Zhiying Xu

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EDUCATION

Harvard University   Cambridge, US
Ph.D. in Computer Science, Advisor: Minlan Yu   2018–Current

Shanghai Jiao Tong University   Shanghai, CN
B.Eng. in Electronic Engineering, GPA: 3.85/4.00   2014–2018

RESEARCH EXPERIENCE

Harvard University   Cambridge, US

Proactive DDoS Detection with Auxiliary Signals   Jan. 2019 –Current
Auxiliary signals in DDoS attack development, such as spoofed or blacklisted sources, or previous attacks, proactively forecast DDoS attacks. We collect 10-day auxiliary signals and propose a multi-timescale LSTM framework to capture their short-term details and long-term overview. Experiments show earlier detection than Arbor with 7.9 minutes on average.
(In submission.)

Dynamic Attack Detection with Graph Neural Networks   Sept. 2018 –Current
We build graphs of network traffic for each time step with edge and node features, and apply a graph neural networks along with an LSTM to capture both spatial (within graph) and temporal (across time) changes for attack detection. Our design has higher accuracy in evaluations on different attack detections including DDoS attacks, botnet and BGP hijacking.
(Partial results of botnet detection are presented in Ml4net workshop; Standard and easy-to-use dataset are uploaded in Zenodo.)

Shanghai Jiao Tong University   Shanghai, CN

Determining Source-Destination Connectivity in Uncertain Networks   Jan. 2016 –Jan. 2017
Given a network with uncertain source-destination connectivity, we prove the NP-hardness for the sequential order of edge connectivity tests with least expected test cost in determining source-destination connectivity.
(Accepted in [3], [5])

PUBLICATIONS

[1]   J. Zhou, **Z. Xu**, A. M. Rush, and M. Yu, "Automating botnet detection with graph neural networks", *arXiv preprint arXiv:2003.06344*, 2020.

[2]   L. Fu, X. Fu, Z. Zhang, **Z. Xu**, X. Wu, X. Wang, and S. Lu, "Joint optimization of multicast energy in delay-constrained mobile wireless networks", *IEEE/ACM Transactions on Networking*, vol. 26, no. 1, pp. 633–646, 2018.

[3]   L. Fu, X. Fu, **Z. Xu**, Q. Peng, X. Wang, and S. Lu, "Determining source–destination connectivity in uncertain networks: Modeling and solutions", *IEEE/ACM Transactions on Networking*, vol. 25, no. 6, pp. 3237–3252, 2017.

[4] X. Fu, Z. Hu, **Z. Xu**, L. Fu, and X. Wang, "De-anonymization of networks with communities: When quantifications meet algorithms", in *GLOBECOM 2017-2017 IEEE Global Communications Conference*, IEEE, 2017, pp. 1–6.

[5] X. Fu, **Z. Xu**, Q. Peng, L. Fu, and X. Wang, "Complexity vs. optimality: Unraveling source-destination connection in uncertain graphs", in *IEEE INFOCOM 2017-IEEE Conference on Computer Communications*, IEEE, 2017, pp. 1–9.

[6] X. Fu, **Z. Xu**, Q. Peng, J. You, L. Fu, X. Wang, and S. Lu, "Conmap: A novel framework for optimizing multicast energy in delay-constrained mobile wireless networks", in *Proceedings of the 18th ACM International Symposium on Mobile Ad Hoc Networking and Computing*, 2017, pp. 1–10.

Skills

- **Programming:** C/C++, Python, Verilog, VHDL.
- **Tools:** Pytorch, TensorFlow, CUDA, OpenFlow, Xilinx ISE, FPGA, Cortex-M, MATLAB, LaTeX

Graduate Courses

Machine Learning, Decision Theory, Advanced Computer Networks, Cloud Networking and Computing, Algorithms at the Ends of the Wire, Systems Development for Computational Science

Teaching

- **Teaching Assistant** at Harvard University   Spring 2020
  Computing Foundations for Computational Science (CS205)
  Instructor: Ignacio M. Llorente, David Sondak

Awards

- Outstanding Graduates in Shanghai   2018
- China Computer Federation(CCF) Outstanding Undergraduate Award   2017
- National Scholarship(top 0.2%, nationwide)   2015, 2017