Alesia Chernikova

Ph.D. Candidate In Computer Science

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Motivated Ph.D. Candidate with 7+ years of research experience in academic and industry settings. Knowledgeable and passionate about solving research problems at the intersection of cybersecurity, network science, and deep learning. Successful and efficient in independent and team-driven research environments which led to the publications in top-tier journals and conferences and the development of open-source software.

Skills

Artificial Intelligence, Deep Learning, Network Science,

Data Science, Statistics, AI Security, Network Security,

Cloud Security, Cyber Threat Intelligence, Python, PyTorch, Tensorflow, Scala, Java, Spark

Professional Experience

2017-09 - Current

Research Assistant

NDS2 Lab, Northeastern University, Boston, MA

- Proposed a new compartmental model to represent self-propagating malware (SPM) behavior in the networks using real-world WannaCry traces. Rigorously studied the characteristics of the propagation process of SPM under homogeneous mixing assumption and on arbitrary networks.
- Proposed new defense algorithms and extensively tested the behavior of existing techniques to improve network robustness of the large enterprise network in the face of SPM by leveraging spectral graph theory.
- Proposed a new framework for evasion attack algorithms that preserve possible feature dependencies to evaluate the robustness of deep learning models in constrained environments such as cybersecurity or healthcare. Evaluated the success of existing defense algorithms against proposed algorithms.
- Demonstrated for the first time evasion attacks against both classification and regression models used in the domain of the self-driving car.
- Authored and presented research papers at international conferences and top-tier journals.

2023-09 - Current

Teaching Assistant (CS4100: AI)

Northeastern University, Boston, MA

- Held weekly office hours to answer questions, provide support, and review course material. Led discussions and answered questions to ensure students thoroughly understood the material.
- Used online discussion tools to answer student questions and provide feedback.
- Assisted professor in grading assignments.

2022-09 - 2022-12

Teaching Assistant (CS4100: AI)

Northeastern University, Boston, MA

- Graded assignments, exams, and research projects for a class of 90+ students.
- Assisted professor with homework and exam preparation.
- Advised students regarding research projects.
- Led weekly office hours to offer additional support and answer student questions.

2021-05 - 2021-09

Applied Scientist Intern

AWS, ESS Detective, Boston, MA

- Collaborated with project manager and senior research scientists to identify customer needs, proposed directions of possible research questions to address them, and described the methodologies to solve the research questions.
- Created a scalable algorithm for tracing the activity in the AWS cloud represented as a heterogeneous graph to allow further research based on AWS cloud activity data.
- Wrote technical reports and documentation for research projects
- Presented research finding to AWS Security teams.

2020-05 - 2020-08

Applied Scientist Intern

AWS, ESS-Detective, Cambridge, MA

- Proposed and implemented the methodology for lateral movement detection in the AWS cloud environment using Bayesian statistics and network science perspectives.
- Designed experiments and analyzed data to evaluate the methodology's effectiveness utilizing Scala, Spark, GraphX, and MLib.
- Wrote technical documents and reports to communicate findings.
- Presented research findings at the AWS internal conference.

2013-11 - 2017-07

Senior Software Engineer

IBA IT Park, Minsk, Belarus

- Experienced in developing large-scale web applications using Java, J2EE, SQL, HTML, JavaScript, CSS, and other related technologies.
- Tested software for bugs, fixing them and maintaining the portal's performance.
- Assisted the software architect with the efficiency and usability improvement of the portal.
- Proven ability to work independently and collaboratively in a fast paced environment.

2012-01 - 2013-12

Undergraduate Research Assistant

Belarusian State University, Minsk, Belarus

- Collaborated with a team of 9 people, including professors, post-doctoral, graduate, and undergraduate students, and a scientist from the National Bank of the Republic of Belarus in the research project on the estimation and evaluation of credit rankings of national enterprises using their real-world financial data.
- Participated in creating the methodology for credit rankings estimation using mathematical, statistical, and econometric methods and models.
- Independently achieved and managed the results for the building enterprise section.
- Collaborated in the development of the package for automated calculation of credit scores based on the proposed credit rankings evaluation methodology.

Education

2017-09 - Current

Doctor of Philosophy: Computer Science

Northeastern University - Boston, MA

- GPA: 3.9, Advisor: Prof. Alina Oprea

2009-09 - 2014-06

Bachelor of Science: Applied Mathematics

Belarusian State University - Minsk, Belarus

- GPA: 3.8, Advisor: Prof. Vladimir Malugin
- Thesis: "Development of risk management algorithms based on derivatives contracts"

Honors and Awards

- Khoury College of Computer Science Fellowship
- National Bank of the Republic of Belarus Merit Scholarship
- BSU Excellence Merit Scholarship

Publications

- Alesia Chernikova, Nicolò Gozzi, Simona Boboila, Nicola Perra, Tina Eliassi-Rad, and Alina Oprea. Modeling Self-Propagating Malware with Epidemiological Models. [Applied Network Science 2023]
- Alesia Chernikova, Nicolò Gozzi, Simona Boboila, Priyanka Angadi, John Loughner, Matthew Wilden, Nicola Perra, Tina Eliassi-Rad, and Alina Oprea. Cyber Network Resilience against Self-Propagating Malware Attacks. [European Symposium on Research in Computer Security (ESORICS) 2022]
- Alesia Chernikova and Alina Oprea. Fence: Feasible evasion attacks on neural networks in constrained environments. [ACM Transactions on Security and Privacy 2022]
- Alesia Chernikova, Alina Oprea, Cristina Nita-Rotaru and Baekgyu Kim. Are Self-Driving Cars Secure? Evasion Attacks against Deep Neural Networks for Steering Angle Prediction. [IEEE Workshop on the Internet of Safe Things collocated with IEEE S&P 2019]

- Alesia Chernikova and Vladimir Malugin. Algorithms for interest-rate swaps hedging. In the 70th undergraduate, graduate, and postgraduate students scientific conference of Belarusian State University (vol. 1, pp. 242 – 245).