Neelesh Verma

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Education

Stony Brook University Aug'22 – Present
M.S. in Computer Science (Specializing in Machine Learning) **GPA : 4/4**
- Relevant Courses: Advanced Machine Learning, Advanced Computer Vision, Introduction to Robotics, Medical Imaging

Indian Institute of Technology Bombay Aug'16 – July'20
B.Tech in Computer Science (with Honors)
- Relevant Courses: Automatic Speech Recognition, Intelligent and Learning Agents, Advanced Topics in Deep Learning.

Work Experience

SRI International | *Research Scientist Intern* Menlo Park, California (May '23 - Aug '23)
- **Adversarial Patch Detection** - Developed a pipeline leveraging frequency-based components to detect adversarial regions and trained a binary SVM to localize the adversarial patches in the images
- **Inpainting with Stable Diffusion** - Integrated stable diffusion-based inpainting to restore the adversarial segment, reducing the attack success rate from 7.92% to 1.81% on the Apricot dataset.

Samsung Research Institute | *Machine Learning Engineer* Bengaluru, India (Sept '20 - July '22)
- **Penup Features** - Implemented Weekly Supervised Object Detection on the Penup Artwork Dataset in PyTorch, achieving a mAP of 58.7. Improved image stylization latency and enhanced GAN-generated drawing quality by $\sim 7\%$
- **DevOps and MLOps** - Successfully transitioned development pipeline from Chef to Ansible. Architected a scalable MLOps pipeline with Kubeflow, resulting in a 5x speed improvement in machine learning model deployment.

SMC Global Capitals | *Software Engineer (Internship)* Delhi, India (June '20 – Aug '20)
- **Performance Monitoring and Metrics Analysis** - Developed a Python interface for a performance-monitoring application, created effective heuristics for system polling, and implemented diverse performance metrics for evaluation.

Samsung Research Institute | *ML Intern* Bengaluru, India (May '19 – July '19)
- **Artistic Style Transfer with Network Pruning** - Built a controlled Artistic Style Transfer system using PyTorch on an artwork database. Applied correlation-based network pruning to reduce 78% of StyleNet parameters, increasing efficiency.

Publications

Crack Segmentation using Swin-based attention - IEEE TITS (Under Review)
Neelesh Verma, Mengyang Pu, Mei Zhang, Danil Prokhorov, Eric Blasch, and Haibin Ling
* Served as a reviewer for **AAAI '24**

Research Work

Shadow Removal via Diffusion Models [report][code] Sept' 22 - Dec '22
Guide : Prof. Dimitris Samaras Stony Brook University
- Built a **Denoising Diffusion Implicit Model** by extending **RePaint** architecture to remove shadows from images
- Designed a decay method to pass shadow features that improved the RePaint by **5.04%** in terms of the **LPIPS** score

Optimal Transport Distances based Reward Function [report][code] Feb '23 - Apr '23
Guide : Prof. Michael Ryoo Stony Brook University
- Computed optimal alignment between an unlabeled trajectory and expert dataset to obtain reward function using **JAX**
- Utilized rewards to train **IQL** agent and obtained competitive performance on several **Gym-MujoCo Locomotion Tasks**

Speech Enhancement with Perceptual Feature Losses [report][code] Jan' 20 - July '20
Guide : Prof. P. Balamurugan (Bachelor's Thesis) IIT Bombay
- Developed a fully convolutional **context aggregation network** in PyTorch, to effectively remove noise from speech signals
- Trained the network using **perceptual feature losses**, achieving state-of-the-art results on the **Voice Bank** dataset

Key Projects

Adversarial Testing for Robust Content Moderation [code] | *Guide: Prof. Amir Rahmati* Sept '23 - Nov '23
- Implemented a patch-based attack utilizing **Grad-CAM** scores to successfully bypass content moderation filters

Facial Features Extraction from Speech [code] | *Guide: Prof. Preethi Jyothi* Sept '19 - Nov '19
- Built a neural network model that converts a speech into a 4096-dimensional feature vector representing the face

Sparse Monocular Slam [code] | *Guide: Prof. Arjun Jain* Feb '19 - April '19
- Proposed an algorithm to recover **3D trajectory** of video from a single camera using **sparse-feature based SLAM**

Scholastic Achievements

- Secured **AIR 209** in JEE Advanced 2016 out of 200,000 candidates
- Awarded the **Kishore Vaigyanik Protsahan Yojana** (KVPY) Fellowship by Govt. of India
- Recipient of the prestigious **National Talent Search Examination** (NTSE) Scholarship