Limin Yang

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Education

University of Illinois (UIUC), Ph.D. in Computer Science, advisor: Gang Wang — Aug. 2019 – Aug. 2023
Virginia Tech, Ph.D. in Computer Science, advisor: Gang Wang — Aug. 2018 – Jul. 2019
East China Normal University, M.S. Study in Computer Science — Sep. 2015 – Jun. 2018
East China Normal University, B.Eng. in Computer Science — Sep. 2011 – Jun. 2015

Internships

IBM Research, Visiting Scholar (Research Intern), Hybrid Cloud Team — May 2022 – Aug. 2022
- Cleaned a noisy real-world network intrusion dataset (25 million traffic/day) from National Supercomputing Center
- Semi-automatically labeled the dataset, defined 65 features for network logs, and summarized 279 security incidents
- Built anomaly detection models (per host) with LSTM autoencoder and applied on 2 past real-world attacks

TikTok, Security Engineering Intern, Threat XDR Team — May 2021 – Aug. 2021
- **Lark Email Spam Rule System**: detected 5,000 more spam/week by adding 25 patterns and 20 rules
- **Protected 50 client companies** and 1 million emails/week by allowlisting 300 domains with semi-automation
- Clustered similar emails based on user actions and increased the size of user labeled ground-truth by 100%
- Contributed to 2 urgent incidents response: a vendor offline and a spam campaign

Selected Projects

Selective ML Backdoor Attack | Published in **IEEE S&P'23** — Sep. 2020 – Jan. 2022
- Proposed a new backdoor attack against Android malware classifiers: only a specific malware family is misclassified
- Achieved 80%–98% attack success rates by alternate optimization with a customized loss function
- Defeated 4 recent backdoor defenses while traditional backdoor cannot bypass the detections

Concept Drift Detect and Explain | Published in **USENIX Security'21** — Jun. 2019 – Jun. 2020
- Leveraged contrastive learning and autoencoder to detect concept drift samples from previously unseen classes
- **Explainable AI**: proposed a novel distance-based explanation to find 45/1000 features making a sample outlier
- Increased detection rate to $F_1 = 96\%$ versus state-of-the-art ($F_1 <= 80\%$) on malware and network datasets
- Identified 161/165 unseen families on a company Blue Hexagon's Windows PE malware database

VirusTotal Reliability | Published in **IMC'19** and **USENIX Security'20** — Feb. 2019 – Nov. 2019
- Controlled 66 phishing sites to measure the label inconsistencies and dynamics between vendors and VirusTotal
- Measured the label dynamics of 14,000+ PE malware from 65 vendors via daily snapshots over one year
- Offered insights and suggestions on a more proper use of VirusTotal (received **100+ citations** in total)

Selected Publications (Citations: 400+, h-index: 9)

[**Submitted to IEEE S&P'24**] **1st author**. *Title anonymized for double-blind submission.*

[**IEEE S&P'23**] **1st author**. "*Jigsaw Puzzle: Selective Backdoor Attack to Subvert Malware Classifiers* ".

[**IEEE S&P'23**] 3rd author. "*Practitioners' Perception of ML-Based Security Tools and Explanations* ".

[**USENIX Security'21**] **1st author**. "*CADE: Detecting and Explaining Concept Drift Samples for Security Applications*". Artifact Evaluated.

[Deep Learning and Security'21] **1st author**. "*BODMAS: An Open Dataset for Learning based Temporal Analysis of PE Malware*". Dataset requested by **85 institutions (about 120 research groups)**.

[**USENIX Security'20**] 3rd author. "*Measuring and Modeling the Label Dynamics of Online Anti-Malware Engines*".

[**IMC'19**] 2nd author. "*Opening the Blackbox of VirusTotal: Analyzing Online Phishing Scan Engines*".

[**USENIX Security'18**] 3rd author. "*Understanding the Reproducibility of Crowd-reported Security Vulnerabilities.*".

Technical Skills

Languages: Python, C++, C, Shell, SQL (Postgres, Hive), Ruby
Security: ML-based malware detection, Network IDS, Spam, Phishing, Bug reproduction
Deep Learning: Keras, Tensorflow, PyTorch
Frameworks: Hadoop, PySpark, MongoDB, Flask, Scrapy, Alexa Skills, Elasticsearch, Ruby on Rails
Developer Tools: Linux, Git, VS Code, Jupyter Notebook, tmux, AWS, Vim, Docker, VirusTotal, Nmap
Libraries: Scikit-learn, LightGBM, NumPy, pandas, Matplotlib