Limin Yang

540-998-9158 | liminy2@illinois.edu | https://liminyang.web.illinois.edu | GitHub: whyisyoung | Google Scholar

Education

University of Illinois (UIUC), Ph.D. in Computer Science, advisor: Gang Wang — Aug. 2019 – May 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) — 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 350 security incidents
- Built anomaly detection models (per host) to detect 2 real-world attacks with LSTM autoencoder

TikTok, Security Engineering Intern — 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 via hand-picked 37 features
- Increased the size of user labeled ground-truth by 100% and augmented threat intelligence (IP, domain, email)
- Contributed to 2 urgent incidents response: a vendor offline and a spam campaign

Selected Projects

Selective ML Backdoor Attack | In submission to 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

ML Temporal Analysis of PE Malware | Published in IEEE S&P workshop'21 — Jul. 2020 – Jan. 2021

- Worked with a security company Blue Hexagon and released an open Windows PE malware dataset (134k samples)
- Measured 4 different retraining strategies to mitigate the degraded classifiers over time
- Received dataset requests from 60 institutions (including Microsoft and Oracle) across 22 countries

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)

Technical Skills

Languages: Python, C++, C, Shell, SQL (Postgres, Hive), Ruby
Security: Rule and ML-based malware detection, Network IDS, Spam, Phishing, Bug reproduction
Deep Learning: Keras, Tensorflow, PyTorch
Frameworks: Hadoop, PySpark, Flask, Scrapy, Alexa Skills, Google Actions, 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