Tharuka Nimesha Wickramasinghe

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Research Interests

Network Security, Applied AI/ML for Security

Education

PhD Candidate — 2023–Present
University of New South Wales (UNSW) — Kensington, Australia

- Supervisors: Dr. Arash Shaghaghi, Prof. Sanjay Jha

B.Sc. Honours in Computer Science, First Class — 2017–2021
University of Colombo School of Computing (UCSC) — Colombo 07, Sri Lanka

- GPA: 3.85/4.00 | Class Position: 4 (Top 2.5%)
- Thesis: Uncovering Hosting IP Types Behind Malicious Websites
- Supervisors: Dr. Mohamed Nabeel, Dr. Chamath Keppitiyagama

Diploma in Computer System Designing — 2016–2017
National Institute of Business Management — Colombo 07, Sri Lanka

GCE - Advanced Level (Physical Science) — 2012–2015
St. Joseph's College — Colombo 10, Sri Lanka

- National Rank: 19 | District Rank: 6

Experience

Software Engineer (Casual) — 2023 Nov - Current
University of New South Wales — Kensington, Australia

- Project: Secure Intelligent Transportation
- Supervisors: Dr. Arash Shaghaghi, Dr. Mohammad Goudarzi

Research Assistant at Cisco-NUS Corp Lab — 2022 Mar - 2023 Aug
National University of Singapore — Kent Ridge, Singapore

- Project: An Explainable Framework for Network Anomaly Detection Based on GNN
- Supervisors: Prof. Dong Jin Song, Dr. Lin Yun

Undergraduate Research Fellow — 2020 Feb - 2021 Feb
Qatar Computing Research Institute - SCoRe Lab — Ar-Rayyan, Qatar

- Project: Uncovering Hosting IP Types Behind Malicious Websites
- Supervisors: Dr. Mohamed Nabeel, Dr. Chamath Keppitiyagam, Prof. Kasun De Zoysa

Open-Source Developer — 2020 Mar - 2020 Aug
Google Summer of Code — Colombo, Sri Lanka

- Developed an open-source blockchain based supply chain management platform
- Pre-contribution and proposal preparation period: 2020 Mar - 2020 Jun

Research Assistant - Internship   2019 Aug - 2020 Feb

Qatar Computing Research Institute - SCoRe Lab   Ar-Rayyan, Qatar

- – Research Project: Proactive Detection of Bad IP Neighborhoods
- – Supervisor: Dr. Mohamed Nabeel, Prof. Kasun De Zoysa

Co-Founder   2019 May - 2022 Feb

RevokeX Technology (Pvt) Ltd.   Colombo, Sri Lanka

- – A start-up initiated to digitize the processes of Sri Lankan government institutions
- – Clients: Ministry of (MO) Education, MO Health, MO Higher Education, MO Water Supply

RESEARCH PROJECTS

SoK: Decoding the Enigma of Encrypted Network Traffic Classifiers

This work systematically investigated machine learning-based network traffic classifiers in the context of modern encrypt -ion protocols like TLS 1.3. It uncovers critical issues in the literature, including widespread use of outdated datasets, flawed design choices leading to overfitting, and unverified assumptions about encrypted data. To address these, the study introduces CipherSpectrum, a contemporary dataset built with TLS 1.3's recommend -ed cipher suites. Through 348 feature occlusion experiments, the study demonstrates key weaknesses in existi -ng approaches and provides practical guidelines for building more robust, generalizable classifiers. [1]

- https://cspectrum.web.cse.unsw.edu.au

- https://github.com/nime-sha256/chromium-cipher-suite-customizer

- https://github.com/nime-sha256/ntc-enigma

Less is More: Simplifying Network Traffic Classification Leveraging RFCs

This study challenges the prevailing trend of using deep learning with complex data transformations for encrypted netw -ork traffic classification. It highlights how existing methods often contradict protocol specifications, rely on flawed assumptions, and incur high resource costs. In response, the study introduces LiM (Less is More), a lightweight classification framework that leverages NetMatrix—a minimal, RFC-compliant tabular represent -ation of traffic excluding encrypted payloads and noisy headers. Paired with a vanilla XGBoost classifier, LiM achieves performance on par with state-of-the-art model drastically reducing resource consumption.[2]

- https://github.com/nime-sha256/LiM

Uncovering Hosting IP Types Behind Malicious Websites

An IP address can either be public or private where the former is a cloud/web hosting IP and the latter is a residential or business IP. Further, public IPs can either be dedicated (i.e. hosting websites belonging to one organization /user) or shared (i.e. hosting websites belonging to more than one organization/user). By considering these conditions, we developed a ML based classifier to assist in taking mitigation measures with minimal collateral damage and to build better IP reputation systems for malicious domain detection.[3]

PUBLICATIONS

[1] **SoK: Decoding the Enigma of Encrypted Network Traffic Classifiers**
    N. Wickramasinghe, A. Shaghaghi, G. Tsudik, S. Jha.
    To Appear at IEEE S&P (CORE A) | arXiv: 2503.20093 (2025)*

[2] **Less is More: Simplifying Network Traffic Classification Leveraging RFCs**
    N. Wickramasinghe, A. Shaghaghi, E. Ferrari, S. Jha
    To Appear at the ACM Web Conference (CORE A) | arXiv: 2502.00586 (2025)*

Honours and Awards

- **IEEE S&P 2025** - Student Travel Grant   2025
  An award designed to support students in attending the conference
  Successful Applications: 26 | Number of Applications: 219 | Award Rate: 11.87%

- **DRTG 2025** - Development and Research Training Grant   2025
  A grant to aid early-stage PhD students in obtaining research and professional experience
  Offered by: UNSW Graduate Research School

- **Ranked 135/4019 Globally** - IEEEXtreme 12.0 Programming Competition   2018
  A 24-hour competitive programming competition organised by IEEE
  Team: ReturnX | Country Rank: 8th | School Rank: 1st

- **Winner** - RealHack 1.0   2018
  A 24-hour competitive programming competition
  Organised by Software Engineering Students' Association, University of Kelaniya

Volunteering

- **ACM SIGCOMM 2024:** Organizing Committee - Student Volunteer
  - Coordinated local arrangements and venue setup support
  - Primary liaison for sponsor support and requests

- **IEEE Sri Lanka Section:** Committee Member
  - Conducted IEEE awareness sessions in universities and schools
  - Organised IEEE Sri Lanka section's annual get-together 2018

- **UCSC ACM Student Chapter:** Treasurer
  - Organised National Olympiad of Informatics 2019 and 2020
  - Conducted workshops for International Olympiad of Informatics 2019

Mentoring and Outreach

- **ReidCon** - University of Colombo School of Computing [Mentor]   2021
- **Google Code-In** - SCoRe Lab [Mentor]   2019
- **National Olympiad of Informatics** Competitive Programming Competition [Mentor]   2018
- **IEEE Pre-Xtreme** Competitive Programming Competition [Mentor]   2018
- **International Schools' Software Competition** [Mentor]   2017

Referees

Dr. Mohamed Nabeel   **Prof. Kasun De Zoysa**
PhD (University of Purdue, USA)   PhD (Stockholm University, Sweden)
Principle Researcher,   Deputy Director,
Palo Alto Networks Inc.   University of Colombo School of Computing.
mmohamednabe@paloaltonetworks.com   kasun@ucsc.cmb.ac.lk