcity, which can process millions of network data efficiently. Tackle domain heterogeneity and negative transfer via self supervision, probabilistic semantics, etc.

- The proposed algorithms improve IoT intrusion detection accuracy by 4%-17%, the efficacy of proposed mechanisms is statistically verified. Low latency makes the proposed algorithms feasible for IoT security monitoring.

- **Skills & Outcomes**: network data analytics, transfer learning, feature engineering, Python programming, performance optimisation and academic writing. Published 6 CCF-A/JCR Q1 papers and 4 patents.

Online Cost-driven Data Caching Algorithm in the Cloud — National Research&Development Project at CAS

- Design and implement an online cost-driven data caching algorithm in the distributed cloud environment. Challenges including cost optimisation under online settings. Solved via packable anticipatory caching model construction. The algorithm is feasible for big data applications due to its optimised cost and excellent scalability.

- The algorithm reduces data caching cost by 5%-11%. Theoretically, the competitive ratio and its lower bound for the online algorithm are proved.

- **Skills & Outcomes**: big data caching optimisation, theoretical analysis, data mining and analytics, Python programming. Published 2 CCF-A papers and 3 patents.

Multi-indexing System based on HDFS for Remote Sensing Data Storage
National Research&Development Project at CAS; Internship at CAS during Nov 2020 - Aug 2021

- Design a multi-indexing remote sensing data storage and analytics system based on HDFS. With low latency, the system benefits geospatial big data storage and analytics, and is broadly applicable under various big data scenarios.
- The multi-indexing mechanism reduces the big data indexing and querying time by 60%. Besides, the system is immune to data loss and is scalable and resource-efficient.
- **Skills & Outcomes**: big data storage system design, indexing algorithm design, SQL. Published 1 JCR Q1 paper.

Publications

I have published **10 CCF-A/JCR Q1 papers** and have 2 IEEE/ACM Trans/CCF-A papers under review. I have **10 patents being granted** and 9 patents under examination. **Key topics**: Network data analytics, transfer learning, IoT security, intrusion detection, data caching and storage, data stream analysis, etc. Below are selected publications.

1. Open Set Dandelion Network for IoT Intrusion Detection
   First author, *ACM Transactions on Internet Technology* (**ACM TOIT**, **JCR Q1**, **IF=5.3**), 2024

2. Adaptive Bi-recommendation and Self-improving Network for Heterogeneous Domain Adaptation-assisted IoT Intrusion Detection
   First author, *IEEE Internet of Things Journal* (**IEEE IoTJ**, **JCR Q1**, **IF=10.6**), 2023

3. Heterogeneous Domain Adaptation for IoT Intrusion Detection: A Geometric Graph Alignment Approach
   First author, *IEEE Internet of Things Journal* (**IEEE IoTJ**, **JCR Q1**, **IF=10.6**), 2023

4. Cost-Efficient Sharing Algorithms for DNN Model Serving in Mobile Edge Networks
   Second author, *IEEE Transactions on Services Computing* (**IEEE TSC**, **CCF-A**, **IF=11.0**), 2023

5. Joint Semantic Transfer Network for IoT Intrusion Detection
   First author, *IEEE Internet of Things Journal* (**IEEE IoTJ**, **JCR Q1**, **IF=10.6**), 2022

6. PackCache: An Online Cost-driven Data Caching Algorithm in the Cloud
   First author, *IEEE Transactions on Computers* (**IEEE TC**, **CCF-A**, **IF=3.7**), 2022

7. Simultaneous Semantic Alignment Network for Heterogeneous Domain Adaptation
   Second author after supervisor, *ACM International Conference on Multimedia* (**ACM MM**, **CCF-A**), 2020

8. Towards Scalable and Efficient Deep-RL in Edge Computing : A Game-based Partition Approach
   Second author, *Journal of Parallel and Distributed Computing* (**JPDC**, **JCR Q1**, **IF=3.8**), 2022

9. MIX-RS: A Multi-indexing System based on HDFS for Remote Sensing Data Storage
   First author, *Tsinghua Science and Technology* (**TST**, **JCR Q1**, **IF=6.6**), 2022

Award

- **National Scholarship**, MoE, 2023
- **President Scholarship of CAS**, 2023 (**Highest award for PhD in CAS, top 0.5%**)
- Pacemaker for Outstanding Student, UCAS, 2023
- Outstanding Student, UCAS, 2023
- Dean's Honours List, University of Melbourne, 2019
- Dean's List of Excellence in Academic Performance, University of Sydney, 2017 & 2018

Skills and Language Ability

Programming Skill: Python (Machine learning tools: PyTorch, Sklearn; Visualisation: Matplotlib), Java, MySQL (Database optimisation), HDFS (Hadoop).

Technical Skill: Data analytics (data cleansing, feature engineering), computer network, statistics, database, machine learning, deep learning, operating system, etc.

Language Skill: Passed IELTS Academic Exam (score=7.0), CET-4 (score=665, got full mark in reading), lived and studied in Australia for 5 years, comfortable in English communication environment. Native speaker of Mandarin Chinese.

Writing Skill: Write logically and professionally, have strong capability of academic paper, patent and technical report writing.

Project Participation: Participated in 7 national/provincial research&development projects, have experience with project execution, report writing, group working, etc.