Jay Gala

AI Resident, AI4Bharat (IIT Madras)

🌐 Website   ⓞ GitHub   🎓 Google Scholar   @ Email   in LinkedIn

Education

Dwarkadas J. Sanghvi College of Engineering (University of Mumbai)   2017 - 2021
Bachelor of Engineering (B.E.) in Computer Engineering   Overall GPA: **9.86/10**
Applied Math, Discrete Math, Algorithms, Machine Learning, Artificial Intelligence, Natural Language Processing.

Experience

Research Collaboration   Nov 2022 - Present
Independent Researcher (Remote)   *Collaborator: Diganta Misra*
> Working on improving existing models' generalization and robustness to serve as universal feature extractors by sparse upcycling Mixture of Experts (MoEs) through supervised and self-supervised learning.

AI4Bharat (IIT Madras)   Aug 2022 - Present
AI Resident   *Advisors: Prof. Mitesh Khapra, Dr. Anoop Kunchukuttan and Dr. Raj Dabre*
> Mined 5M high-quality bitext pairs from the web (ebooks, lecture transcripts, etc) using LaBSE and margin score.
> Developed SOTA IndicTrans2 translation models and created a challenging IN22 benchmark for Indian languages.
> Working on text generation models extending BLOOM (Scao et al., 2022) and instruction-tuning for Indian languages.

Research Collaboration   Sep 2021 - Present
Independent Researcher (Remote)   *Advisor: Dr. Zeerak Talat*
> Proposed cross-dataset generalization for hate speech detection using Federated Learning extending Fortuna et al. (2021).
> Experiments show around 10% improvement in f1-score with relatively less data compared to centralized training.
> Working on mitigating biases in adversarial federated learning for hate speech by minimizing vulnerabilities induced by potential client adversaries due to data distributional shifts during server aggregation.

University of California San Diego   Jun 2021 - Jun 2022
Research Intern (Remote)   *Advisor: Prof. Pengtao Xie*
> Implementation of Learning from Mistakes for Neural Architecture Search (Garg et al., 2021) in PyTorch [Code].
> Proposed an efficient optimization algorithm as an extension to Garg et al. (2021) for improving NAS by conducting performance-aware data generation using class-wise evaluation (importance weighting) during the architecture search.
> Model-agnostic framework that can be coupled with any gradient-based (differentiable) search approaches.

Tata Consultancy Services   Dec 2019 - Feb 2020
Machine Learning Intern
> Developed models using VAEs and K-means clustering for customer behavior analysis to prevent customer churn.
> Prepared a custom dataset by developing surveys to handle open-ended and closed-ended questions.
> Extracted feedback responses from handwritten survey forms using OCR achieving 12% CER and 18% WER.

Unicode Research   Aug 2020 - Feb 2023
Research Student   *Advisor: Swapneel Mehta*
> Founding Research Engineer at SimPPL (from Jan 2022) and developing tools for policymakers and journalists to audit online disinformation on social media (currently supported by NYC Media Lab and AI4ABM).
> Collaborated with The Sunday Times and Ippen Digital to develop parrot.report, part of SimPPL.
> **Teaching Assistant:** Summer Machine Learning Course, UMLSC 2021, supported by **Google Research India**.
> Presented seminars & paper reviews related to the topic of machine learning and research opportunities.

Publications

Complete List at 🎓Google Scholar (∗ = equal contribution)

IndicTrans2: Towards High-Quality and Accessible Machine Translation Models for all 22 Scheduled Indian Languages [🔗] [Code]
AI4Bharat, Jay Gala∗, Pranjal A. Chitale∗, *et al.*
e-Print Archive (2023)   **[Arxiv]**

Needs-Aware Image Generation [🔗]
Jay Gala, Pengtao Xie
37th Conference on Neural Information Processing Systems   **[In Submission to NeurIPS 2023]**

A Federated Approach for Hate Speech Detection [🔗] [Code]
Jay Gala*, Deep Gandhi*, Jash Mehta*, Zeerak Talat
17th Conference of the European Chapter of the Association for Computational Linguistics   [**EACL 2023**]

Expanding Access to ML Research through Student-led Collaboratives [🔗]
Deep Gandhi, Raghav Jain, Jay Gala, Jhagrut Lalwani, Swapneel S Mehta
NeurIPS Workshop on Broadening Research Collaborations 2022   [**WBRC 2022**]

Improving Image-Based Dialog by Reducing Modality Biases [🔗] [Code]
Jay Gala, Hrishikesh Shenai, Pranjal Chitale, Kaustubh Kekre, Pratik Kanani
5th International Conference on Advances in Computing and Data Sciences   [**ICACDS 2021**]

Pothole Detection and Dimension Estimation System using Deep Learning (YOLO) and Image Processing [🔗] [Code]
Pranjal A. Chitale, Kaustubh Y. Kekre, Hrishikesh R. Shenai, Ruhina Karani, Jay P. Gala
35th International Conference on Image and Vision Computing New Zealand   [**IVCNZ 2020**]

IoT and ML based Smart System for Efficient Garbage Monitoring: Real Time AQI monitoring and Fire Detection for dump yards and Garbage Management System [🔗]
Dev V. Savla, Amogh N. Parab, Kaustubh Y. Kekre, Jay P. Gala, Meera Narvekar
3rd International Conference on Smart Systems and Inventive Technology   [**ICSSIT 2020**]

Projects

Ocubot - Image-based Dialog [Code]   *Advisor: Prof. Pratik Kanani*
> Bachelor's project which focused on improving performance on the multimodal task of Visual Dialog.
> Adversarial analysis of existing systems to identify modality biases towards historical context and salient visual features.
> Reduced modality biases by improving visual context with dense captions and attention over these captions.
> Achieved competitive performance to the baseline with around 66% training data (80K images out of 120K images).

Anomaly Detection in ECG Signals   *Advisor: Prof. Pratik Kanani*
> Industry collaboration to develop neural models for detecting anomalies in processed ECG signals from IoT devices with a human-in-the-loop approach to semi-automate the process while ensuring the safety of human lives.
> Applied distributed computing algorithms for speed improvements during inference and load balancing by 60%.

Annotated PyTorch Paper Implementations [Code]
> Annotated PyTorch implementations of deep learning papers as interactive jupyter notebooks.
> Includes papers such as Word2Vec, GloVe, KimCNN, Bahdanau Attention, Transformer, Neural Style Transfer, etc.

C Programming Exam Portal [🎥]
> A paperless solution for conducting C programming exam for over 500 students at D. J. Sanghvi institution.
> Generated data-driven detailed reports for students and instructors to enhance the overall learning experience.

Skills

Languages	Python, C, Java, JavaScript, SQL, HTML5
Databases	MySQL, SQLite, PostgreSQL, MongoDB
Libraries	PyTorch, Keras, Transformers, Scikit-learn, NumPy, Pandas, OpenCV, Gensim, SpaCy, NLTK, Flask, FastAPI, Streamlit, Gradio, ReactJs, NodeJs
Others	Git, Jupyter, Docker, Raspberry Pi, LaTeX

Academic Service

Volunteer	EACL 2023

Co-Curricular Activities

> Member of Shalizi–Stats reading group which focuses on the stats book Advanced Data Analysis from an Elementary Point of View by Cosma Shalizi and Bayesian Statistics.
> Attended the Advanced Language Processing Winter School (ALPS) 2022.
> Attended the Eastern European Machine Learning Summer School (EEML) 2022.
> ML Collective Natural Language Processing Reading Group Moderator.
> Cohere for AI Interactive Reading Group Organizer.