Clinton Cao

Personal Details

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Dutch

Links

github.com/ClintonCao

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Languages

Cantonese	●●●●●
Papiamento	●●●●●
English	●●●●●
Dutch	●●●●●
Mandarin	●●●○○
Spanish	●●○○○
French	●○○○○

About Me

I am a highly disciplined and motivated PhD candidate, specializing in the monitoring, verification, and testing of microservice applications. Whilst actively working on a large-scale European project, I acquired valuable knowledge of different technology stacks for microservice deployment. I am seeking an exciting position to develop impactful ML pipelines that enhance various aspects of the software development process.

Work Experience

January 2021 - January 2025 (Graduating in 2025):
PhD Candidate
Delft University of Technology
Software Technology - Algorithmics (2024 - 2025)
Intelligent Systems - Cybersecurity (2021 - 2023)
Supervisors: Dr.ir. Sicco Verwer & Dr. Annibale Panichella

Projects:

Automated Testing of Microservices (2024)

- Designed and implemented a new AI approach to automatically generate test cases for REST APIs of microservices.
- Approach uses real-time system monitoring to guide an evolutionary algorithm to generate system-level tests.
- Skills used: Kotlin, Java, Python, C++, Evolutionary Algorithms, State Machines, Docker, Git, Maven, ShellScript, Automated Test-Case Generation, Automated Software Testing.

EU-H2020 AssureMOSS (2021-2023)

- Large-scale EU-funded project involving various academic and industrial partners. Project focused on enhancing the security within the development life-cycle of microservice applications.
- Managed all administrative responsibilities and collaborations within the involved work packages, while leading one of the work packages.
- Designed and implemented several ML pipelines for the monitoring and verifications of microservice applications.
- My research focus in the project was to employ the ML pipelines to detect anomalies (network attacks) and verify that the deployed system conformed to the specifications in the source code.
- Skills used: Java, Python, C++, Machine Learning, Docker, ELK-Stack, Kubernetes, Prometheus.io, Grafana, Ansible, Helm, Packetbeat, Git, Maven, Flask, State Machines, Scikit-Learn, Project Management, Interdisciplinary Collaboration, Technical Report Writing.

October 2019 - November 2020:
Research Intern (Master Thesis)
APTA Technologies & Delft University of Technology

- Researched learning of state machines in real-time.
- Implemented algorithm to improve learning speed.
- Applied state machines for network anomaly detection on small detected hardware (Raspberry PI 4).
- Skills used: Java, Apache Kafka, Apache Flink, Apache Zookeeper, Git, Maven, Python, C++, Machine Learning.

September 2017 - April 2024:
Teaching Assistant
Delft University of Technology

- Guided students with their work on multiple subjects.
- Skills used: Java, Git, Maven, Python, C++, Docker, Group Teaching.

April 2017 - June 2017:
Project Intern - Software Engineering
ING Nederland

- Helped with the design and implementation of a monitoring tool for the systems of ING.
- Skill used: Java, Python, Git, JavaScript, TypeScript, HTML, CSS, D3.js, Node.js, Flask.

Education

September 2017 - November 2020:
Delft University of Technology
Master of Science - Computer Science
Data Science & Technology Track
Specialization: Cyber Security
Thesis: Learning State Machines in Real-Time on a Small Dedicated Hardware Device.

September 2014 - August 2017:
Delft University of Technology
Bachelor of Science - Computer Science
Information & Knowledge Engineering Track
Thesis: Graphalytics Global Competition: A Competition Platform to Compare Different Graph Processing Platforms.

Extra Curricular Activities

November 2016 - October 2018:
Media Manager (Board Member)
ABC Compas

- Coordinated the media output of the association.
- Skills used: Python, HTML, CSS, WordPress, Team management.

Technical Skills

Programming Languages:
Bash, C++, CSS, HTML, Java, JavaScript, Kotlin, Matlab, PHP, Python, Scala, Shell script, SQL, TypeScript.

Tools, Framework, and Other Knowledge:
Ansible, Apache Flink, Apache Hadoop, Apache Pig, Apache ZooKeeper, Automated Software Testing, Automated Test-Case Generation, Docker, ELK-stack, Evolutionary Algorithms, Flask, Git, Gradle, Grafana, Helm Charts, Kubernetes, Machine Learning, Maven, NLP, Node.js, Numpy, Packetbeat, Pandas, Prometheus.io, ROS, Scikit-Learn, SciPy, Symbolic Execution, Travis CI (CI/CD).

Selected Publications

Clinton Cao, Annibale Panichella and Sicco Verwer. 2024. Automated Test-Case Generation for REST APIs Using Model Inference Search Heuristic. ***Accepted at AST 2025.*** Preprint**:** https://arxiv.org/abs/2412.03420.

Clinton Cao, Agathe Blaise, Annibale Panichella, and Sicco Verwer. 2024. State Frequency Estimation for Anomaly Detection. ***Under Review*.**

Clinton Cao, Simon Schneider, Nicolas E. Diaz Ferreyra, Sicco Verwer, Annibale Panichella, and Riccardo Scandariato. 2024. CATMA: Conformance Analysis Tool For Microservice Applications. In Proceedings of the 2024 IEEE/ACM 46th International Conference on Software Engineering: Companion Proceedings (ICSE-Companion '24). Association for Computing Machinery, New York, NY, USA, 59–63. https://doi.org/10.1145/3639478.3640022.
Awards: BNAIC 2024 Best Demo Award.

Clinton Cao, Agathe Blaise, Sicco Verwer, and Filippo Rebecchi. 2022. Learning State Machines to Monitor and Detect Anomalies on a Kubernetes Cluster. In Proceedings of the 17th International Conference on Availability, Reliability and Security. Association for Computing Machinery, New York, NY, USA, Article 117, 1–9. https://doi.org/10.1145/3538969.3543810.

Tim Buckers, Clinton Cao, Michiel Doesburg, Boning Gong, Sunwei Wang, Moritz Beller, & Andy Zaidman. 2017. UAV: Warnings from multiple Automated Static Analysis Tools at a glance. In 2017 IEEE 24th International Conference on Software Analysis, Evolution and Reengineering. https://doi.org/10.1109/SANER.2017.7884656.
Awards: Best Tool Paper of SANER 2017.