

Nirbhay Sharma

+91 9369630713 | sharma.59@iitj.ac.in | [Github](#) | [Portfolio](#) | [LinkedIn](#)

Education

M.Tech , AI Indian Institute of Science (IISc) Bangalore AIR-6 GATE DA	07/2024-Present
B.Tech , CSE Indian Institute of Technology (IIT) Jodhpur CGPA: 8.97/10	06/2019-05/2023
Class 12th Dehradun public school Percentage: 96.4	03/2018-03/2019
Class 10th SD public school CGPA: 10/10	03/2016-03/2017

Technical Skills

Programming Languages: Python, C/C++
Skills: Machine Learning, Deep Learning, Computer Vision
Tools and Frameworks: Pytorch, Django, Flask, Docker, AWS Lambda, Regex, Git, Github, Firebase, MySQL

Research Interests

Computer Vision (CV), Generative Adversarial Networks (GAN's), Natural Language Processing (NLP), Transformers, Federated Learning (FL), Object Detection

Publications

- **An Extremely Lightweight CNN Model For the Diagnosis of Chest Radiographs in Resource-constrained Environments** | *International Journal of Medical Physics* 2023 | [Paper](#)
- **Aggregation-Assisted Proxyless Distillation: A Novel Approach for Handling System Heterogeneity in Federated Learning** | *International Joint Conference on Neural Networks (IJCNN)* 2024

Industry Experience

Faaya Astu India Full Time (ML Engineer)	06/2023-07/2024
<ul style="list-style-type: none">• Trained Stable Diffusion ControlNet models on Lineart and Colorbox control on VastAI GPU instance and deployed them on RunPod for more flexibility and control on print generation• Trained Low Rank Adaptation (LoRA) with Kohya_SS for custom face and background generation• Experimented with custom ComfyUI workflows with integrated ControlNet, LoRA, InstantID models• Containerised ComfyUI with Docker and deployed them as Serverless Endpoints on RunPod and exposed endpoint APIs to AWS Lambda to create APIs for APP using AWS API gateway	
ExaWizards India Intern (ML Engineer)	06/2022-07/2022
<ul style="list-style-type: none">• Worked on Split Neural Network ML paradigm and Splitted Mask-RCNN, FCN_Resnet50, YOLOv5 models for Instance segmentation, segmentation, face detection tasks• Implemented Autoencoder model for efficient image compression to latent space and setup Pysyft to communicate latents from Jetson Nano to GPU server, preserving data privacy at Jetson Nano	

Research Experience

FedAgPD: Aggregation-Assisted Proxyless Distillation IIT Jodhpur	08/2022-05/2023
Research Project Supervisor: Dr. Deepak Mishra <ul style="list-style-type: none">• Proposed a novel FL Framework FedAgPD to simultaneously handle model and data heterogeneity• Leveraged Deep Mutual Learning at Client and Aggregation followed by Gaussian Noise based data free distillation at the Server, eliminating need of proxy dataset or GAN's• FedAgPD achieved 2x better performance compared to SOTA FL algorithms like FedDF, FedMD, Kt-pfl	
Extremely Lightweight CNN for Chest X-Ray Diagnosis IIT Jodhpur Paper	06/2021-03/2022
Research Project Supervisor: Dr. Angshuman Paul <ul style="list-style-type: none">• Designed a novel Lightweight CNN model (ExLNet) for the abnormal detection of Chest Radiographs	

- Fused **Squeeze and Excitation** blocks with **Depth-wise convolution** to create **DCISE** layer as a component of **ExLNet**, which outperforms SOTA models like **Mobilenet**, **Shufflenet** on **NIH**, **VinBig** medical datasets

Cell Detection and Classification | IIT Jodhpur |

08/2022-03/2023

Research Project | Supervisor: **Dr. Angshuman Paul**

- Detected and classified cells data sample into **necrotic** and **apoptotic cells**
- Finetuned various SOTA object detectors such as **YOLO**, **SSD**, **RetinaNet**, **DeTR**
- Achieved remarkable results using **DeTR** with a Mean Average Precision (MAP) of **40.0**

Projects

Regularizing Federated Learning (FL) via Adversarial Model Perturbations (AMP) | [Github](#) | FL

- Analyzed the effect of integrating **AMP** on SOTA FL algorithms like **FedAvg**, **FedProx**, **FedNTD**, **SCAFFOLD**. Observed a boost of **2-3%** accuracy on CIFAR10/100 dataset with AMP integrated FL algorithms

Image Captioning using Detection Transformer (DeTR) | [Github](#) | Transformers

- Implemented modified **DeTR** from **scratch** in **pytorch** for **image captioning** task. Trained **DeTR** on **Flickr30k** dataset for **500** epochs and achieved a **BLEU** score of **57.36** on **Flickr8k** dataset

Transformers-Implementation | [Github](#) | Transformers, CNN

- Implemented **11** SOTA research papers on **vision transformers** variants like **Swin Transformer**, **Pyramid ViT**, **Convolution ViT** etc. for **Image Classification** from scratch in **pytorch**

CNN Algorithms Comparison | [Github](#) | Pytorch, Numpy, Matplotlib, PIL, Python

- Implemented and analyzed **7** SOTA **CNN** architectures like **Squeezenet**, **Mobilenet**, **Inceptionnet**, **Shufflenet**, **Googlenet**, **Resnet**, **Efficientnet** from **scratch** on **Retinal Eye disease dataset**

Image Colorization | [Github](#) | Pytorch, PIL, Python

- Implemented **pix2pix** GAN from scratch in **pytorch** for converting **grayscale image** to **colored image** in **LAB** space to **RGB** space

Mask-NoMask Detection | [Github](#) | Pytorch, Numpy, PIL, OpenCV, Python

- Leveraged **transfer learning** with **Mobilenet v2** for classifying images under **mask** and **no mask** category with an accuracy of **99.6%** on dataset of size **5300**
- Combined the trained model with **OpenCV** for real time classification

Coursework

Probability and Statistics, Optimization for Machine Learning, Pattern Recognition and Machine Learning (PRML), Deep Learning, Dependable AI, Time Series Analysis, Cryptography, Blockchain, Computer Graphics