Sagnik Dakshit

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RESEARCH INTERESTS

- Healthcare Informatics
- Explainable AI
- Expert Allied Machine Learning
- FAccT ML

WORK EXPERIENCE

Assistant Professor : *The University of Texas at Tyler, Current*

Seagate Technologies : *Machine Learning Research Intern, Summer 2022*

HP Labs : *Machine Learning Research Intern, Summer 2021*

Nokia Bell Labs : *Augmented Human Sensing Research Intern, Summer 2020*

IBM India Pvt. Ltd. : *Software Development Intern, Winter 2017*

Tata Technologies Ltd. : *Software Development Intern, Summer 2016*

EDUCATION

2018 - June 2023	**Ph.D.**; Computer Science *University of Texas at Dallas, USA; GPA 3.821* Advisor: Prof B. Prabhakaran *Dissertation: Framework for Deep Learning on Healthcare Time Series Data*
2014 - 2018	**B.Tech**; Computer Science and Engineering *West Bengal University of Technology, India; CGPA 8.52*

RESEARCH PUBLICATIONS

A. Peer Reviewed Publication

- "Bias Analysis in Healthcare Time-Series (BAHT) Decision Support Systems from Meta-Data", **S. Dakshit**, N.Khargonkar and B. Prabhakaran, Springer Journal of Healthcare Informatics Research, 2023 **(First Author)**
- "CVAE-based Generator for Variable Length Synthetic ECG", **S. Dakshit**, and B. Prabhakaran, *IEEE International Conference on Healthcare Informatics,* June 2023 **(First Author)**
- "Twelve Lead Double Stacked Generalization for ECG Classification", **S. Dakshit**, and B. Prabhakaran, *IEEE International Conference on Healthcare Informatics,* June 2023 **(First Author)**
- "Core-set Selection Using Metrics-based Explanations (CSUME) for multiclass ECG", **S. Dakshit**, B. M. Maweu, S. Dakshit, and B. Prabhakaran, *IEEE International Conference on Healthcare Informatics,* June 2022 **(First Author)**
- "CEFEs: A CNN Explainable Framework for ECG Signals", B. M. Maweu[1], **S. Dakshit[1]**, R. Shamsuddin, and B. Prabhakaran, *Artificial Intelligence in Medicine*, Volume 115

(102509), May 2021. https://doi.org/10.1016/j.artmed.2021.102059 **(Joint First Author)**

- "Reinforcement Learning Framework for Navigation problems using LiDAR Scan-Based Virtual Reality", **Sagnik Dakshit,** Hiranya Kumar, Chris Young Jin Jung, Ammar Hasan Mehboob Nanjiani, Marshal Renfrow, Brian To, Briscoe Fletcher, Liam Heffernan, and Balakrishnan Prabhakaran, *Machine Learning for Mobile Robot Navigation in the Wild (ML4NAV) Symposium as part of the AAAI Spring Symposium,* 2021. (Peer-reviewed Short Paper). **(First Author)**
- "Generating Healthcare Time Series Data for Improving Diagnostic Accuracy of Deep Neural Networks," B. M. Maweu, R. Shamsuddin, **S. Dakshit** and B. Prabhakaran, *IEEE Transactions on Instrumentation and Measurement,* https://doi.org/10.1109/TIM.2021.3077049 2.
- "SSBC 2020: Sclera segmentation benchmarking competition in the mobile environment.", Vitek, M., Das, A., Pourcenoux, Y., Missler, A., Paumier, C., Das, S., ... & Štruc, V. (2020, September). In *2020 IEEE International Joint Conference on Biometrics (IJCB)* (pp. 1-10). IEEE. (Benchmarking Competition)

B. Manuscript and Under-Review

- "Using Explainability to Remove Outliers for Multi-modal Pediatric Heart Sound Abnormality Classification", **S. Dakshit**, (Manuscript)
- "Near Real-time Forgery Detection and Localization in RGB and 3D LiDAR Data from Autonomous Vehicles", S. Mohammadpour, **S. Dakshit**, and B. Prabhakaran, Under Review, *ACM Transactions on Multimedia Computing, Communications, and Applications* 2022
- "Representation learning for mitigation of sampling frequency in ECG", **S. Dakshit**, and B. Prabhakaran (Manuscript) **(First Author)**

TEACHING EXPERIENCE

The University of Texas at Tyler

- Fall 2023, **Assistant Professor**
  - *COSC 4336 Software Development*
  - *COSC 4395 Capstone Project*
  - *CSCI 4385 Capstone Project*
  - *COSC 4375 Capstone Project*

The University of Texas at Dallas

- Fall 2022 : **Teaching Assistant,** *CS 6375 Machine Learning*
  - Graded coursework and answered questions
  - Guided the student on final group project
- Spring 2022 : **Teaching Assistant,** *CS 6360 Database Design*
  - Graded coursework and answered questions
  - Guided the student on final group project
- Spring 2021 : **Teaching Assistant,** *CE 4337 Org. of Programming Language*
  - Graded coursework and answered questions.
- Fall 2020: **Teaching Assistant,** *CS 4347 Database Systems*
  - Graded coursework and answered questions
  - Guided the student on final group project
- Spring 2020: **Teaching Assistant,** *CS 6375 Machine Learning*

    - Graded coursework and answered questions
    - Guided the student on final group project

- Fall 2019: **Teaching Assistant,** *CS 6360 Database Design*
    - Graded coursework and answered questions
    - Guided the student on final group project
- Summer 2019: **Teaching Assistant,** *CS 4301 Web Design*
    - Graded coursework and answered questions
    - Guided the student on final group project
- Spring 2019 : **Teaching Assistant,** *CS 6348 Data and Applications Security*
    - Graded coursework and answered questions
- Fall 2018 : **Teaching Assistant,** *CS 6364 Artificial Intelligence*
    - Graded coursework and answered questions
    - Guided the student on final group project

Calcutta Institute of Engineering and Management, India

- Spring 2018 : **Student Instructor,** *Introduction to Python*
    - Designed the course material and assignments.
    - Designed the exam

ADVISING AND MENTORING EXPERIENCE

- Nikhil Patel; Undergrad, The University of Texas at Dallas, 2020
- Arib Dhuka; Undergrad, The University of Texas at Dallas, 2020
- Steven Chung Yi Lo; Undergrad, The University of Texas at Dallas, 2020
- Ryan Peterson; Undergrad, The University of Texas at Dallas, 2020
- Manoj Sreeram; MS Student, The University of Texas at Dallas, 2019
- B.Tech Final Project Guest Mentor:
  Calcutta Institute of Engineering and Management, India, 2021
    - Co-supervised under-graduate students through their final year B.Tech projects.
    - Guided the student on problem formulation and developing solutions.
    - Served as a judge for the developed final-year projects.
- Mentored 70 students on Arduino programming and interfacing various sensors for the development of IoT devices, 2016

SELECTED RESEARCH PROJECTS

- *Detecting Fake Audio Signals (CAE INSuRE):* This project was a joint collaboration between UT Dallas, UT Houston, and John Hopkins to detect DeepFake audio signals with highly imbalanced datasets. We compared various state-of-the-art methods and proposed a one-class classifier.
- *Sclera Segmentation*: IJCB 2020, Sclera Segmentation Benchmarking Competition in the Mobile Environments with 85% accurate segmentation model and proposed research strategy presentation in a conference paper.
- *Computational Intelligence based feature selection for Arsenic contamination of Drinking Water in Bengal:* This interdisciplinary project was funded by a research grant from The Institution of Engineers, India (Project ID: UG2017023) for the development of machine learning models to detect the local drinking groundwater arsenic contamination. We used ensemble learning to achieve 90+% accuracy on real-world test data.

- *Size-Invariant Federated learning:* Developed a distributed size invariant time-series ECG signals learning framework allowing distributed training using Federated Learning and Spatial Pyramid Pooling, without losing information or samples due to resizing, and under-sampling to train and test on deep learning models with 92% model accuracy.
- *Stereo to LiDAR Mapping:* Developed a pipeline for the Localization of objects in 3D Point Cloud based on the corresponding 2D detected objects leveraging object detection, disparity calculation, triangulation, and changing the coordinate system. This facilitates object detection and recognition in a 3D point cloud in real time for tasks such as forgery detection and autonomous navigation.
- *UNET Forgery Detection and Segmentation:* Develop UNET-based deep learning segmentation architecture for detection and localization of additive forgery in 3D LiDAR and 2D RGB images.
- *Few-Shot ECG for Personalization:* Developed a few-shot learning algorithm for personalizing ECG-based disease diagnosis where there is a shortage of data samples for immediate personalized delivery of services.
- *Bitcoin Transaction System:* Developed a web-based software Bitcoin Transaction System that leverages relational DBMS technology for data storage and querying under Dr. Murat Kantarcioglu (UT Dallas)

RESEARCH PROPOSALS

I have been involved in preparing five proposals with my Ph.D. Advisor, but I am not the PI and do not own these proposals.

- **NSF CRII** 2023**;***Under Preparation;* **PI**
- **NSF SLES**: Mixed-initiative Multi-robot Systems; co-PI (Rejected)
- VR-LEARN: Virtual Reality-based Learning for Explainable Authenticated Robot Navigation (Rejected)
- Active Serious Gamification for Physical Rehabilitation, *Under Review 2022, Student Contributor*
- Computational intelligence-based feature selection for arsenic contamination of drinking water of West Bengal, Bihar, and Bangladesh region **Project ID: UG2017023,** Sponsored by Institution of Engineers, India, 2017, *Lead Contributor (Accepted).*

INVITED TALKS, PRESENTATIONS

- **"Core-set Selection Using Metrics-based Explanations (CSUME) for multiclass ECG",** *International Conference on Healthcare Informatics; MN, USA, 2022*
- STEM Mentoring Career Panel "**How I ended up in Technology, why I am passionate about it, and how it impacts our lives**." *Thomas Elementary School; Plano, TX, 2019*
- "**A peek into the world of Artificial Intelligence**" organized by the *STEM Professional Series (My Passion for Science); Frisco, TX, 2020.*
- "**The Present and Future of ML & AI**", *Calcutta Institute of Engineering and Management, 2021*
- Keynote on "**Improving Healthcare Time-Series Deep Learning Models**." *International Conference on Current Research in Engineering and Technology, 2021*
- Invited **Guest Mentor for Final Year Engineering Projects** at *Calcutta Institute of Engineering and Management*, *2021*

TRAINING AND CERTIFICATIONS

- Graduate Teaching Certificate | The University of Texas at Dallas | 2022
- MLOps Specialization | DeepLearning.ai | 2022
- 5G End-to-End Associate | Nokia Bell Labs | 2020

- AI in Medicine | Coursera, Andrew Ng |2020
- Deep Learning in Healthcare Workshop | Deepkapha.ai | 2019
- Deep Learning with Tensorflow | UT Dallas Workshop | 2019
- Deep Learning Specialization | DeepLearning.ai by Andrew NG | 2019
- Microsoft Technology Associate | Database Fundamentals Microsoft Certification ID: 12837976| 2017
- Python Specialization | University of Michigan, Coursera | 2015
- Internet of Things and Embedded Systems | University of California | 2015
- Introduction to Big Data | University of California, San Diego | 2015
- Data Science and Hadoop | Training | 2017 | Live project Customer 360 analysis, Hadoop, PIG.

PROFESSIONAL SERVICE

- **NIPS AXAI;** *Reviewer 2023*
- **Computer Methods in Biomechanics and Biomedical Engineering;** *Reviewer 2023*
- **ICHI Special Session on COVID-19;** *Program Committee Member 2020*
- **IEEE Transactions on Multimedia;** *Reviewer 2019,2020,2021*
- **Journal of Healthcare Informatics Research**; *Reviewer 2020, 2022*
- **SPRINGER, Multimedia Systems**; *Reviewer 2019-Present*
- **ACM International Conference on Multimedia Retrieval;** *Reviewer 2022*
- **ACM Information Hiding and Multimedia Security***; Reviewer 2022*

ORGANIZED WORKSHOPS

- **Embedded systems and Sensor technology;** *Organized and Mentored students on Arduino programming and interfacing with different modules*; 2016
- **Entrepreneurship and Startup Training;** *Entrepreneurship Development Institute, a Govt. Initiative*; 2017
- **Big Data and Cloud Computing** in joint collaboration with Cloudera, 2017