Tarini Saka

PhD Candidate in Artificial Intelligence and Cybersecurity

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EDUCATION

University of Edinburgh — Edinburgh, UK
PhD in Artificial Intelligence Applications Institute — *April 2021 – Present*

Indian Institute of Science Education and Research — Thiruvananthapuram, India
Master and Bachelor of Science in School of Mathematics — *August 2015 – July 2020*

RESEARCH EXPERIENCE

Phishing Campaign Detection — September 2021 – Present
University of Edinburgh — *Edinburgh, UK*

- **Objective**: Developed an advanced context-aware clustering tool utilizing HTML parsing and transformer-based language models to detect and categorize phishing campaigns. This tool empowers security teams to efficiently identify and mitigate large-scale phishing threats.
- **Technologies and Methods**: Implemented HTML parsing with BeautifulSoup, applied language models such as BERT and LLama, and created contextual topic models, and employed semi-supervised learning and unsupervised clustering algorithms.

PhishEd: Automated Phishing Feedback for End-Users — March 2022 – Present
University of Edinburgh — *Edinburgh, UK*

- **Objective**: Funded by REPHRAIN (National Research Centre on Privacy, Harm Reduction, and Adversarial Influence Online). Designed a potential user interface for an AI-assisted phishing guidance tool. Conducted a comprehensive study to evaluate the usability and effectiveness of this conceptual tool.
- **Skills and Methods**: Applied human-centered design principles, organized and conducted focus groups, collaborated with a multidisciplinary team and developed surveys to assess the usability of the proposed tool using Qualtrics and Figma.

Qualitative Phishing Analysis — October 2022 – February 2023
Technology Usability Lab in Privacy and Security, University of Edinburgh — *Edinburgh, UK*

- **Objective**: Conducted an in-depth qualitative and thematic analysis of a publicly available phishing dataset. Developed the pioneering "Phishing Codebook," a comprehensive framework to assist researchers in systematically labeling and analyzing phishing data.
- **Key Contributions**:
  * Uncovered factors influencing human decision-making in assessing phishing emails.
  * Identified novel descriptive features through iterative qualitative coding.
  * Highlighted challenges and attacker strategies to evade rule-based filters.
- **Skills and Methods**: Inductive coding, Thematic analysis, Manual data labeling.

PhishCoder — October 2023 – Present
Human-centered Artificial Intelligence (CHAI) Lab, University of Edinburgh — *Edinburgh, UK*

- **Objective**: Developing an intelligent tool to efficiently extract crucial information from phishing emails, focusing on human-centric features often overlooked by traditional approaches.
- **Key Contributions**:
  * Fine-tuned transformer-based language models to accurately extract descriptive features from phishing emails.

- ∗ Enhanced data annotation processes for model training, ensuring high-quality training data.
- ∗ Conducted experiments using HuggingFace and Transformers to improve the model's performance.
  - ○ **Skills and Methods**: Fine-tuning language models, Data annotation, Experimenting with HuggingFace and Transformers.

TEACHING EXPERIENCE

- **Teaching Assistant**
  Human-Computer Interaction, Usable Security and Privacy   *University of Edinburgh, UK*
  - ○ **Classroom Management**: Facilitated a positive learning environment by efficiently managing classroom activities and coordinating course documents.
  - ○ **Hybrid Learning**: Supported the planning and execution of hybrid class sessions, ensuring seamless integration of in-person and online learning.
  - ○ **Curriculum Development**: Collaborated in lesson planning and curriculum implementation, accelerating the rollout and delivery of course content.
  - ○ **Assessment Administration**: Accurately recorded and managed grades for coursework and tests using an online reporting system.

- **Lab Demonstrator and Marker**
  Machine Learning Practical, Discrete Mathematics, and Probability   *University of Edinburgh, UK*
  - ○ **Problem Solving**: Applied critical thinking to decompose complex problems, evaluate solutions, and make informed decisions.
  - ○ **Student Support**: Provided comprehensive assistance to students in understanding challenging material and solving intricate problems.
  - ○ **Interactive Learning**: Facilitated review sessions, guiding students in discovering accurate solutions and deepening their understanding of class material.

PUBLICATIONS

- **Context-Based Clustering to Mitigate Phishing Attacks**: In Proceedings of the 15th ACM Workshop on Artificial Intelligence and Security (AISec), 2022.
- **SoK: Grouping Spam and Phishing Email Threats for Smarter Security**: Submitted to ACM Transactions on Privacy and Security, Under Review.
- **Phishing Codebook: A Structured Framework for the Characterization of Phishing Emails**: Submitted to the 2024 European Symposium on Usable Security (EuroUSEC 2024), Under Review.
- **PhishCoder: Efficient Extraction of Contextual Information from Phishing Emails**: Submitted to the Workshop on Security and Artificial Intelligence (SECAI) 2024, Under Review.

TECHNICAL SKILLS

- **Programming Languages**: Python, C, SQL, R
- **Mathematics and Statistics**: Advanced Analysis, Algebra, Probability, Descriptive and Inferential Statistics
- **Machine Learning**: Regression, Clustering, Classification, Semi-Supervised Learning, Data Preparation, Model Evaluation and Validation, PyTorch, TensorFlow
- **Deep Learning**: Artificial Neural Networks, Hyperparameter Tuning, Transfer Learning, GPU Acceleration, TensorFlow, PyTorch
- **Natural Language Processing**: Word Embeddings, Machine Translation, Sequence-to-Sequence Models, Hugging Face Transformers, Part-of-Speech Tagging, Named-Entity Recognition, Probabilistic Models, Language Models, Text Generation, Fine-Tuning Models
- **Human-Computer Interaction (HCI)**: User-Centered Design, Usability Testing, Prototyping, Survey Design (Qualtrics), Focus Groups, Interaction Design, User Experience (UX) Research, Figma