Nirbhay Sharma ML .md 8/27/2023

# Nirbhay Sharma | +91 9369630713 | ■ sharma.59@iitj.ac.in | • Github | • Portfolio | • LinkedIn

Education - B.Tech, CSE | Indian Institute of Technology (IIT) Jodhpur | CGPA: 8.97/10

Aug'19-May'23

#### **Technical Skills**

Languages: Python, C/C++, HTML/CSS, Javascript, Haskell, Prolog

Tools and Frameworks: Pytorch, Flask, Django, Regex, Heroku, Git, Github, Firebase, MongoDB, MySql

#### **Publications**

*Nirbhay Sharma*, *Gautam Kumar*, *Dr. Angshuman Paul*, "An Extremely Lightweight CNN Model For the Diagnosis of Chest Radiographs in Resource-constrained Environments". "International Journal of Medical Physics" 2023

## Research / Industry Experience

Print Generation | Pytorch, GAN, Diffusion | Full Time (ML Engineer) | Faaya Astu India

Jun'23-Present

- Analyzed **Text To Image** models for print/pattern generation using Text prompts
- FineTuned GALIP, a GAN based model for Text to Pattern generation on AWS instance
- FineTuned Latent Diffusion Model (LDM) for Text to Pattern generation on Vastai instance
- Containerized GALIP and LDM by setting up Docker images

Split Neural Networks | Pytorch, Jetson Nano, PySyft | Intern (ML Engineer) | ExaWizards India

Jun'22-July'22

- Splitted Mask-RCNN, FCN\_Resnet50, YOLOv5 for Instance segmentation, segmentation, face detection tasks
- Utilized Pysyft and Jetson Nano for feature transfer from one device to another
- Implemented Encoder-Decoder architecture for tensor compression
- Reduced inference time on Jetson nano device while preserving data privacy

Noise Engineered Federated Distillation for Heterogeneous Settings | Pytorch, Federated Learning, Data-Free KD

Research Project | Supervisor: Dr. Deepak Mishra | IIT Jodhpur

Aug'22-May'23

- Proposed a novel Federated Learning (FL) Framework to handle model and data heterogeneity
- Implemented data-free KD using Gaussian Noise at the Server, eliminating need of proxy dataset
- Compared and analyzed our algorithm with SOTA FL algorithms for model heterogeneity
- Outperformed all baselines in terms of test accuracy by a considerable margin on multiple datasets

Light Weight CNN Model for Chest Radiographs Classification | Pytorch, Light Weight CNN Models

Research Project | Supervisor: Dr. Angshuman Paul | IIT Jodhpur

Jun'21-Mar'22

- Designed a Lightweight CNN model (ExLNet) for the abnormal detection of Chest Radiographs
- Fused the concepts from **Squeezenet** and **Mobilenet** into a single architecture to make it lightweight
- ExLNet outperforms SOTA models like MobileNet, ShuffleNet on various datasets
- Our research paper got accepted at International Journal of Medical Physics

### **Projects**

Image Captioning using Detection Transformer (DeTR) | Github | Pytorch, DeTR, Transformer

- Implemented DeTR from scratch using Pytorch and modified it for image captioning task
- Trained DeTR on Flickr30k dataset for 500 epochs and evaluated on Flickr8k dataset using BLEU score
- Achieved a BLEU score of 57.36 on Flickr8k dataset

Regularizing Federated Learning (FL) via Adversarial Model Perturbations (AMP) | Github | Report | Pytorch, FL

- Analyzed the effect of Adversarial Model Perturbations (AMP) on 4 SOTA Federated Learning (FL) algorithms
- Implemented FedAvg, FedProx, FedNTD, SCAFFOLD from scratch and integrated AMP module at the client
- Observed a boost of **2-3%** accuracy on CIFAR10/100 dataset after integrating AMP in each of the algorithm

CNN Algorithms Comparison | Github | Report | Pytorch, Numpy, Matplotlib, PIL, Python

- Compared 7 deep CNN architectures on Retinal Eye disease dataset
- Implemented Squeezenet, Mobilenet, Inceptionnet, Shufflenet, Googlenet, Resnet, Efficientnet from scratch
- Performed a comparison study among the state-of-the-art deep CNN architectures