

# Sankha Subhra Mullick

Email (personal): [mullicksankhasubhra@gmail.com](mailto:mullicksankhasubhra@gmail.com)

Email (official): [sankha\\_r@isical.ac.in](mailto:sankha_r@isical.ac.in)

Website: <https://sankhasubhra.github.io>

Mobile: +91 9088 087 929

Google Scholar: <https://scholar.google.com/citations?user=Qnz1BI8AAAAJ>

DBLP: [https://dblp.org/pers/hd/m/Mullick:Sankha\\_Subhra](https://dblp.org/pers/hd/m/Mullick:Sankha_Subhra)

GitHub: <https://github.com/SankhaSubhra>



## Research Interests:

Evolutionary optimization algorithms especially Differential Evolution (DE),  $k$ -nearest neighbor classifier and its variants, deep learning, classification in presence of class-imbalance, label ambiguities, and small-disjuncts, density based clustering.

## Research Experience:

1. Designed classifiers and deep learning frameworks which are resilient to the detrimental effects of class-imbalance, and theoretically analyze 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, and/or relieve the user from parameter tuning.
3. Proposed new variants of DE suitable for large scale optimization problems, and explored their applicability in optimizing a classifier's performance, adversarial attack, etc.
4. Considers Computer Vision and Bioinformatics as interesting domains of applications.

## Positions Held:

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

## Education:

<i>Ph.D. in Computer Science 2014-Now</i>	Addressing Label Ambiguity and Class Imbalance in Classification Problems: Some Studies. Supervisor: Dr. Swagatam Das. Associate Professor, ECSU, ISI.
<i>M.tech in Computer Science 2012-2014</i>	ISI, Kolkata, India. Percentage: 81.5%. 1st Division with Distinction.
<i>B.Tech in Computer Science and Engineering 2008-2012</i>	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:

<i>Dissertation during M.Tech at ISI, for the partial fulfillment of the course December, 2013-July, 2014</i>	Study on Integrative Clustering of Multiple Genomic Data to Discover Cancer Subtypes. Supervisor: Prof. Pradipta Maji, Professor, Machine Intelligence Unit, ISI.
<i>Project as part of the Parallel processing: Architectures and Algorithms paper during M.Tech September-November, 2013</i>	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:

---

### Journals:

1. 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) (2018): 1226-1236.
2. 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.
3. 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.
4. 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.
5. Datta, Shounak, Sankha Subhra Mullick, and Swagatam Das. "Generalized mean based back-propagation of errors for ambiguity resolution." *Pattern Recognition Letters* 94 (2017): 22-29.
6. 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.

### Conferences:

1. Mullick, Sankha Subhra, Shounak Datta and Swagatam Das. "Generative adversarial minority oversampling." Accepted in International Conference on Computer Vision (ICCV), 2019.
2. 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. Mullick, Sankha Subhra, Shounak Datta, Sourish Gunesh Dhekane, Swagatam Das, and B. K. Panigrahi. "Appropriateness of performance indices for imbalanced data classification: an analysis." Communicated with *Pattern Recognition*.
2. Datta, Shounak, Sayak Nag, Sankha Subhra Mullick, and Swagatam Das. "Diversifying support vector machines for boosting using kernel perturbation: An application to class imbalanced learning." Communicated with *Pattern Recognition Letters*.
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=Qnz1BI8AAAAJ&hl=en>

DBLP: [https://dblp.org/pers/hd/m/Mullick:Sankha\\_Subhra](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, 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 550, with a h-index of 5.
2. Receives a monthly fellowship as a research scholar from ISI.
3. Ranked 486-th among 156,780 students (99.7 percentile) in Graduate Aptitude Test in Engineering for Computer Science and Engineering in 2012. Received a scholarship providing full financial assistance during M.Tech in Computer Science, from ISI, Kolkata, and received special prize for extraordinary performance in the 3rd semester examination.
4. Ranked 935-th in the West Bengal Joint Entrance Examination for Engineering, and 1304-th for Medical, in 2008. Received merit cum means scholarships from the state government providing partial financial assistance during B.Tech.
5. Passed the Higher Secondary Examination in 2008 (West Bengal Council of Higher Secondary Education), and Madhyamik Pariksha in 2006 (West Bengal Board of Secondary Education), with respective scores of 81%, and 80.75%. An alumnus of Hindu School, and The Scottish Church Collegiate School.

## Professional Activities:

---

### *Teaching and Project Supervision:*

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

### *Lectures:*

1. "Introduction to Deep Learning." Series of lectures. Sixth Summer School on Computer Vision, Graphics and Image Processing, May-July, 2019.
2. "Machine Learning using MATLAB." Series of lectures. Fifth Summer School on Computer Vision, Graphics and Image Processing, May-July, 2018.
3. "Basics of MATLAB, with a Focus on Machine Learning Applications." Forth Summer School on Computer Vision, Graphics and Image Processing, May-July, 2017.

### *Reviewer Duties:*

<i>Since 2019</i>	IEEE Access, IEEE Transactions of Evolutionary Computation
<i>Since 2018</i>	IEEE Transactions on Neural Networks and Learning Systems, Swarm and Evolutionary Computation (Elsevier), and Neurocomputing (Elsevier)
<i>Since 2017</i>	Pattern Recognition (Elsevier), Information Sciences (Elsevier)
<i>2017, 2015</i>	International Conference on Advances in Pattern Recognition

## Personal Information and Contact Details:

---

<i>Data of Birth</i>	1st October, 1990.
<i>Extra-curricular Interests</i>	Avid reader and a creative writer. High-altitude trekker.
<i>Office Address</i>	Electronics and Communication Sciences Unit, Room number-912, S. N. Bose Bhavan, Indian Statistical Institute, 203, Barrackpore Trunk Road, Kolkata, India, 700108.
<i>Residential Address</i>	11/3B Hidaram Banerjee Lane, Bowbazar, Kolkata, India, 700012.

Sankha Subhra Mullick  
28th July, 2019