

Nirbhay Sharma

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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 | [Paper](#)

Industry Experience

- Faaya Astu India** | **Full Time** (ML Engineer) 06/2023-07/2024
- Trained **Stable Diffusion ControlNet** models on **Linear** 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
- 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**
- **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**
- 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