

## Sankha Subhra Mullick

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### Education:

- **Ph.D. in Computer Science, Indian Statistical Institute, India: 2014-January, 2021**

*Thesis Title:* On class imbalance learning: design of non-parametric classifiers, efficient performance indices, and deep oversampling strategies. *Supervisor:* Dr. Swagatam Das.

- **M.Tech in Computer Science, Indian Statistical Institute, Kolkata, India: 2012-2014**
- **B.Tech in Computer Science & Engineering, West Bengal University of Technology, India: 2008-2012**

**Research Experience (GitHub: <https://github.com/SankhaSubhra>):**

**Broad areas of Expertise:** Machine Learning, Deep Learning, Evolutionary Optimization

- **Applied Research Engineer, LinkedIn, India, April, 2021-Now**
  - Involved in research on natural language processing and tasked with designing deep text classifiers for maintaining the content quality in the platform.
- **Visiting Scientist, Indian Statistical Institute, Kolkata, January, 2021-March, 2021**
  - Improved performance of meta learning algorithms and investigated their applicability in domain adaptation task.
  - Designed deep classifiers for diagnosing respiratory diseases from chest radiography images keeping the impact of class imbalance in mind.
  - Performed black-box universal as well as image dependent adversarial attacks of varying sparsity on state-of-the-art deep classifiers using evolutionary optimization.
- **Senior Research Fellow, Indian Statistical Institute: 2016-2021**
  - Proposed adversarially learned generative network based artificial oversampling for handling class imbalance in deep image classifiers and achieved about 8% improvement over the state-of-the-arts on average.
  - Designed a couple of scalable self-adaptive variants of  $k$ -nearest neighbor type classifiers which offer improved performance as well as higher immunity against class imbalance.
  - Investigated the applicability of popular classification performance evaluation measures in presence of class imbalance especially for challenging applications involving concept drift or streaming data.
  - Formally defined the problem of label ambiguity and showed how that can be handled by a neural network.
- **Junior Research Fellow, Indian Statistical Institute: 2014-2016**
  - Proposed a couple of variants of Differential Evolution (DE) suitable for high dimensional optimization problems.
  - Explored the applicability of DE in problems related to classical machine and deep learning.

**Selected Publications (Google Scholar: <https://scholar.google.com/citations?user=Qnz1BI8AAAAJ>):**

- Ghosh A., **Mullick, S. S.**, S. Datta, S. Das, A. K. Das, and R. Mallipeddi. “A Black-box Adversarial Attack Strategy with Adjustable Sparsity and Generalizability for Deep Image Classifiers.” *Pattern Recognition* (2021).
- **Mullick, S. S.**, S. Datta, S. G. Dhekane, and S. Das. “Appropriateness of Performance Indices for Imbalanced Data Classification: An Analysis.” *Pattern Recognition* 102 (2020).
- **Mullick, S. S.**, S. Datta and S. Das. “Generative adversarial minority oversampling.” in proceedings of the International Conference on Computer Vision (ICCV), 2019.
- **Mullick, S. S.**, S. Datta and S. Das. ”Adaptive learning-based  $k$ -nearest neighbor classifiers with resilience to class imbalance,” *IEEE Transactions on Neural Networks and Learning Systems*, 29(11) (2018): 5713 - 5725.
- Banerjee, I., **S. S. Mullick**, and S. Das. ”On Convergence of the Class Membership Estimator in Fuzzy  $k$ -Nearest Neighbor Classifier.” *IEEE Transactions on Fuzzy Systems* 27(6) (2018): 1226-1236.
- Biswas, N., S. Chakraborty, **S. S. Mullick**, and S. Das. “A parameter independent fuzzy weighted  $k$ -Nearest neighbor classifier.” *Pattern Recognition Letters* 101 (2017): 80-87.
- Das, S., **S. S. Mullick**, and P. N. Suganthan. ”Recent advances in differential evolution—an updated survey.” *Swarm and Evolutionary Computation* 27 (2016): 1-30.

### Programming Languages:

**Regularly use:** Python (3+ years), PyTorch (2+ years), Keras/TensorFlow (2+ years), MatLab (8+ years).

**Also familiar with:** C, C++, R, and shell scripting.

### Academic Achievements and Professional Activities:

- Published a total of 10 research articles with 1200+ citation count, h-index of 7 and i-10 index 7.
- Received ACM-India/IARCS conference travel grant. Selected as a student volunteer at ICCV 2019. Receives Indian Statistical Institute fellowship.
- *Teaching Assistant:* “Pattern Recognition and Image Processing”, M.Tech. in Computer Science, ISI, Fall, 2020.
- *Supervised:* 10+ undergraduate and graduate research interns from various notable academic institutes (such as ISI, IIT Delhi, Jadavpur University, IIT Guwahati, IIIT Guwahati, etc.) since 2015.
- Assisted Dr. Swagatam Das (Ph.D. supervisor) with the drafting of the successful grant applications: NVIDIA (2018) and Department of Science and Technology, Government of India (2020).