Shengping Bi

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Education

University of North Texas Denton, Texas

Ph.D. Computer Science, Machine Learning *2021 - Present*

North Carolina State University Raleigh, North Carolina

M.S. Computer Engineering 2019 - 2020

Key Publications

- ***Exquisite Feature Selection for Machine Learning Powered Probing Attack Detection***, Hamidah Alanazi, Shengping Bi, Tao Wang, Tao Hou | IEEE ICC'23, Rome, Italy, 2023.
- ***Adaptive Feature Engineering via Attention-Based LSTM Towards High Performance Reconnaissance Attack Detection***, Hamidah Alanazi, Shengping Bi, Tao Wang, Tao Hou | IEEE MILCOM'23, Boston, MA, 2023.
- ***MUSTER: Subverting User Selection in MU-MIMO Networks***, Tao Hou, Shengping Bi, Tao Wang, et al. | IEEE INFOCOM'22, 2022 (Top Networking Conference).
- ***DyWCP: Dynamic and Lightweight Data-Channel Coupling Towards Confidentiality in IoT Security***, Shengping Bi, Tao Hou, Tao Wang, et al. | ACM WiSec'22, San Antonio, TX, 2022.

Research Experience

Driving Innovation in Multimodal Object Recognition Systems: AI Workflow Automation and Performance Benchmarking Denton, Texas, *August 2023 – June 2024*

- Developed a multimodal object recognition framework combining vision and sound for improved detection under challenging conditions (e.g., occlusions, low-light), achieving **97%** accuracy on benchmark datasets like MS-COCO and ImageNet.
- Designed a dual-method retrieval system integrating semantic segmentation and pattern-based searches, reducing false positives by **20%.**
- Created an evaluation framework to benchmark performance across 12 multimodal datasets, improving accuracy, efficiency, and generalization of object detection models.
- Applied adaptive learning mechanisms to dynamically adjust model parameters, enhancing performance in real-world, variable environments such as robotics and autonomous systems.

Advanced Feature Engineering for Probing & Reconnaissance Attack Detection Denton, Texas**,** *June 2022 – June 2023*

- Developed a unified feature selection framework, combining **correlation analysis**, **mutual information**, and **attention-dropout** mechanisms to remove redundant features and **dynamically refine** the most relevant features for two types of attack detections.
- Implemented a lightweight attention-based **LSTM** to learn temporal and spatial dependencies in network traffic, focusing on critical packets within each flow to enhance real-time feature learning.
- Achieved a **99.88%** detection rate for reconnaissance attacks and **99.74%** for probing attacks, significantly outperforming traditional models like **Random Forest** and **KNN**.

Subverting User Selection in MU-MIMO Networks Denton, Texas**,** *January 2021 – August 2021*

- Developed **MUSTER**, a system designed to infer and subvert user selection algorithms in MU-MIMO networks by exploiting vulnerabilities in the **Channel State Information (CSI)** feedback mechanism. Utilized **RNNs** and **Monte Carlo Tree Search**, achieving **98.6%** accuracy in user selection prediction.
- Improved **prediction** accuracy by modeling the selection process as a **Markov Decision Process** and encoding inter-user dependencies using **RNN** combined with **Monte Carlo Tree Search** to efficiently explore user selection possibilities.

Work Experience

Teaching Assistant *University of North Texas, 2021 – 2024*

- Assisted with courses such as **Network & Info Security**, **Data Structures**, **Database System,** and **Object-Oriented Programming**.
- Led labs and discussions, guiding students through coding tasks in **C/C++**, **Python** and **SQL**, with a focus on coding practices.

Technical Skills

- Programming Languages: Python, C/C++, Java, MATLAB, HTML, SQL.
- Frameworks & Libraries: TensorFlow, PyTorch, Scikit-learn, Keras, Numpy, Pandas, Matplotlib, Seaborn, Scipy.
- Machine Learning Models: LSTM, CNN, RNN, SVM, Random Forest, Decision Trees, XGBoost, K-means, Logistic Regression, Naive Bayes.
- Platforms & Tools: AWS, Git, GNU Radio, Wireshark, CICFlowmeter, Linux.

Hobbies

Travelling (Road Trip, Hiking), Sports (Basketball, Football, Soccer), Cooking, Language Learning.