Jay Sawant

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Education

University of California, San Diego — San Diego, CA
- MS in Data Science student at Halıcıoğlu Data Science Institute (HDSI) [Expected Sep '24 - Mar '26]
- Key courses: Biomedical Natural Language Processing, Data Science Ethics & Society

Indian Institute of Technology Bombay — Mumbai, India
- Graduated with a Bachelor's and Master's Degree in Electrical Engineering | CGPA - 8.9/10 [Jul '18 - Jun '23]
- Relevant courses: Machine Learning, Generative AI with LLMs (Coursera), Automatic Speech Recognition, Probability and Random Process, Linear Algebra, Medical Image Computing, Advanced Image Processing, Data Structures and Algorithms

Technical Skills and Extracurricular

Programming & Tools Python, C++, SQL, Bash, MATLAB, PyTorch, CUDA, Tensorflow, HuggingFace, Pandas, OpenCV, Git

Teaching Assistantship Introduction to Machine Learning (EE769), Introduction to Digital Image processing (EE610)

Publications

- Patil, A.; Diwakar, H.; **Sawant, J.**; Kurian, N.C.; Yadav, S.; Rane, S.; Bameta, T.; Sethi, A. Efficient Quality Control of Whole Slide Pathology Images with Human in-the-Loop Training. *J. Pathol. Inform.* **2023**, *14*, 100306
- Patil, A., Jain, G., Diwakar, H., **Sawant, J.**, Bameta, T., Rane, S., & Sethi, A. (2024). Semantic Segmentation Based Quality Control of Histopathology Whole Slide Images. *arXiv preprint arXiv:2410.03289* (Submitted to IEEE Journal of Biomedical and Health Informatics)

Work, Research and Internship Experience

- **Cardiac arrhythmia detection and classification** | *Probeplus Innovative Solutions Pvt. Ltd.* | *AI Consultant* [May '24 - Jul '24]
  - Trained a baseline CNN and multi-head attention based model as a part of a remote-health monitoring system to achieve a multi-label classification of 26 arrhythmias using a diverse dataset of 12-lead ECG recordings from Physionet 2021 challenge
  - Improved the model performance by integrating an RNN branch for temporal context and by calculating cross-attention features between CNN and RNN outputs, achieving 2% increase in the challenge score on external test datasets
- **Software Development Engineer in Test** | *Enphase Energy, Bangalore, India* [Jul '23 - May '24]
  - Collaborated with a 7-member Test Automation team to develop and maintain a Python-based test framework
  - Utilized Object-Oriented Programming (OOP) techniques to create comprehensive test suites for the hardware test automation
  - Developed a Python library leveraging the Jama REST API to connect to Jama, fetch test cases, execute them on a local PC, and update results in Jama, providing end-to-end automation support for the Design-Verification-Test team
- **Improving Histopathology and Medical Image Analysis with Deep Learning** | *M.Tech Thesis* [May '22 - Jun '23]
  - Employed active learning method to train a classifier, achieving efficient segmentation of WSIs into six tissue regions and outperforming the popular HistoQC tool with higher dice scores on 70% of the WSIs
  - Utilized DeepLabV3 architecture for cell detection and classification using segmentation method in the OCELOT Challenge 2023, securing a global ranking of 16th place with an F1-score of 0.67
- **Opacity Detection in Chest Xrays using Contrastive Learning** | *Qure.ai* | *AI Scientist Intern* [May '22 - Aug '22]
  - Trained a vanilla classification model of ResNet50 on 1.2M chest x-rays using the conventional supervised training method for opacity classification and achieved an AUC score of 0.80 on the test dataset of 280K chest x-rays
  - Outperformed the vanilla baseline by utilizing a model backbone trained using the Supervised Contrastive Learning method

Key Technical Projects

- **The Vital Extraction Challenge** | *Inter-IIT Tech Meet 11.0* | *Gold Medal among 20+ IITs* [Jan'23 - Mar'23]
  - Employed a YOLOv8 object detection model to extract the bounding boxes of the vitals in the ECG monitor images
  - Innovatively devised a classification-based segmentation approach to detect the corners of the screen of ECG monitors
  - Conducted in-depth exploration of OCR techniques, including parseq, ABINet, and PaddleOCR for text recognition of vitals
- **Brain MRI Tumour Segmentation** | *CS736: Medical Image Computing* | *Guide: Prof. Suyash Awate* [Feb'22 - April'22]
  - Trained a U-Net architecture for segmentation of the tumor region in MRI slices using the soft dice loss and used a dataset consisting of around 4K MRI slices from 110 patients from The Cancer Imaging Archive
  - Achieved a mean IOU of 0.77 on the validation set between the predicted and the true segmentation masks of tumor-positive MRI slices and an accuracy of 96.8% on the binary classification of the presence of tumor
- **Identity Aware Portrait Generation** | *CS726: Advanced Machine Learning* | *Guide: Prof. Sunita Sarawagi* [Feb'22 - April'22]
  - Utilized the CycleGAN model in the Image translation to generate portraits preserving the human facial features
  - Proposed a perceptual loss to preserve facial features that uses FaceNet embeddings to guide the generators
  - Achieved an average SSIM of 0.98 using our approach between the human faces and their respective portraits
- **Adversarial Attacks on ASR Systems** | *CS753: Automatic Speech Recognition* | *Guide: Prof. Preethi Jyothi* [Feb'21 - May'21]
  - Trained a Bi-RNN CTC-based network on the SpeechCommands dataset with a WER of 16% for command classification
  - Implemented Gradient-descent based targeted adversarial attack achieving a 0% classification accuracy along with a Signal-to-Noise Ratio (SNR) of 30dB in the perturbed audio examples