Ajay Kumar Mahto

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LinkedIn

Education

IIT Kharagpur, *M.Tech in Vision and Intelligent Systems (VIPES)* *(7.37/10)* 2025

Maulana Abul Kalam Azad University of Technology, *B.Tech in ECE* *(8.41/10)* 2020

Indian School Certificate, *Higher Secondary Education* *(73.5%)* 2015

Bihar School Examination Board, *Secondary School Examination* *(79.2%)* 2013

Projects

Heart Murmur Detection from PCG Signal using Self-Supervised Transfer Learning, Aug 2024 – present

M.Tech Thesis Project | Audio & BioSignal Lab | Prof. Goutam Saha, Dept. of E&ECE, IIT KGP

- Supervised models need large labeled PCG data, but fine-tuning a self-supervised model with limited annotated data can be effective.
- Automatic feature extraction using audio-pre-trained wav2vec 2.0 is being evaluated to detect murmurs in PCG signals.
- Transfer learning methodology is utilized to fine-tune the modified wav2vec 2.0 model for classifying normal and abnormal PCG signals.

Brain Tumor MRI Image Classification using AlexNet and VGG Models, Jul 2024 – Aug 2024

Course Project | Embedded Machine Learning | Prof. A. Chatterjee, Dept. of ATDC, IIT KGP

- Developed a deep learning pipeline for brain tumor classification using AlexNet and VGG models with MRI datasets.
- Preprocessed MRI images through normalization and data augmentation to improve model generalization.
- Achieved 92% accuracy with AlexNet and 96% accuracy with VGG during testing.

Optical Flow Estimation | Lucas - Kanade | Classical Methods | Deep Optical Flow, Feb 2024 – Mar 2024

Course Project | Intelligent Systems Design Lab | Prof. D. Sen, Dept. of E&ECE, IIT KGP

- Implemented a python program to take two input images and find the optical flow estimation between them.
- Implemented Lucas - Kanade estimator and compared with pretrained deeplearning framework, FlowNet.

Optical Character Recognition using Deep Neural Network | Self Dataset, Jan 2024 – Feb 2024

Course Project | Intelligent Systems Design Lab | Prof. D. Sen, Dept. of E&ECE, IIT KGP

- Built a ResNet-9 model in PyTorch for number recognition, achieving 97% accuracy on the MNIST dataset (Hindu-Arabic numerals).
- Applied transfer learning to a self-curated dataset of Bengali numerals, retraining only the final layers of the model.
- Achieved 92% accuracy on the Bengali numeral recognition task after retraining.

Designing of JPEG Image Compression Pipeline using Entropy Encoding, Oct 2023 – Nov 2023

Course Project | IVP Lab | Prof. PKB & S. Bhattacharya, Dept. of E&ECE, IIT KGP

- Designed the entire JPEG pipeline, including key steps such as transforming the image to the YCbCr color space.
- Implemented Discrete Cosine Transform (DCT), quantization, Huffman encoding, and run-length encoding for image compression.
- Achieved compression on BMP files using Python, NumPy, and OpenCV frameworks.

Internships

Machine Learning-Based Heart Disease Detection from Phonocardiogram Signals, May 2024 – Jul 2024

Research Internship | Audio & BioSignal Lab | Prof. Goutam Saha, Dept. of E&ECE, IIT KGP

- Utilized the PhysioNet/Computing in Cardiology Challenge 2016 dataset from Shiraz University.
- Performed preprocessing (filtering, normalization) and feature extraction in time, frequency, and time-frequency domains.
- Applied stratified k-fold cross-validation, classified using SVM, k-NN, and CNN models, and constructed a confusion matrix for evaluation.

Skills

- Languages: C/C++, Python, SQL, MATLAB
- Libraries: C++ STL, Numpy, Pandas, Matplotlib, OpenCV, Pytorch
- Software Tools: Google Colab, VS Code, Jupyter Notebook, MySQL
- Hardware Tools: 8051 Microcontroller, STM32, ARM7

Coursework Information

- Image And Video Processing
- Advanced Operating System
- Embedded System Design
- Pattern Recognition & ML
- Learning Theory
- Multimedia Systems
- Deep Learning
- Vision And Visualization
- Digital Signal Processing
- Computer Vision
- Embedded Machine Learning
- Data Structures & Algorithms

Professional Experience

Emmvee Photovoltaic Power Pvt. Ltd, Bengaluru, India | Solar Power Plant Apr 2022 – Dec 2022

- Served as an Engineer Management Trainee, responsible for operating machines in the production line area.
- Gained hands-on experience with machines such as Stringer, Auto Bussing, and Auto Tapping.

Certificates

- Pytorch for Deep Learning Bootcamp [Udemy Certificate]
- Embedded System Bare Metal Programming Ground Up (STM32)
- RISC-V Processor - RV32I Base ISA [Maven Silicon Online Certification]

Positions of Responsibility

•Teaching Assistant for the Digital Signal Processing & Digital Electronic Circuits course under Prof. Goutam Saha

•Teaching Assistant for the Digital Signal Processing Laboratory & Design Laboratory under Prof. BL, AS, MKM, RD, SB, SM