Sankha Subhra Mullick

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Google Scholar: `https://scholar.google.com/citations?user=QnzlBI8AAAAJ`
DBLP: `https://dblp.org/pers/hd/m/Mullick:Sankha_Subhra`
GitHub: `https://github.com/SankhaSubhra`

Research Interests:

Class imbalanced learning, deep generative models, adversarial learning, machine learning, deep learning, evolutionary optimization, few-shot learning, applications in bioinformatics and computer vision.

Research Experience:

1. Designed deep neural network and traditional classifiers which are resilient to the detrimental effects of class-imbalance, alongside theoretical analysis of their behavior. Investigated the effects of class imbalance on classification performance evaluation indices.

2. Designed classifiers which can resolve label ambiguities, retain their performance on small disjuncts, general scarcity of training instances, and/or relieve the user from parameter tuning.

3. Proposed new variants of Differential Evolution (DE) suitable for large scale optimization problems, and explored their applicability in optimizing a classifier's performance, adversarial attack, etc.

Positions Held:

August, 2016-Now	Senior Research Fellow, Electronics and Communication Sciences Unit (ECSU), Indian Statistical Institute (ISI).
August, 2014-July, 2016	Junior Research Fellow, ECSU, ISI.

Education:

Ph.D. in Computer Science 2014-Now Thesis submitted: August, 2020	On class imbalance learning: design of non-parametric classifiers, efficient performance indices, and deep oversampling strategies. Supervisor: Dr. Swagatam Das. Associate Professor, ECSU, ISI.
M.tech in Computer Science 2012-2014	ISI, Kolkata, India. Percentage: 81.5%. 1st Division with Distinction.
B.Tech in Computer Science and Engineering 2008-2012	Kalyani Government Engineering College (KGEC), West Bengal University of Technology (recently renamed as Maulana Abul Kalam Azad University of Technology). Degree Grade Point Average: 8.56/10

Projects and Internships:

Dissertation during M.Tech at ISI, for the partial fulfillment of the course December, 2013-July, 2014	Study on Integrative Clustering of Multiple Genomic Data to Discover Cancer Subtypes. Supervisor: Prof. Pradipta Maji, Professor, Machine Intelligence Unit, ISI.
Project as part of the Parallel processing: Architectures and Algorithms paper during M.Tech September-November, 2013	Exploring the scope of parallelism in matrix multiplication using CUDA. Supervisor: Prof. Nabanita Das, Professor, Advanced Computing and Microelectronics Unit, ISI.
Summer Internship at the Indian Institute of Technology (IIT), Delhi May-June, 2013	Prediction of replication origins of eukaryotic genes. Supervisor: Dr. Kushal Shah, Assistant Professor, Department of Electrical Engineering (DEE), IIT Delhi, and Prof. B. K. Panigrahi, Professor, DEE, IIT Delhi.

Project during B.Tech at KGEC, for the partial fulfillment of the course *June, 2011-May,2012*	Time series prediction using fuzzy clustering. Supervisor: Dr. Satyendra Nath Mandal, Assistant Professor, Department of Information Technology, KGEC.

Publications:

2020:

1. **Mullick, Sankha Subhra**, Shounak Datta,Sourish Gunesh Dhekane, and Swagatam Das. "Appropriateness of Performance Indices for Imbalanced Data Classification: An Analysis." Pattern Recognition 102 (2020) doi:10.1016/j.patcog.2020.107197.

2019:

1. **Mullick, Sankha Subhra**, Shounak Datta and Swagatam Das. "Generative adversarial minority oversampling." in proceedings of the International Conference on Computer Vision (ICCV), 2019.

2. Banerjee, Imon, **Sankha Subhra Mullick**, and Swagatam Das. "On convergence of the class membership estimator in fuzzy k-nearest neighbor classifier." IEEE Transactions on Fuzzy Systems 27(6) (2019): 1226-1236.

2018:

1. **Mullick, Sankha Subhra**, Shounak Datta and Swagatam 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.

2017:

1. Ghosh, Arka, Swagatam Das, **Sankha Subhra Mullick**, R Mallipeddi, and AK Das. "A switched parameter differential evolution with optional blending crossover for scalable numerical optimization". Applied Soft Computing 57 (2017): 329-352.

2. Biswas, Nimagna, Saurajit Chakraborty, **Sankha Subhra Mullick**, and Swagatam Das. "A parameter independent fuzzy weighted k-Nearest neighbor classifier." Pattern Recognition Letters 101 (2017): 80-87.

3. Datta, Shounak, **Sankha Subhra Mullick**, and Swagatam Das. "Generalized mean based backpropagation of errors for ambiguity resolution." Pattern Recognition Letters 94 (2017): 22-29.

2016:

1. Das, Swagatam, **Sankha Subhra Mullick**, and Ponnuthurai N. Suganthan. "Recent advances in differential evolution–an updated survey." Swarm and Evolutionary Computation 27 (2016): 1-30.

2015:

1. Das, Swagatam, Arka Ghosh, and **Sankha Subhra Mullick**. "A switched parameter differential evolution for large scale global optimization–simpler may be better." Mendel 2015. Springer, Cham, 2015. 103-125.

Communicated and archived manuscripts:

1. Das, Swagatam and **Sankha Subhra Mullick**. "On Classification of Imbalanced Datasets: An Updated Perspective and Some Future Challenges". Submitted to Pattern Recognition (2020).

2. Ghosh, Arka, **Sankha Subhra Mullick**, Shounak Datta, Swagatam Das, R. Mallipeddi, and A. K. Das. "One Sparse Perturbation to Fool them All, almost Always!" arXiv preprint arXiv:2004.13002 (2020). Submitted to Pattern Recognition (2020).

3. Datta, Shounak, Sayak Nag, **Sankha Subhra Mullick**, and Swagatam Das. "Diversifying support vector machines for boosting using kernel perturbation: applications to class imbalance and small disjuncts." arXiv preprint arXiv:1712.08493 (2017).

Google Scholar: https://scholar.google.com/citations?user=QnzlBI8AAAAJ&hl=en
DBLP: https://dblp.org/pers/hd/m/Mullick:Sankha_Subhra

Programming Languages and Tools:

1. Proficient in Python for machine learning applications using libraries such as numpy, scipy etc., and deep learning API/platform like Keras, tensorflow, PyTorch, etc.

2. Highly skilled in MATLAB.

3. Comfortable in using C/C++, R, and UNIX shell script as per requirement.

4. Extensive expertise in preparing academic documents using Latex.

GitHub: `https://github.com/SankhaSubhra`

Academic Achievements:

1. A citation count of more than 980, with a h-index of 7 and i-10 index 6.

2. Received ACM-India/IARCS travel grant. Selected as a student volunteer at ICCV 2019.

3. Ranked 486-th among 156,780 students (99.7 percentile) in Graduate Aptitude Test in Engineering for Computer Science and Engineering in 2012. Ranked 935-th in the West Bengal Joint Entrance Examination for Engineering, and 1304-th for Medical, in 2008.

Professional Activities:

Teaching and Project Supervision:

1. Teaching Assistant: "Pattern Recognition and Image Processing", M.Tech. in Computer Science, ISI, Fall, 2020.

2. Supervised more than 10 undergraduate and graduate research interns from various notable academic institutes (such as ISI, IIT Delhi, Jadavpur University, IIT Guwahati, IIIT Guwahati, etc.) on projects leading to journal papers, technical reports and/or dissertations since 2015.

3. Series of lectures on "Introduction to Deep Learning", "Machine Learning using MatLab", "MatLab basics" delivered between 2017-2019 in Summer School on Computer Vision, Graphics and Image Processing (an ECSU, ISI initiative).

Reviewer Duties:
Acts as a regular reviewer in British Machine Vision Conference 2020, IEEE Access (2019-now), IEEE Transactions of Evolutionary Computation (2019-now), IEEE Transactions on Fuzzy Systems (2019-now), IEEE Transactions on Systems, Man, and Cybernetics: Systems (2018-now), IEEE Transactions on Neural Networks and Learning Systems (2018-now), Swarm and Evolutionary Computation (2018-now), Pattern Recognition (2017-now), Information Sciences (2017-now), etc.

Grants Obtained:
Assisted Dr. Swagatam Das (Ph.D. supervisor) with the drafting of the following successful grant applications:

1. NVIDIA GPU grant in 2018.

2. Department of Science and Technology, Government of India, COVID Rakshak grant in 2020.

Personal Information and Contact Details:

Data of birth	1st October, 1990.
Interests	Avid reader and a creative writer. High-altitude trekker.
Office address	Electronics and Communication Sciences Unit, Room number-912, S. N. Bose Bhavan, Indian Statistical Institute, 203, Barrackpore Trunk Road, Kolkata, India, 700108.
Residential address	11/3B Hidaram Banerjee Lane, Bowbazar, Kolkata, India, 700012.
Nationality	Indian.
Languages known	English (fluent), Bengali (mother language).

Sankha Subhra Mullick
10th November, 2020