

Faizanuddin Ansari

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Research Profile: AI researcher specializing in developing robust and fair deep learning methods to address class imbalance, long-tailed distributions, group biases, and limited data challenges. I have proposed solutions grounded in oversampling, distribution calibration, mixed-data augmentation techniques, and boundary fidelity principles, with applications in computer vision, medical imaging, time-series forecasting, and structured data domains. More recently, I have investigated the reasoning capabilities and representational limits of large language models (LLMs), through studies on in-context learning with structured tasks and the architectural foundations of attention.

Technical Skills:

- **Programming:** Python (7+ years), PyTorch (6+ years), TensorFlow/Keras (4+ years), C, C++, R, Java, SQL, Shell scripting
- **AI Frameworks:** scikit-learn, HuggingFace Transformers, OpenCV, Pandas, NumPy
- **Domains:** NLP, computer vision, time-series, graphs, multimodal data

Education:

- **Senior Research Fellow, Ph.D. candidate** at Indian Statistical Institute (ISI), Kolkata (2021-Present)
Ph.D. Thesis: **Generalization under Sub-population Shift: Equitable Models for Imbalanced, Long-tailed, and Fair Representation Learning.** *Supervisor:* **Dr. Swagatam Das.**
- **Junior Research Fellow (JRF)** at Indian Statistical Institute (ISI), Kolkata (2019-2021)
- **M.Tech (Software Engineering)** at Zakir Husain College of Engineering & Technology, AMU, CGPA: 9.3 (2019)
- **B.Tech (Computer Engineering)** at Zakir Husain College of Engineering & Technology, AMU, CGPA: 8.9 (2017)

Broad Areas of Expertise Machine Learning, Deep Learning, Generative AI, Large Language Models (LLMs), Small Language Models (SLMs), Domain-Specific AI Adaptation, Explainable AI, Long-Tailed Learning, Class Imbalance, Continual Learning, Fairness and Bias Mitigation.

Work Experience:

- **Research Associate | Ericsson Research** (June, 2024 - May, 2025)
 - Developed an algorithm to handle class imbalance in churn prediction, improving customer retention and reducing churn rates.
 - Developed zero-shot and few-shot time series forecasting models for channel data, reducing prediction error.
- **Investigator | CESC (Calcutta Electric Supply Corporation), Kolkata** (April, 2022 - March, 2023)
Developed deep learning-based peak load forecasting models, enabling CESC to optimize resource allocation, improve load balancing, and enhance infrastructure planning. Demonstrated practical impact by providing actionable insights for electricity procurement and demand management.

Publications: *Selected top-tier publications in MICCAI, ISBI, IJCNN, EAAI, and IEEE TETCI. Full list available on website.*

- [P1] **F. Ansari**, S. Das and P. Shamsolmoali, “Handling Class Imbalance by Estimating Minority Class Statistics,” *IEEE International Joint Conference on Neural Networks (IJCNN)*, Gold Coast, Australia, (2023).
- [P2] **F. Ansari**, A. Bhattacharya, B. Saha, and S. Das, “Mo2E: Mixture of Two Experts for Class-Imbalanced Learning from Medical Images,” *IEEE International Symposium on Biomedical Imaging (ISBI)*, Athens, Greece (2024).
- [P3] P. Mondal, **F. Ansari**, and S. Das, “CCO: A Cluster Core-based Oversampling Technique for Improved Class-Imbalanced Learning,” *IEEE Transactions on Emerging Topics in Computational Intelligence (TETCI)*, (2024).
- [P4] **F. Ansari**, T. Chakraborti, and S. Das, “Algorithmic Fairness in Lesion Classification by Mitigating Class Imbalance and Skin Tone Bias,” *International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI)*, Marrakesh, Morocco, (2024).
- [P5] **F. Ansari**, A. Panigrahi, and S. Das, “The Goldilocks Principle: Achieving Just Right Boundary Fidelity for Long-Tailed Classification,” *IEEE Transactions on Emerging Topics in Computational Intelligence (TETCI)*, (2025).
- [P6] P. Mondal, **F. Ansari**, S. Das, and P. Shamsolmoali “Force of Attraction-Based Distribution Calibration for Enhancing Minority Class Representation,” *IEEE International Joint Conference on Neural Networks (IJCNN)*, (2025) (Accepted for Publication).

[P7] **F. Ansari**, A. Panigrahi, and S. Das, “STTP-Net: Sampling-Tailored Two-Pronged Network for Long-Tailed Class Imbalance Learning,” *Engineering Applications of Artificial Intelligence* (EAAI), (2025) (Accepted for Publication).

Papers Under Review

[UR1] D. Dutta, **F. Ansari**, and S. Das, “Assessing the Limits of In-Context Learning beyond Functions using Partially Ordered Relation,” arXiv preprint arXiv:2506.13608 (2025). (Under Review).

[UR2] D. Dutta, **F. Ansari**, A. Chakrabarty and S. Das, “On the Existence of Universal Simulators of Attention,” arXiv preprint arXiv:2506.18739. (Under Review).

[UR3] P. Mondal, **F. Ansari**, and S. Das, “Rebalancing with Calibrated Sub-classes (RCS): An Enhanced Approach for Robust Imbalanced Classification,” (Under Review at ACM journal).

Academic Achievements and Professional Activities

- **Teaching and Training:** Delivered lectures and workshops on data science and advanced machine learning for postgraduate students and industry participants (ISI PGDBA, M.Tech., AIVOT startup workshop 2023), empowering over 200 learners with practical AI skills.
- **Research Mentorship:** Supervised 8+ research interns (undergraduate and graduate research interns from premier institutes (ISI Kolkata, NIT Rourkela, NIT Trichy, Jadavpur University) since 2022) and junior collaborators on projects spanning LLM expressiveness, generative models, and domain adaptation, with successful preprints and conference submissions under guidance.
- **Invited Speaker:** Regularly invited to deliver talks at the Summer School on Computer Vision, Graphics, and Image Processing (2022–2024), and the Winter School on Deep Learning (2022–2024), reaching a wide academic and industry audience.
- **Competitive Examinations:** Qualified GATE (Score 644), JEST AIR 102, and UGC-NET for Assistant Professor; recipient of full fellowships for M.Tech. and PhD from MHRD and ISI Kolkata, demonstrating academic excellence.
- **Leadership Roles:** Served as Organizing Chair (WSDL-2024), Web Chair (WSDL-2023), Committee Member (WSDL-2022), and led design initiatives at Entrepreneurship Development Cell, AMU, highlighting proven leadership in technical community-building.
- **Reviewer Service:** Actively contributed as a reviewer for prestigious journals and conferences, including IEEE Transactions on Neural Networks and Learning Systems, IEEE TETCI, IJCNN, Pattern Recognition, and others, ensuring rigorous standards in AI research dissemination.

Projects completed during my bachelor’s, master’s, and during PhD

- **CESC Project:** Peak Load Demand Forecasting for CESC (Calcutta Electric Supply Corporation), Kolkata Using Advanced Deep Learning Model (July, 2022 - July, 2023)
- **Summer School 2023 Project:** GraphMol: Decoding Molecule Patterns with Graph Neural Network (Led a team of Master and B.Tech students)
- Participated in Research Week with Google 2022.
- **Summer School 2022 Project 1:** StANO: Style Based Anomaly Detection in Medical Images (Team project with B.Tech student from NIT)
- **Summer School 2022 Project 2:** Investigating the Effectiveness of Mixup Augmentation Techniques in Supervised and Semi-supervised Learning (Team project with B.Tech students from Jadavpur University)
- **M.Tech Thesis:** Enhanced Image Captioning: Unveiling Objects with Attention Mechanism Integration (2019)
- **M.Tech Minor Project:** Comparative Analysis of Various Object Detection Algorithms Using CNN (2018)
- **B.Tech Major Project:** Ad-hoc Data Transfer for Android Devices: Modifying the WiFi Protocol (2017)
- **Robotics Project:** Robowar Competition in IIT Bombay tech-fest (Programmer for Arduino) (2015)

Awards and Research Grants

- ISI Kolkata International Travel Grant
- Science and Engineering Research Board (SERB), Department of Science and Technology, Government of India Research Grant
- Reinforcing Inclusiveness & DiverSity and Empowering (RISE) Grant from MICCAI Society
- ACM/IARCS Travel Grant

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June, 2025