

Saurabh Chatterjee

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EDUCATION

Indian Institute of Technology Kharagpur

M.Tech in Signal Processing and Machine Learning

Aug. 2022 - May 2024

CGPA: 8.23/10.0

Gurukula Kangri Vishwavidyalaya Haridwar

B.Tech in Electrical Engineering

Aug. 2016 - Sept. 2020

CGPA: 8.64/10.0

COURSEWORK

Machine Learning for Signal Processing • Deep Learning: Foundations and Applications • Digital Image Processing • Probability and Random Processes • Linear Algebra for Signal and Systems • Convex Optimization • Statistical Signal Processing • Medical Image Analysis

PROJECTS

Assessment of Cognitive Load and Emotional Characteristics using Ocular Features | Sept 2023 - April 2024

- Developed face and **facial landmark** detection pipeline for video, and performed **pupil localization** by radial inspection of gradients. Developed **CUDA** algorithms to accelerate execution speed by **300 times**.
- **Blink detection** and iris location correction using Cubic Spline interpolation.
- **Screen gaze** and heatmap estimation using **Polynomial Regression**. Classified eye motion into saccades and fixations using iris velocity and dispersion based thresholds.
- Built deep learning model using **ResNet-18** by pre-training with facial expression images and further fine tuned with action unit intensity labels to estimate **facial micro-expressions**.

Single Image Super-Resolution using Generative Adversarial Network | *TensorFlow*

Dec 2023

- Implemented **SRGAN** with deep residual network (ResNet) trained on ImageNet dataset for 4x scale.
- Used combination of adversarial loss and **VGG feature loss** which helped better recovery of fine textures.

Image-to-Image Translation (Pix2Pix) for Satellite Images to Map Routes | *TensorFlow*

Feb 2024

- Developed a Pix2Pix network leveraging **U-Net** as the Generator and **PatchGAN** as the Discriminator.
- Used Google satellite-map dataset with BCE and Pixel-Distance loss to improve performance.

Lossy and Lossless Image and Text Compression | *Numpy*

Jan 2023

- Performed lossy compression using **PCA** from scratch on images with varying number of principal components.
- Lossless compression performed using Huffman encoding on text and images.

Detection of Premature Ventricular Contraction in ECG | *Matlab*

Dec 2022

- QRS complex location in ECG is estimated and PVC detected based on inter-RR peak distance.

TECHNICAL SKILLS

Key Skills: Machine Learning | Deep Learning | Computer Vision | Image Processing | Statistical Modelling | Data Visualization | CUDA Computing

Programming Languages: Python | C++ | SQL | MatLab

Libraries: TensorFlow | Scikit-Learn | NumPy | Pandas | Matplotlib | OpenCV

Software Tools: Matlab | Git | Docker | LTspice | LaTeX

AWARDS AND ACHIEVEMENTS

- Secured an All India Rank 747 (99.147 percentile) in GATE 2021 out of 87559 candidates.
- Gold Medalist in two semesters (2nd and 7th) in B.Tech

POSITION OF RESPONSIBILITY

Teaching Assistant | Machine Learning for Signal Processing Lab | IIT Kharagpur

Jan'24 - April'24

- Mentored a batch of 30 students for hands-on machine learning experiments and evaluation.

Teaching Assistant | Digital Signal Processing Lab | IIT Kharagpur

Aug'23 - Nov'23

- Mentored a batch of 45 students for signal processing related experiments and evaluation.