# Adithya Iyer

adithyaiyer1999.github.io adithya.iyer@nyu.edu adithyaiyer1999

## Research Interests

▪ Deep Learning ▪ Probability & Statistics ▪ Remote Sensing ▪ Computational Materials Science

## Education

**Courant Institute of Mathematical Sciences - New York University** **2022-2024**
*Masters in Scientific Computing/ Computational Science*

**Indian Institute of Technology Bombay** **GPA: 8.88/10** **2016-2021**
*Dual Degree(Btech+Mtech) in Metallurgical Engineering and Materials Science*

**Technical University of Denmark (DTU)** **GPA: 9.33/10** **Fall 2019**
*Student Exchange Program*

## Scholastic Achievements

- Awarded **Undergraduate Research Award (URA3)** for excellence in research by the Dean of Academic Affairs

## Research Experience and Projects

**Structure-Property Relations from Microstructural Images - Link to thesis** **Apr'2020-Present**
*Master's Project: Guide: Prof. M P Gururajan and Prof. Hina Gokhale* *IIT Bombay*

- *MIST (MIcrostrusture STatistics): A open source library in Python for the analysis of anisotropic microstructures*: **paper under review**, library can be found **here**
- Reviewed literature about the state of the art statistical descriptors of Microstructural images
- Derived **Spatial Probability Distributions** of local states in Cahn-Hilliard generated binary microstructures after pre-processing and **benchmarked** results with state of the art python libraries
- Implemented a custom **Quick Union-Find** based **Hoshen-Kopelman** clustering algorithm for binary images with **periodic boundary conditions**
- Calculated parameters such as precipitate size distribution, sphericity and inclination for generated microstructures
- Introduced a **precipitate tracking algorithm** on binary microstructures to track local states during evolution
- Incorporated **Level-set methods** to calculate interfacial velocity and compared results with analytical solutions
- Formulated and implemented a **Monte Carlo method** to quantify convexity of precipitate shape
- Compared evolution of isotropic, and anisotropic microstructures on the derived statistical and spatial parameters

**Missing Data Importance Weighted Autoencoder (MIWAE)** **Sep-Dec'2019**
*Guide: Prof. Jes Frellsen* *DTU Copenhagen*

- Reviewed literature about generative models, with emphasis on variational autoencoders
- Implemented Importance Weighted Autoencoder (**IWAE**) by **Burda et al.** on MNIST dataset using Pytorch
- Removed pixels to create **incomplete MNIST** dataset; used custom imputation functions pre-training
- Built a **MIWAE** by training on imputed data; produced complete images from incomplete test dataset

## Professional Experience

**McKinsey & Company | Risk Dynamics Group** **Jul'2021-Mar'2022**
*Analyst/Associate Consultant* *Delhi*

- Responsible for the complete **credit underwriting automation** for the Self-Employed customer segment for a major Indian banking client; created system to automate underwriting of portfolio worth **60+ mil USD** annually
- Built **5+** qualitative and quantitative models in R from bureau, financial and other quantitative data sources
- Conducted **back-testing** workshops for historical data collection, ensured population stability of variables and planned and executed complete on-ground implementation of models; model to be used by **100+** credit underwriters
- Built comprehensive excel models for implementation, and launched a **pan-India pilot** to kick-off adoption of credit model
- Looked at model performance during pilot run though a **custom built dashboard** to identify defunct variables, data input issues and implementation challenges; coordinated with company leads to **head workshops** on best underwriting practices
- Built a **MSME credit engine** based on customer interviews and bank deposits for a **leading Philippines bank**

**Round Finance** **May-Aug'2022**
*Backend Developer* *Mumbai*

- Responsible for building scalable and robust backend systems and APIs in **AWS Lambda** by leveraging *Node.js* to enable instantaneous verification of payments in **cryptocurrencies** for the RoundPe payment gateway
- Ideated, structured and implemented the **crypto-donation link** backend system to enable influencers to accept crypto donations; coordinated between designers and front-end developers to prioritize and deliver features
- Setup email and multi-factor authentication with Auth0; used **JWT tokens** to verify users and enable selective access of sensitive payment data to business owners, customers and admins respectively
- Conducted load testing of concurrent payment requests; set up **API rate limits** to protect against malicious activity
- Used **Redis** as a cache service to get instantaneous API responses to enable seamless frontend user flow
- Setup **API documentation** for the payment gateway with Docusaurus; created **tutorials** to ease client onboarding

**EXL Analytics** **May-Jul'2019**
*Machine Learning and Data Science Intern* *Gurugram*

- Automated **credit risk estimation** and segmentation of merchant and consumer accounts based on their transaction history by implementing **NLP** and **Machine Learning models**
- Built **50+** financial variables that captured credit risk by pre-processing over **3 million** data entries
- Predicted probability of default and **improved Gini by 500 basis points** over existing credit risk models
- Received a **Pre-Placement Offer** for exemplary performance during the course of the internship

## Entrepreneurial Venture

**Budnip : Copernicus Accelerator, European Space Agency (ESA)** **Dec'2019-Jan'2021**
*Mentor: Dr Alireza Taravat, Deimos Space UK*
*Using **Deep Learning** to detect **crop features and diseases** by analysing **satellite** imagery from Sentinel 2*

- **Winner** of the **Oi-X Hackathon** jointly conducted by **DTU Skylab** and **Copernicus Programme** in Denmark
- Attended the **start-up bootcamp** in **Helsinki, Finland** as part of the European Space week and selected to be a part of the **Copernicus Accelerator**, a platform by the **ESA** for a period of **1 year**
- Built the pre-processing pipeline to extract raster data from Sentinel Level-2A; Built 15+ vegetative indices
- Generated training data from raster and shape-files, built data augmentation tools to expand the dataset
- Built a U-Net based semantic segmentation Deep learning model to classify crops based on indices created
- Presented poster titled '***Comparative Study of Neural Networks and Machine Learning Models for Winter Wheat Crop Classification in Denmark***' at the **ESA EO Φ-week 2020** **Oct'2020**
  Received business and market related training with the **Copernicus Accelerator Training Lab**
- Conducted **40+ interviews** with potential business partners to identify target market and build business model
- **Finalist** and $2^{nd}$ **runner up** in the **Copernicus Masters - University Challenge 2020**

## Teaching Experience

**MM217-Data Analysis and Interpretation** **2020**
*Teaching Assistant* *IIT Bombay*

- Conducted fortnightly tutorials on statistics for $2^{nd}$ year undergraduates on the **R Programming** language
- Involved in correction of exams and addressing conceptual doubts for a class of **130+** students

## Relevant Coursework & Programming Skills

- **Computation & Modelling**: Process Control, Simulation and Optimisation, Data Analysis and Interpretation, Numerical Analysis, Introduction to Machine Learning and Data Mining
- **Image Processing & Deep Learning**: Digital Image Processing of Remotely Sensed Data, Deep Learning
- **Miscellaneous**: Probability and Random Processes, Linear Algebra, Differential Equations, Calculus
- **Online Courses**: Data Structures and Algorithms(Princeton), Computer Vision(Microsoft)
- **Programming Skills/Software Packages**: Python, Pytorch, Node.js, React, R, C++. JAVA, MATLAB, LaTeX, SNAP

## National and International Debate

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| Prague Open, Czech Republic | • Semi-Finalist and $5^{th}$ best team<br>• $7^{th}$ best speaker, beat 50+ participants<br>• Defeated top European teams |
| COEP Debate'19, Pune | • Finalist<br>• $4^{th}$ best team |