

# ABHINAV SHARMA

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## EDUCATION

### **Stony Brook University, New York**

August 2022 - May 2024

MS in Computer Science

Relevant Coursework - Computer Vision, Natural Language Processing, Operating System (Linux Kernel Programming in C)

### **University of Mumbai, India**

July 2018 – July 2022

BE in Computer Engineering

GPA: 9.24/10

Relevant Coursework – Computer Graphics, Deep Learning, Big Data Systems, Distributed Computing

## SKILLS

Programming languages - Python, C++, C, Bash

Libraries - PyTorch, TensorFlow, OpenCV, Scikit-learn, Keras, SciPy, Pandas, Numpy, Caffe (Learning)

Databases - MySQL, MongoDB

Other Technologies - GStreamer, Deepstream SDK, Docker, Kubernetes, AWS Sagemaker, OpenVino, GitHub GitOps

## EXPERIENCE

### **PACE & PiCASSo Lab, Stony Brook University** | Research Assistant (Computer Vision)

Jan 2023 – Present

- Developing a Machine Learning on Edge system for “**Decentralized AI-powered Modular Video Analytics**”.
- Implemented a fast and memory efficient Computer Vision pipeline for scaling **Automatic License Plate Recognition** task utilizing PyTorch, TensorRT, **NVIDIA Deepstream SDK (analytics frameworks)** and **TAO Toolkit**.
- Successfully deployed the application on a cluster of Jetson Nanos (GPUs) utilizing Kubernetes for orchestration.
- Future Work: Implementing additional pipelines for pose estimation, traffic analysis and pedestrian recognition.

### **Tata Institute of Fundamental Research** | Computer Vision Research Intern

July 2021 – July 2022

- Developed an **Qt (C++)** application with **AWS SageMaker** pipeline for recognizing Gujarati Script from newspapers using EfficientNet B3 model with an **accuracy of 99.7%**.
- Implemented a **Bi-LSTM** model to rectify grammatical errors with an **accuracy of 95.1%**.
- Increased the recognition accuracy of conjunct consonants **by 12%** in comparison with traditional OCR models.
- Results of the research are published in [Procedia Computer Science 218C \(2023\) pp. 2271-2282](#).

### **National Institute of Electronics and Information Technology** | Computer Vision Intern

May 2021 – July 2021

- Developed a VGG16 model for detection of Sars-Cov-2 from Chest X-rays and achieved an **accuracy of 93%**.
- Designed and deployed a Traffic Sign Classification model using Deep Inception based CNN for virtual simulation of self-driving cars.

## PATENT & PEER - REVIEWED PUBLICATIONS

[System to Monitor and Implement COVID Appropriate Protocol](#) – IND Patent Application No. 202121021574

A Machine Learning on Edge system to monitor entrants for mask detection (safety monitoring in hospitals) using MobileNet V2 model, keeping count of people entering and ensuring that the entrants queue follows social distancing norms using **OpenCV, YOLO v3 and GStreamer**.

[Multi-label Classification of Retinal Disorders in Optical Coherence Tomography using Deep Learning](#) – ICESC, 2021

Devised a Deep Learning based detection system for the purpose of screening patients with blinding retinal diseases. Convolutional Neural Network is used achieving an accuracy of 99.38%.

[Rainfall Prediction: Analysis of Machine Learning Algorithms and Ensemble Techniques](#) – ICSC, 2021

[AI-Farm: A Crop Recommendation Application](#) – ICACC, 2021

[Native and Non-Native English Speech Classification: A premise to Accent Conversion](#) – ICECCT, 2021

## PROJECTS

### **Shadow Removal using Denoising Diffusion Probabilistic Models**

Sep 2022 – Dec 2022

CV course project under Prof. Dr. Dimitris Samaras

- Implemented Diffusion Model for shadow removal tasks using two methodologies - we use the shadow mask for conditional inpainting task; without using Shadow Masks here, we use the novel intermediate-conditional sampling method for shadow removal.

### **EquationNet – Handwritten Equation Solver**

Nov 2022 – Jan 2023

- Conceptualized and designed a novel convolution neural network architecture to examine pictures of handwritten mathematical equations such as linear, simultaneous and quadratic and solve it, taking one character at a time.
- Trained constructed CNN on an exhaustive and aggregated data set of >50000 images of digits, alphabets and mathematical symbols and achieved a training accuracy of 93%.
- Scripted a custom Python program using libraries such as Tensorflow, OpenCV and SymPy to pre-process scanned images, segment characters, pass it on to CNN and finally solve predicted equation to output an answer.