

EDUCATION

- **University of Maryland, Baltimore County** Baltimore, Maryland
Doctor of Philosophy in Computer Science Present
- **University of Maryland, Baltimore County** Baltimore, Maryland
Master of Science in Computer Science; GPA: 4.00 May 2022
- **University of Maryland, Baltimore County** Baltimore, Maryland
Bachelor of Science in Computer Science; GPA: 4.00 Dec. 2020
 - *Summa Cum Laude.*
 - National Science Foundation (NSF) CyberCorps: Scholarship for Service (SFS).

EMPLOYMENT

- **Los Alamos National Laboratory** Los Alamos, NM
Scientist Nov. 2022 - Present
 - Conduct research in machine learning with an emphasis on tensor decomposition methods for an interdisciplinary set of fields including cyber-security, text mining and natural language processing, data privacy, biology, and high performance computing.
 - Develop machine learning pipelines/tools for extra-large datasets.
 - Lead for Cyber Summer School Research Track, an internship program where students apply machine learning to solve cyber-security problems.
- **Los Alamos National Laboratory** Los Alamos, NM
Graduate Research Assistant/Undergraduate Research Assistant Jun. 2020 - Oct. 2022
 - Conducted research in data analysis and machine learning with an emphasis on tensor decomposition methods for anomaly detection, natural language processing, and high performance computing.
 - Develop pipelines/tools for machine learning and natural language processing.
 - Delivered state-of-the-art solutions for cyber anomaly detection, malware analysis, and large-scale data analysis.
- **University of Maryland, Baltimore County** Baltimore, MD
Graduate Research Assistant/Undergraduate Teaching Fellow Aug. 2020 - May 2022
 - Conducted research in data analysis and machine learning with an emphasis on tensor decomposition methods for malware analysis and data privacy.
 - Collaborated with a team to teach and prepare instruction material for an active cyber defense class.
 - Presented Linux hardening and machine learning topics to eighty students.
- **Cyber Pack Ventures** Columbia, MD
Undergraduate Research Assistant Nov. 2019 - May 2020
 - Conducted research on the detection of malicious code in larger systems.
 - Implemented a data science driven approach to malware analysis on a large scale.
- **Montgomery County Government EISO** Rockville, MD
Information Security Intern Jan. 2018 - Oct. 2019
 - Utilized the central threat console, SIEM, OSINT, asset and vulnerability management system, and help desk system to identify, investigate, and respond to malicious incidents.
 - Developed a real-time cyber threat map, and incident response and vulnerability management dashboards for the Security Operations Center display.

U.S. PATENTS

- **Eren, M.E.**, Bhattarai, M., Nicholas, C., Rasmussen K., and Alexandrov, B. (2023), Data Identification and Classification Method, Apparatus, and System, US, Provisional Patent 63/472,188.

Conferences & Workshops

- **Eren, M.E.**, Barron, R., Bhattarai, M., Wanna, S., Solovyev, N., Rasmussen, K., Alexandrov, B., and Nicholas, C.. Catch'em all: Classification of Rare, Prominent, and Novel Malware Families. *In ISDFS '24: 12th IEEE International Symposium on Digital Forensics and Security (ISDFS)*, Apr. 29-30, 2024, San Antonio, Texas USA. 6 pages.
- Most, A., **Eren, M.E.**, Alexandrov, B., and Lawrence, N.. Electrical Grid Anomaly Detection via Tensor Decomposition. *In MILCOM '23: IEEE Military Communications Conference, Artificial Intelligence for Cyber Workshop*, Oct. 30 - Nov. 3, 2023, Boston, Massachusetts, USA. 7 pages. DOI: 10.1109/MILCOM58377.2023.10356348
- Solovyev, N., Barron, R., Bhattarai, M., **Eren, M.E.**, Rasmussen, K.O., and Alexandrov, B.. Interactive Distillation of Large Single-Topic Corpora of Scientific Papers. *In ICMLA '23: 22st IEEE International Conference on Machine Learning and Applications*, Dec. 15-17, 2023, Jacksonville Riverfront, Florida, USA. 6 pages.
- **Eren, M.E.**, Bhattarai, M., Rasmussen, K., Alexandrov, B., and Nicholas, C.. MalwareDNA: Simultaneous Classification of Malware, Malware Families, and Novel Malware. *In ISI '23: 20th Annual IEEE International Conference on Intelligence and Security Informatics*, Oct. 2-3, 2023, Charlotte, North Carolina USA. 3 pages. DOI: 10.1109/ISI58743.2023.10297217
- **Eren, M.E.**, Bhattarai, M., Solovyev, N., Richards, L., Yus, R., Nicholas, C., and Alexandrov, B.. One-Shot Federated Group Collaborative Filtering. *In ICMLA '22: 21st IEEE International Conference on Machine Learning and Applications*, Dec. 12-15, 2022, Nassau, The Bahamas. 6 pages. **Awarded Best M.S. Research at 2023 UMBC CSEE Research Day**. DOI: 10.1109/ICMLA55696.2022.00107
- Boureima, I., Bhattarai, M., **Eren, M.E.**, Solovyev, N., Djidjev, H., and Alexandrov, B.. Distributed Out-of-Memory SVD on CPU/GPU Architectures. *In HPEC '22: 26th IEEE High Performance Extreme Computing Conference*, **Outstanding Paper Award**, Sept. 19-23, 2022, Virtual Event, New England. 8 pages. DOI: 10.1109/HPEC55821.2022.9926288
- **Eren, M.E.**, Solovyev, N., Bhattarai, M., Rasmussen, K., Nicholas, C., and Alexandrov, B.. SeNMFk-SPLIT: Large Corpora Topic Modeling by Semantic Non-negative Matrix Factorization with Automatic Model Selection. *In DocEng '22: 22th ACM Symposium on Document Engineering*, Sept. 20-23, 2022, Virtual Event, San Jose, CA, USA. ACM, New York, NY, USA, 4 pages. DOI: 10.1145/3558100.3563844
- **Eren, M.E.**, Solovyev, N., Hamer, C., McDonald, R., Alexandrov, B., and Nicholas, C.. COVID-19 Multidimensional Kaggle Literature Organization. *In DocEng '21: 21th ACM Symposium on Document Engineering*, Aug. 24-27, 2021, Virtual Event, Limerick, Ireland. ACM, New York, NY, USA, 4 pages. DOI: 10.1145/3469096.3474927
- **Eren, M.E.**, Moore, J.S., and Boian, A.S.. Multi-Dimensional Anomalous Entity Detection via Poisson Tensor Factorization. *In ISI '20: Proceedings of the 13th IEEE International Conference on Intelligence and Security Informatics*, Nov. 9-10, 2020, Virtual Event, USA., 6 pages. DOI: 10.1109/ISI49825.2020.9280524
- **Eren, M.E.**, Solovyev, N., Raff, E., Nicholas, C., and Johnson, B.. COVID-19 Kaggle Literature Organization. *In DocEng '20: 20th ACM Symposium on Document Engineering*, Sep. 29 - Oct. 2, 2020, Virtual Event, CA, USA. ACM, New York, NY, USA, 4 pages. DOI: 10.1145/3395027.3419591

Journals

- **Eren, M.E.**, Bhattarai, M., Joyce, R.J., Raff, E., Nicholas, C. and Alexandrov, B.. 2023. Semi-supervised Classification of Malware Families Under Extreme Class Imbalance via Hierarchical Non-Negative Matrix Factorization with Automatic Model Selection. *TOPS: ACM Transactions on Privacy and Security*, 26 pages. DOI: 10.1145/3624567
- Bhattarai, M., Boureima, I., **Eren, M.E.**, Skau, E., Romero, P., Eidenbenz, S., and Alexandrov, B.. 2023. Distributed Out-of-Memory NMF on CPU/GPU Architectures. *The Journal of Supercomputing*. DOI: 10.1007/s11227-023-05587-4
- **Eren, M.E.**, Moore, J.S., Skau, E.W., Bhattarai, M., Moore, E.A., and Alexandrov, B.. 2022. General-Purpose Unsupervised Cyber Anomaly Detection via Non-Negative Tensor Factorization. *Digital Threats: Research and Practice*, 28 pages. DOI: 10.1145/3519602
- Golaszewski, E., Sherman, A.T., [et al, including **Eren, M.E.**]. 2020. Project-based learning continues to inspire cybersecurity students: the 2018-2019 SFS research studies at UMBC. *Association for Computing Machinery*. ACM, New York, NY, USA, 9 pages. DOI: 10.1145/3386363

Book Chapters

- **Eren, M.E.**, Alexandrov, B., and Nicholas, C.. Classifying Malware Using Tensor Decomposition. *Malware - Handbook of Prevention and Detection*, Springer Nature. 2024.

Posters & Abstracts

- **Eren, M.E.**, Rasmussen, K.O., Nicholas, C., and Alexandrov, B.S.. Malware-DNA: Machine Learning for Malware Analysis that Treats Malware as Mutations in the Software Genome. *MTEM '23: Malware Technical Exchange Meeting*, July 25-27, 2023, Lawrence Livermore National Laboratory, Livermore, California, USA.
- **Eren, M.E.**, Nicholas, S., Barron, R., Bhattarai, M., Boureima, I.D., Rasmussen, K.O., and Alexandrov, B.. Sub-topic and Semantic Sub-structure Extraction via SPLIT: Joint Nonnegative Matrix Factorization (NMF) with Automatic Model Selection. *CoDA '23: Conference on Data Analysis*, March 7-9, 2023, Santa Fe, New Mexico, USA.
- Bhandary, P., Adetunji, I., Kiendrebeogo, A., Vieson, C., Joyce, R.J., **Eren, M.E.**, and Nicholas, C.. Malware Antivirus Scan Pattern Mining via Tensor Decomposition. *MTEM '22: Malware Technical Exchange Meeting*, July 26-28, 2021, Massachusetts Institute of Technology, Cambridge, MA, USA.
- Liu, R., **Eren, M.E.**, and Nicholas, C.. Can Feature Selection Help Quantum Machine Learning for Malware Detection?. *MTEM '22: Malware Technical Exchange Meeting*, July 26-28, 2021, Massachusetts Institute of Technology, Cambridge, MA, USA.
- **Eren, M.E.**, Nicholas, C., McDonald, R., and Hamer, C.. Random Forest of Tensors. *MTEM '21: Malware Technical Exchange Meeting*, July 13-15, 2021, Sandia National Laboratories, Virtual Event, USA.
- Boutsikas, J., **Eren, M.E.**, Varga, C., Raff, E., Matuszek, M., and Nicholas, C.. Evading Malware Classifiers via Monte Carlo Mutant Feature Discovery. *MTEM '21: Malware Technical Exchange Meeting*, July 13-15, 2021, Sandia National Laboratories, Virtual Event, USA.

Thesis

- **Eren, M. E.**. Random Forest of Tensors (RFoT) Master's Thesis. Master's Thesis in Computer Science at the University of Maryland, Baltimore County Department of Computer Science and Electrical Engineering. 2022.

PRESENTATIONS

- **Invited Speaker:** Tensor Decomposition Methods for Cybersecurity. *University of Maryland Baltimore County, Cyber Defense Lab (CDL)*. Virtual Event, March 29, 2024.
- **Invited Speaker:** Tensor Decomposition Methods for Cybersecurity. *Auburn University, AI for security (AI4Sec)*. Virtual Event, March 12, 2024.
- **Invited Speaker:** Scientific Leadership Identification and Characterization: Interactive Distillation of Large Single-Topic Corpora of Scientific Papers. *Love Data Week: Los Alamos National Laboratory Data Lightning Talks*. Virtual Event, Feb. 14, 2024.
- **Invited Speaker:** Tensor Decomposition Methods for Cybersecurity. *Purdue University - The Center for Education and Research in Information Assurance and Security (CERIAS) Webinar*. Virtual Event, Feb. 07, 2024.
- **Invited Speaker:** Tensor Decomposition Methods for Cybersecurity. *Lab Research Technical Exchange (LRTE)*. Virtual Event, Nov. 16, 2023.
- **Project Presentation:** Scientific Leadership Identification and Characterization: Interactive Distillation of Large Single-Topic Corpora of Scientific Papers. *Lawrence 2023 Livermore National Laboratory, DOE Data Days (D3)*. Livermore, CA, Oct. 24-26, 2023.
- **Invited Speaker:** Tensor Decomposition Methods for Cybersecurity. *Los Alamos National Laboratory, Cybersecurity Capabilities Day*. Los Alamos, NM, Oct. 11, 2022.
- **Invited Speaker:** Tensor Decomposition Methods for Cybersecurity. *DOE Omni Technology Alliance Internship Program*. Virtual Talk. Jun. 22, 2021.
- **Student Presentation:** Anomalous Event Detection using Non-Negative Poisson Tensor Factorization. *Los Alamos National Laboratory Student Symposium*. Virtual Event, Aug. 10, 2020. (https://youtu.be/_z7yCd4vqrc)

GRANTS

- **Principle Investigator:** Los Alamos National Laboratory (LANL), Information Science and Technology Institute (ISTI) Rapid Response. Dec. 2022 - Oct. 2023
- **Co-Principle Investigator:** Los Alamos National Laboratory (LANL), Information Science and Technology Institute (ISTI) Rapid Response. Dec. 2022 - Oct. 2023

PROFESSIONAL ACTIVITIES

- **Principle Investigator, Organizer:** Los Alamos National Laboratory, Information Science and Technology Institute (ISTI) Cyber Toaster Invited Speaker Series. May-Aug. 2023
- **Data Analyst Volunteer:** Los Alamos National Laboratory, Northern New Mexico Community Data Sprint. Assisted Rocky Mountain Youth Corps. Aug. 2021
- **Editor:** Los Alamos National Laboratory, Harnessing Transformational Technology Seminar (HTT). Aug. 2021

IN THE PRESS

- **Using AI to develop enhanced cybersecurity measures:** <https://discover.lanl.gov/news/0215-ai-cybersecurity-measures>. 2024.
- **Not too big: Machine learning tames huge datasets:** <https://discover.lanl.gov/news/0911-machine-learning>. 2023.
- **Computer scientists build new tool to fight coronavirus:** <https://freethink.com/science/text-mining>. 2020.

SOFTWARE RELEASES

- **T-ELF:** Comprehensive machine learning toolbox for analyzing large datasets (<https://github.com/lanl/T-ELF>).
- **RFoT:** Tensor decomposition based semi-supervised ensemble classifier for malware (<https://github.com/MaksimEkin/RFoT>).
- **pyCP_APR:** Non-negative Poisson tensor decomposition algorithm on GPU with anomaly detection interface (https://github.com/lanl/pyCP_APR).
- **pyCP_ALS:** Python implementation of the CP-ALS tensor decomposition algorithm (https://github.com/MaksimEkin/pyCP_ALS).
- **pyDNMFk:** Distributed non-negative matrix factorization with automatic model determination (<https://github.com/lanl/pyDNMFk>).
- **pyDNTNK:** Distributed non-negative tensor networks (<https://github.com/lanl/pyDNTNK>).
- **pyQBTNs:** Boolean tensor factorization using D-Wave quantum annealers (<https://github.com/lanl/pyQBTNs>).
- **pyDRESCALK:** Distributed non-negative RESCAL decomposition for relational data (<https://github.com/lanl/pyDRESCALK>).

STUDENTS

- **Alexander Most:** M.S. Student at Montana State University.

SKILLS

- **Programming Languages:** Python, C++, C, x86_64 Assembly.
- **Foreign Language:** Turkish.

HONORS AND AWARDS

- **Employee Achievement Award:** Los Alamos National Laboratory. Spot Award, 2021, 2023.
- **R&D100 Winner:** R&D100 winner at R&D Magazine for SmartTensors project (team award), 2021.
- **R&D100 Bronze Award:** R&D100 special recognition award, Market Disruptor - Services category, at R&D Magazine for SmartTensors project (team award), 2021.
- **Competition Winner:** University of Maryland, College Park, UMD Data Challenge 2020. Awarded the Most Innovative Project, and the Outstanding UMBC Project categories.
- **Honors:** University of Maryland, Baltimore County, Phi Kappa Phi Honors, 2020.
- **Hackathon Winner:** University of Maryland, Baltimore County, hackUMBC 2019. Elected hackathon winning project. Additionally, awarded the Best Data Science Hack, and the Most Unique Hack categories.
- **Hackathon Winner:** Georgetown University, Hoya Hacks 2019. Elected second place in the Best Hardware Hack category.
- **Academic Excellence:** University of Maryland, Baltimore County, President's List, 2019, 2020.
- **Academic Excellence:** University of Maryland, Baltimore County, Dean's List, 2018, 2019, 2020.
- **Scholarship:** National Science Foundation (NSF) CyberCorps: Scholarship for Service (SFS), 2017-2020.
- **Academic Excellence:** Montgomery College, Dr. Harry Harden Jr. Student Academic Excellence Award, 2018.
- **Academic Excellence:** Montgomery College, Frank L. Verwieve Academic Excellence Award, 2017.
- **Honors:** Montgomery College, Phi Theta Kappa Honors, 2016.
- **Academic Excellence:** Montgomery College, Dean's List, 2016, 2017, 2018.