Abhishek Kumar Ranjan **193310005**
Geoinformatics and Natural Resources Engineering **M.Tech.**
Indian Institute of Technology, Bombay **Gender: Male**
DOB: 18-07-1996

Examination	University	Institute	Year	CPI / %
Post Graduation	IIT Bombay	IIT Bombay	2021	9.5
Graduation	NIT Trichy	NIT Trichy	2018	8.18
Graduation Specialization: Civil Engineering				
Intermediate	CBSE	K.V. NO-1 A.F.S. Tambaram	2014	95.40%
Matriculation	CBSE	K.V. NO-1 A.F.S. Tambaram	2012	9.8

AREAS OF INTEREST

o Deep Learning o Machine Learning o Image Processing o Computer Vision o Statistical Data Analysis o GIS

SCHOLASTIC ACHIEVEMENTS

- Achieved **98.81 percentile** in GATE Civil Engineering among **0.15 million+** candidates *[2018]*
- Secured **98.9 percentile** in JEE Main among **1.3 million+** candidates *[2014]*
- Received an honorable acknowledgement for contribution in research about "the application of remote sensing in water security and agriculture for food security" supported by **The National Science Foundation, USA** *[2020]*
- Honoured with appreciation letter from former **MHRD minister Smriti Irani** & Awardee of **CSSS (Central Sector Scholarship Scheme)** worth **50k** rupees for being among top **0.1 percent** in CBSE Board exam *[2014]*
- **Centum** holder in subject **MATHEMATICS** in CBSE Board Examination 2014 *[2020]*
- Awarded **3k** cash prize for securing **AIR 28 & 3rd** in Chennai region in **Junior Mathematics Olympiad** *[2012]*
- Achieved **100% scholarship worth 1.6 Lakh** rupees in ANTHE Exam conducted by AAKASH Institute *[2012]*

MAJOR PROJECTS

- **M.Tech Project: Incremental learning for land use-land cover classification** *[July'20-Present]*

  Guide: *Prof. Biplab Banerjee*
  o Performed semantic segmentation on **UCMerced** and **AID datasets** using **U-net** Architecture
  o Developing an improved model using **attention U-net** for End to End **Incremental learning** to add new classes
  o Implementing **GAN** based Generative Feature Replay with Feature distillation to avoid **Catastrophic forgetting**

- **Real-Time Hand Gesture Tracking Using Deep Learning** *[April'20-June'20]*

  Summer of Science 2020
  o Designed a model using **OpenCV** to detect hand gestures using basic mathematical and geometrical concepts
  o Developed a **CNN** model with **TensorFlow** using **leapGestRecog** dataset and achieved an accuracy of **95%**
  o Fine-tuned **VGG-16** model using **Transfer Learning** concept to achieve **99%** detection accuracy

- **Show, Attend and Tell for Image to speech** *[Aug'20-Present]*

  Guide: *Prof. Biplab Banerjee*
  o Implemented **Show, Attend and tell** approach using **InceptionV3 + Encoder-Decoder** architecture
  o Output the generated caption in speech form to give the context of the scene using **Google text to speech** engine
  o Developing a **Visual question answering System** using the input image for **Attention-based querying**

- **M.Tech Seminar: Context-aware CNN for Object Detection** *[Feb'20-June'20]*

  Guide: *Guide- Prof. B. K. Mohan*
  o Performed extensive literature study on different **Object detection algorithms** for satellite images
  o Achieved improved performance in **Context-aware CNN** over **RCNN, Fast-RCNN and Faster-RCNN**
  o Utilized **Context ROI Mining** Layer over Faster R-CNN Architecture to achieve enhanced detection accuracy

- **B.Tech Project: Accessibility Analysis of Primary Schools Using Geo-spatial Techniques**

  Guide: *Prof. Nisha Radhakrishnan* *[Jan'18-May'18]*
  o Conducted an extensive field survey from students of **144** government primary schools across Trichy district
  o Calculated **Spatial Accessibility Index** using **ArcGIS** & **Three-step floating catchment area** model
  o Generated SPAI **Thematic map** of schools to identify the areas **deprived** of primary educational facilities

COURSE PROJECTS

- **One-shot learning for Human face mask detection for COVID-19** *[July'20-Aug'20]*
  - o Simplified the problem statement as a **Binary Classification** problem and identified anchor pairs
  - o Reduced training time significantly by deploying **Siamese Network** & achieved accuracy of **77%** with triplet loss
- **Gold Prospectivity using fuzzy logic and Artificial Neural network** *[Feb'20-May'20]*
  - o Generated prospectively maps of gold reserve of Arunta region from its geochemical properties in **ArcMap**
  - o Predicted optimum location of gold deposits with an accuracy of **75%** using **Artificial Neural Network**
  - o Generated gold prospectivity map **using Fuzzy Inference System** in ArcGIS & obtained accuracy of **80%**
- **DNA sequence classifier using machine learning** *[Feb'20-May'20]*
  - o Developed **Multinomial Naive Bayes classifier** from scratch using **Bag-of-words** language model
  - o Achieved genome accuracy of **98.4%** on human, **99.35%** on chimpanzee and **92.56%** on dog datasets
- **Flight Delay Prediction on Bureau of Transportation Statistics Data using Julia** *[Mar'20-Apr'20]*
  - o Analyzed underlying trends in Flight delay based on **visualization** & **EDA (Exploratory Data Analysis)**
  - o Increased overall accuracy by **2.16**% by performing **feature engineering** to **90.68**% using **Logistic Regression**
- **Statistical analysis of CWC streamflow Time series data over Ganga Basin** *[July'19-Apr'20]*
  - o Preprocessed and formatted **Time series data** of over **45+** years and **20+** gauge stations in desired structure
  - o Utilized **MATLAB** & **Numpy, Pandas, Matplotlib** libraries of python for analysis, visualization of data
- **House pricing prediction using Linear/Non-linear and Regularized Regression** *[Jan'20–Feb'20]*
  - o Implemented **Linear**, **Polynomial** , **Ridge** and **LASSO Regression** model and compared their performance
  - o Achieved maximum **R-square** score of **0.5392** and minimum **RMSE** with **LASSO regression** in **Julia**
- **Detection of Line features in images using Hough Transform** *[Aug'19-Nov'19]*
  - o Implemented feature extraction technique of Hough Transform from scratch using Matlab over Sobel detected edge
  - o Achieved **comparable** result with inbuilt function and developed a **Graphics User Interface** for this operation
- **Edge Detection package for Satellite images** *[Feb'20-May'20]*
  - o Implemented **Canny Edge Detector** from scratch in MATLAB and achieved **similar** result as inbuilt function
  - o Registered **improvement** over Sobel operator using NMS, Double threshold, Edge Tracking by Hysteresis
- **Deploying Solar Panel in IIT Bombay using GIS techniques** *[Aug'19-Nov'19]*
  - o Interpolated Irradiance surface using **IDW** of IITB campus using Solar DATA from **PVGIS Database**
  - o Conducted **cost-benefit analysis** of solar data in different PV Systems to achieve **optimum** PV system
  - o Developed **3-D model in AUTOCAD** of IITB campus, simulating the deployment of **SOLAR grid**

POSITIONS OF RESPONSIBILITY

- **Teaching Assistant-CSRE, IIT Bombay** *[July'20-Present]*
  - o Assisting in instructing a niche group of **113+** students by holding tutorials and helping with project realization
- **Department Coordinator CSRE ISCP 2020-21** *[May'20-Present]*
  - o Worked in a team of **177** people and coordinated the **e-orientation** at the department level for **30** new entrants
  - o **Interviewed candidates** to select a team of SCs & **leading** them to mentor **31** students throughout the year
  - o **Compiled & Developed** department's Handbook with SCs that serves as informative manual to PG freshmen
  - o **Mentoring 8 students** throughout the year helping them on academic as well as non-academic fronts
- **Volunteer for helping students from TEQIP-III institutions prepare for GATE Exam** *[Aug'20-Present]*
  - o To **help** the UG students from TEQIP-III Institutions in Bihar, learn fundamental concepts & prepare for **GATE**
  - o To encourage students to appear for GATE and make them aware of different opportunities after GATE qualification

KEY RELEVANT COURSES

- **Machine Learning for Remote Sensing II***(Transfer learning,R-CNN family,YOLO)**
- **Machine Learning for Remote Sensing I** *(Linear Regression,Decision Trees,KNN,SVM)*
- **Advanced Methods in Satellite Image Processing***(Image classification, change detection, filters)*
- **Principles of Geographic Information System***(GIS applications,Spatial data ,Interpolation)*
- **Geo-spatial Predictive Modelling***(Neuro-fuzzy inference system,SVM,Neural Nets, CNN,SVM)** *audit

TECHNICAL SKILLS

- **Programming Languages :** Python, R, SQL, MATLAB, C++, C, Julia
- **Libraries/Frameworks :** Keras, Scikit-Learn, PyTorch, TensorFlow,
- **Software :** ESRI ArcGIS Desktop, QGIS, ERDAS Imagine, ENVI, LATEX, Git