

# Subhrajyoti Dasgupta

Montréal, Canada

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## Education

### Université de Montréal / Mila - Quebec AI Institute

Montréal, Canada

MSc Computer Science - Specialization in Artificial Intelligence

September 2022 - Present

- Expected Graduation: May, 2024; CGPA 4.06/4.33
- Part of the Mila MSc in Machine Learning program; Program supervisor - Prof. Yoshua Bengio

### Amity University

Kolkata, India

B.Tech. in Computer Science and Engineering

August 2016 - August 2020

- CGPA 8.66/10.0 (First Class with Distinction)

## Research

- Sanjoy Chowdhury\*, Sayan Nag\*, **Subhrajyoti Dasgupta\***, Jun Chen, Mohamed Elhoseiny, Ruohan Gao and Dinesh Manocha: Meerkat: Audio-Visual Large Language Model for Grounding in Space and Time. [Under Review at ECCV '24.]
- Sanjoy Chowdhury, Sreyan Ghosh, **Subhrajyoti Dasgupta**, Anton Ratnarajah, Utkarsh Tyagi and Dinesh Manocha: AdVerb: Visually Guided Audio Dereverberation. *IEEE/CVF International Conference on Computer Vision (ICCV) 2023*. **ICCV 2023**. [paper]
- Subhrajyoti Dasgupta**, Arindam Das, Sudip Das, Andrei Bursuc, Ujjwal Bhattacharya, Senthil Yogamani: UnShadowNet: Illumination Critic Guided Contrastive Learning For Shadow Removal. *IEEE Access*. [paper]
- Sanjoy Chowdhury, Aditya P Patra, **Subhrajyoti Dasgupta**, Ujjwal Bhattacharya: AudViSum: Self-Supervised Deep Reinforcement Learning for diverse Audio-Visual Summary generation. *British Machine Vision Conference (BMVC) 2021*. **BMVC 2021**. [paper]
- Sanjoy Chowdhury, **Subhrajyoti Dasgupta**, Sudip Das, Ujjwal Bhattacharya: Listen to the Pixels. *International Conference on Image Processing (ICIP) 2021, Anchorage, Alaska, USA*. **ICIP 2021**. [paper]
- Subhrajyoti Dasgupta**, Sudip Das, Ujjwal Bhattacharya: CardioGAN: An Attention-based Generative Adversarial Network for Generation of Electrocardiograms. *International Conference on Pattern Recognition (ICPR) 2020, Milan, Italy*. **ICPR 2020**. [paper]

## Experience

### Researcher

Remote

University of Maryland, College Park [Advisor - Prof. Dinesh Manocha]

Feb 2023 - Present

- Working on Generative AI and foundational models for multimodal learning focusing primarily on Vision+Audio+Language.
- Led the development of a 3 Million+ audio-visual-language dataset for instruction-finetuning of audio-visual foundation models.
- Published a paper on audio-visual dereverberation at ICCV '23.
- Developing ML training pipelines combining 15+ data sources of different structures.
- Tools used : Pytorch, HuggingFace, DeepSpeed, Python 3, Pandas, Numpy, WANDB, Deepspeed, Linux, SLURM, Shellscripts, Multiprocessing.

### ML Research Intern

Montréal, Canada

BIOS Health Inc. [Advisor - Prof. Guillaume Lajoie, Prof. Blake Richards]

May 2023 - Present

- Working to build algorithms for closed-loop neuromodulation devices that can lead to precise and personalised therapies for diseases.
- Specifically responsible for designing neural decoding algorithms to understand compound action potentials (CAPs).
- Exploring different generative techniques to generate synthetic data and create algorithms for detection of CAPs.
- Presented poster about the work at NeuroAI 2023, Montreal workshop bringing together top minds in computational neuroscience.
- Tools used : Pytorch, Python 3, Pandas, Numpy, Scikit-learn, MLFlow, AWS, Linux.

### Visiting Researcher (Earlier - Research Intern)

Kolkata, India

Indian Statistical Institute [Advisor - Prof. Ujjwal Bhattacharya]

January 2020 - August 2022

- Designed novel approaches for audio-visual scene understanding & summarization, and illumination estimation & correction for natural scenes.
- Developed projects involving audio-visual co-segmentation and privacy-preserving synthetic ECG signal generation.
- Explored self-supervised learning, generative models, attention mechanism and other advanced deep-algorithms.
- Collaborated with internal and also senior industry researchers which resulted in top-tier publications.
- Tools used : Tensorflow 2.0, Keras, Python 3, Librosa, Pandas, Numpy, WFDB, Scikit-learn, Linux.

### Data Engineer

Kolkata, India

Tata Consultancy Services [Client - Amgen Inc.]

September 2020 - August 2022

- Selected as a *Digital candidate* for top rank in global programming contest 'Codevita' (among ~ 60k participants).
- Designed pipelines for large-scale (multi terabytes) data ingestion and maintained existing ingestion pipelines.
- Subject Matter Expert (SME) on 'Logistic Service Provider (LSP)' ingestion pipeline.
- Innovated and implemented CI/CD feature enhancements reducing pipeline deployment time by 80%.
- Trained and mentored new associates about different running ingestion architectures, technical know-hows, etc.
- Tools used : Python 3, PySpark, Databricks, PostgreSQL, Pandas, Numpy, CI/CD, Gitlab, AWS, Airflow.

## Deep Learning Project Trainee

Mumbai, India

Bhabha Atomic Research Center

June 2019 - July 2019

- Developed a CTC-based Handwritten Text Recognition model for documents with Devanagari script characters with the help of Deep Learning.
- Studied and used zero/few-shot learning and transfer learning techniques to address very limited training data.
- Incorporated cleaning and feature extraction of image data using conventional Image Processing techniques along with Data Augmentation.
- The project also helped in studying and reviewing several state-of-the-art Deep Learning architectures from scratch like EAST, FOTS, etc.
- Tools used : Keras, OpenCV, Python3, Pandas, Numpy, Matplotlib, Linux.

## Awards & Achievements

- Awarded scholarship of CAD ~3,000 by UdeM for presenting research paper at ICCV '23 in Paris, France
- Selected for DLRL Summer School 2023 by CIFAR/Mila/Vector Institute/Amii
- Recipient of UdeM Exemption Scholarship valued at CAD ~10,000/year
- Recipient of Quebec Government Scholarship valued at CAD ~3,000 twice
- Merit-based scholarship waiving partial tuition fees from Amity University for academic excellence
- 1st Runner Up in the entire region at 'Exabyte'-2018 Programming Contest at St. Xavier's College, Kolkata, India (among 500+ participants)
- Amazon Web Services and Udacity Machine Learning Scholarship
- Facebook AI and Udacity Secure and Private AI Challenge Scholarship

## Skills & Courses

### Languages/Frameworks/Tools

Python, Java, SQL, Tensorflow, Keras, Pytorch, OpenCV, Scikit-learn, Pandas, Numpy, PySpark  
HuggingFace, Git, Jupyter, MIFlow, WANDB, Databricks, SLURM, Agile

### Relevant Courses

Deep Learning, Machine Learning, Data Science, Probability and Statistics, Discrete Mathematics  
Applied Mathematics (Linear Algebra and Calculus), Algorithms and Data Structures  
English, French (beginner), Hindi, Bengali.

## Volunteer Experience

- Developer Students Community (by Google Developers) - Hosted technical talks, seminars and mentored students with AI research.
- United Nations Volunteers, India - Helped raise awareness about Plastic Pollution. Conducted campaigns and drives in the entire city.
- FIFA U17 World Cup, India - Helped organize first ever FIFA tournament in India as a Media Operations Volunteer.
- Helped more than 1000 families from the start of the pandemic with ration and women hygiene kit.

## Projects

### Image Super-Resolution

2019

Academic Project

- Implemented an adversarial resolution-enhancement solution for pixelated images.
- Implemented several types of CNNs using methods like dense connections, pyramid pooling, progressive upsampling and iterative upsampling to reconstruct the image.
- Studied and evaluated the performance by using different loss functions like content loss, pixel loss, texture loss and adversarial loss. Performance evaluation was done using metrics like PSNR, SSIM.

### Studying ways to solve challenges faced by the LHC (CERN) with Machine Learning

2018

Academic Project

- A humongous amount of data is produced by the LHC per day. This data needs to be processed and used efficiently for further research.
- This study was on how Machine Learning can be implemented for particle identification, particle track reconstruction, clustering of particles based on similarity, and identifying rare decays.
- A study on the proposed SHiP experiment, with the scope of Machine Learning in it, was also done.

## MOOCs

- Deep Learning Specialization, deeplearning.ai - Coursera
- Machine Learning, Stanford University - Coursera
- Introduction to Data Science using Python, University of Michigan - Coursera
- Programming, Data Structures and Algorithms in Python, Indian Institute of Technology, Madras - NPTEL

## Languages

English, French (beginner), Hindi, Bengali.