
EDUCATION

- **Ph.D. in Computer Science at Virginia Tech** (2023-Present)
Coursework: Security Risks of Generative AI; Scientific Knowledge-Guided Machine Learning; Network Security; Optimization for Machine Learning; Deep Learning.
- **M.Sc. in Data and Knowledge Engineering at Otto-von-Guericke Universität Magdeburg** (2016-2019)
Selected Coursework: Data Mining; Frequent Pattern Mining; Recommender Systems; Bayesian Networks; Advanced Databases; Distributed Data Management; Machine Learning; Information Retrieval.
- **B.Tech. in Computer Science and Engineering at GITAM University, India** (2009-2013)
Selected Coursework: Probability & Stats; Data Mining; Artificial Intelligence; Data Structures & Algorithms; Discrete Math; Databases; C, C++, Java & Unix Programming; Computer Architecture; Operating Systems.

PUBLICATIONS

- **Sindhuja Madabushi** and Parameswaran Ramanathan, “[Two-Cloud Private Read Alignment to a Public Reference Genome](#),” **accepted to *Privacy Enhancing Technologies Symposium (PETS) 2023***.
- **Sindhuja Madabushi**, “[Graph Sketches and Embeddings: A Study of their Applications in Graph Databases](#),” *Master’s Thesis*, Faculty of Computer Science, Otto-von-Guericke-Universität Magdeburg, 2019.
- **Sindhuja Madabushi**, “Novel Network System with Miscellaneous Features,” *Bachelor’s Thesis*, Department of Computer Science and Engineering, GITAM University, 2013.

RESEARCH INTERESTS

- Federated Learning (FL)
- Privacy and Fairness in FL
- Incentive Mechanisms in FL

RESEARCH PROJECTS

- **P2VFL: Performance and Privacy-enhanced Incentive Mechanism for Vertical Federated Learning** (present)
 - Designed a *privacy-preserving incentive mechanism* for Vertical Federated Learning (VFL)
 - Worked with split neural networks to compute contributions and rewards in VFL
 - Experienced with data privacy techniques such as differential privacy and homomorphic encryption
- **Two-Cloud Private Read Alignment to a Public Reference Genome** (2020-2022)
 - Designed a *scalable cloud-based algorithm for private alignment* of DNA sequence data.
 - Worked with the whole human genome and high volumes of Next Generation Sequencing (NGS) data.
 - Evaluated scalability and accuracy using RNA-Seq, ChIP-Seq, SAMtools, and SimLord.
- **Graph Sketches and Embeddings: A Study of their Applications in Graph Databases** (M.Sc. Thesis)
 - Performed a comprehensive study on graph sparsification and graph representation learning methods.
 - Evaluated effect of graph sparsification on graph properties of social network data such as page rank, community detection, and betweenness centrality.
 - Examined effect of graph embedding methods such as *DeepWalk*, *Node2Vec*, and *GNNs* on node similarity.
 - Created stored procedures for different graph queries in the Neo4j graph database to evaluate results.
- **Evaluation of High-Performance Application-level Caching of Generic Graph Structured Data** (2018)
 - Implemented several hashing techniques and graph algorithms in Java.
 - Evaluated the effects of these hashing techniques on graph properties using SNAP datasets.
- **Supporting Non-Relational Models with Flexible Schema Storage** (2017)
 - Created mappings between NoSQL and relational data stores to tile-based architectures.
 - Evaluated get and count queries for these mappings.
- **Novel Network System with Miscellaneous Features** (Bachelor’s Thesis)

- Designed a two-step authentication protocol to securely store files on a network disk using Rijndael cypher.
- Developed a web application to demonstrate my approach.

WORK EXPERIENCE

- **Student Research Intern at PisaSales CRM (2017-2018)**
 - Performed a detailed evaluation study of existing visualization libraries and pitched to senior management a library to integrate with the existing software system.
 - Implemented visualization elements such as heat maps, chord diagrams, Venn diagrams, and hive plots.
 - Designed and integrated a *flexible visualization widget* for customer sales data onto a graphical dashboard.
- **Software Engineer 1 at Innominds Software (2015-2016)**
 - Created *versatile UI elements* such as chatbots, visualizations, and navigation menus for BenchmarkONE's Customer Relationship Management and Sales Automation toolkit.
- **Systems Engineer at Tata Consultancy Services (2013-2015)**
 - Developed a communication portal using C# and Microsoft SQL for Microsoft India's weekly newsletters.
 - Migrated the portal to the cloud based on the client's specifications.
 - Responsible for client communication and maintaining content on the cloud.

TECHNICAL SKILLS

- **Languages:** Python; C#; Java; SQL; JavaScript; L^AT_EX
- **Libraries:** PyTorch; TensorFlow; Scikit-learn; NumPy; Matplotlib; Pandas
- **Environments & IDEs:** Linux; Git; Google Cloud Platform; MPI; Cluster Computing; Jupyter Notebook
- **Databases:** Neo4j; MongoDB; Cassandra; Redis; MySQL
- **Frontend and Visualization:** SharePoint; HTML5; CSS3; Bootstrap; d3.js; Dimple.js; Gephi

AWARDS AND SERVICE

- **ACSAC Conference Travel Award (2023).** Received conference travel award to attend Annual Computer Security Applications Conference held in December 2023.
- **Volunteer at STEM Santa Fe (2022).** Led the team that mentored ~ 100 school girls for the "Pathways for Girls conference" held in Santa Fe, NM in November 2022.
- **Master's Mentor at Otto-von-Guericke Universität (2017-2018).** Organized social events for 100 incoming Master's students. Mentored international students on adapting to changes in cultural environments.
- **Organizer at Magdeburg Indians (2017-2018).** Organized a Summer Fest for about 1000 participants. Led the cultural team that organized several other annual cultural events.
- **Awards and Other Achievements (2004-2013).** Top 10 ranks in the Indian Math Talent Search Exam; Degree in South Indian classical music; Several prizes in the performing arts.