Roland Croft

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CAREER PROFILE

I am a final year Ph.D. student (expected graduation May 2023) with a research focus on software engineering, cyber security, and machine learning. My research works primarily involve the application of data-centric AI for software security, and have been published in the top software engineering conferences and journals.

EDUCATION

Ph.D. in Computer Science (Software Engineering)   03/2020 – 05/2023 (Expected)
University of Adelaide

Bachelor of Computer Science (Advanced) (Honours)   03/2016 – 12/2019
University of Adelaide   *GPA: 6.85/7 – First Class Honours*

PROFESSIONAL EXPERIENCE

Academic Researcher   **2020 - Present**
CREST Research Lab, Cyber Security Cooperative Research Centre   *University of Adelaide*

Teaching Assistant   **2018 - Present**
- *Foundations of Computer Science* (2022, 2023)   *University of Adelaide*
- *Software Engineering Research Project* (2020, 2021, 2022)
- *Advanced Topics in Computer Science* (2020)
- *Algorithm Design and Data Structures* (2018)

Cyber Security Consultant *(Freelance)*   **2022 - Present**

Research Assistant & Engineer   **2017 – 2019**
CREST Research Lab   *University of Adelaide*

PROJECTS

AI-Based Software Vulnerability Detection and Assessment
- Development of state of the art AI-based and data-driven methods for timely Software Vulnerability detection and assessment from source-code.
- Utilization of NLP-based methods for program analysis, and training ML/DL models for classification.

Data Quality for Software Vulnerability Intelligence
- Analysis and assessment of data quality from software vulnerability information sources, to assist with trustworthiness of security analytics.
- Development of robust analytical methods to overcome poor data quality during security analysis.

Large-Scale Automatic Security Knowledge Retrieval and Analysis
- Creation of tools to automatically extract and disseminate large-scale security knowledge from open sources, such as Stack Overflow and GitHub.
- In-depth analysis of security considerations and information for different technologies and technology stacks.

PUBLICATIONS

Conference:
- **Data Quality for Software Vulnerability Datasets (2023)**
  Roland Croft, M. Ali Babar, Mehdi Kholoosi. *Proceedings of the 45th International Conference on Software Engineering.*
- **Noisy Label Learning for Security Defects (2022)**
  Roland Croft, M. Ali Babar, Huaming Chen. *Proceedings of the 19th International Conference on Mining Software Repositories.*
- **An Investigation into Inconsistency of Software Vulnerability Severity across Data Sources (2022)**
  Roland Croft, M. Ali Babar, Li Li. *Proceedings of the 29th IEEE International Conference on Software Analysis, Evolution and Reengineering.*
- **An Empirical Study of Rule-Based and Learning-Based Approaches for Static Application Security Testing (2021)**
  Roland Croft, Dominic Newlands, Ziyu Chen, M. Ali Babar. *Proceedings of the 15th ACM/IEEE International Symposium on Empirical Software Engineering and Measurement.*
- **DeepCVA: Automated Commit-level Vulnerability Assessment with Deep Multi-task Learning (2021)**
  Triet Le, David Hin, Roland Croft, M. Ali Babar. *Proceedings of the 36th International Conference on Automated Software Engineering.*

- **A Large-scale Study of Security Vulnerability Support on Developer Q&A Websites (2021)**
  Triet Le, <u>Roland Croft</u>, David Hin, M. Ali Babar. *Proceedings of the 25th International Conference on Evaluation and Assessment in Software Engineering.*
- **PUMiner: Mining Security Posts from Developer Question and Answer Websites with PU Learning (2020)**
  Triet Le, David Hin, <u>Roland Croft</u>, M. Ali Babar. *Proceedings of the 17th International Conference on Mining Software Repositories.*

Journal:
- **SmartValidator: A Framework for Automatic Identification and Classification of Cyber Threat Data (2022)**
  Chadni Islam, M. Ali Babar, <u>Roland Croft</u>, Helge Janicke. *Journal of Network and Computer Applications.*
- **An Empirical Study of Developers' Discussion about Security Challenges of Different Programming Languages (2022)**
  <u>Roland Croft</u>, Yongzheng Xie, Mansooreh Zahedi, M. Ali Babar, Christoph Treude. *Empirical Software Engineering.*
- **Data Preparation for Software Vulnerability Prediction: A Systematic Literature Review (2022)**
  <u>Roland Croft</u>, Yongzheng Xie, M. Ali Babar. *Transactions on Software Engineering.*

[Full Publication List (10)](#)

TECHNICAL SKILLS

- **Languages:** Python, Java, C/C++, R, Shell
- **Programming Skills:** Secure Programming, Object Oriented Programming, Algorithms & Data Structures
- **Cybersecurity:** Static Application Security Testing, Vulnerability Assessment and Analysis
- **Data Skills:** Data mining/cleaning/analysis/wrangling/visualization
- **Statistics:** Hypothesis testing, regression analysis, sampling methods
- **Machine Learning:** Natural language processing, machine learning, deep learning, weak supervision
- **Research Methods:** Qualitative & quantitative analysis, statistical modelling, systematic review

AWARDS

- **Cyber Security CRC Research Scholarship** (Honours & Ph.D.)   *2019 - 2023*
- **University Medal** (highest GPA from graduating cohort)   *2019*
- **Summer Research Scholarship** (for academic excellence)   *2017*
- **High School Valedictorian** (99.5/100 ATAR)   *2015*

Volunteer Work

Academic Supervision:
- **Empirical Analysis of Pre-release and Post-release Vulnerabilities (2022)**
  Students: Dileepa Pitawela (Masters)
- **Comparing Traditional Vulnerability Discovery Tools to AI-based Intelligent Vulnerability Prediction (2021)**
  Students: Dominic Newlands, Ziyu Chen (Masters)
- **Cross-Project Vulnerability Prediction (2020)**
  Students: Franky Lu (Undergraduate)

Conference Committee Member:
- **International Workshop on Software Vulnerability Management.** 2023. Publicity Chair.
- **International Conference on Mining Software Repositories.** 2022. Technical Track (Shadow).
- **International Symposium on Advanced Security on Software and Systems.** 2022. Program Committee.

Journal Reviewer:
- **Computers & Security (COSE).**
- **Science of Computer Programming (SCP).**