Adithya Jairam Iyer

adithyaiyer1999.github.io 16D110011@iitb.ac.in adithyaiyer1999

Research Interests

•*Deep Learning* •*Computer Vision* •*Remote Sensing* •*Applied Probability*

Education

Indian Institute of Technology Bombay **GPA: 8.55/10** **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

Rajiv Gandhi Academy of E-Learning, Pune 12^{th} Std. Percentage **87.6%** **2014-2016**
DAV Public School Nerul, Mumbai 10^{th} Std. Percentage **95.6%** **2008-2014**

Scholastic Achievements

- Selected as an Exchange Student **(4/800+)** at **Technical University of Denmark** (DTU), Copenhagen [2019]
- Achieved a percentile of **99.57** in JEE Mains 2016 and **98.8** in JEE Advanced 2016
- Ranked 8^{th} in the state of Maharashtra in the Regional Mathematics Olympiad(**RMO**) [2015]
- Ranked in the **top 1%** of students in the National Standard Examination in Physics (**NSEP**) [2015]

Entrepreneurial Venture

Budnip : Copernicus Accelerator, European Space Agency (ESA) **Dec'2019-Present**
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 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**

Research Experience and Projects

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

- 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

*Future research focused on using the derived features to formulate **Structure-Property Relationships** in **Anisotropic** simulated and experimental microstructures*

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

Planner App : Android application to manage tasks **May-Jul'2018**
Seasons of Code: Web and Coding Club IITB *IIT Bombay*

- Built an **Android application** where users can store,delete and edit their daily from any android device
- Designed the network architecture on the **Django** Web framework; based interaction through **REST APIs**
- Enabled sharing of tasks between users by implementing models like many-to-many fields and foreign keys
- Implemented the **Retrofit HTTP client** in Android Studio to manage requests with the server

The Saviour: Game Development **Mar'2018**
Ubisoft Game Jam *Ubisoft - IIT Bombay*

- Was one among only 3 teams selected to represent IIT Bombay in the **Ubisoft Game Jam 2018**
- Built a multi-level **3D arcade game** using the **Unity Game Engine** while working in a team of 5

Internship

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

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, R, C++. JAVA, MATLAB, LaTeX, SNAP **running course*

National and International Debate

Prague Open, Czech Republic	○ Semi-Finalist and 5^{th} best team ○ 7^{th} best speaker, beat 50+ participants ○ Defeated top European teams
COEP Debate'19, Pune	○ Finalist ○ 4^{th} best team
SMC Debate, Chennai	○ Semi-Finalist ○ 8^{th} best team
The IIT Bombay Inter-Varsity Debate	○ Organizing Committee: Registrations Head ○ Managed 250+ Participants