JAY GALA

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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.

RESEARCH EXPERIENCE

Research Collaboration Nov 2022 - Present
Independent Researcher (Remote) *Collaborator: Diganta Misra*

- Working on adversarially reprogramming existing pretrained unimodal (vision/language) models for VQA task.

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.
- Working on developing SOTA translation models (IndicTrans v2) and a challenging benchmark for Indian languages.
- Working on developing text generation models (IndicGPT) extending BLOOM (Scao et al., 2022) 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 personalized 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.

Unicode Research Aug 2020 - Present
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.

RESEARCH & PUBLICATIONS

Publications available at Google Scholar

[1] **Jay Gala** and Pengtao Xie, "Improving Neural Architecture Search via Needs-Aware Data Generation." In Submission, 2022. Preprint available on ArXiv.

[2] **Jay Gala***, Deep Gandhi*, Jash Mehta*, and Zeerak Talat, "A Federated Approach for Hate Speech Detection," in *Proceedings of the 17th Conference of the European Chapter of the Association for Computational Linguistics (EACL)*, Association for Computational Linguistics, 2023. Preprint available on ArXiv.

[3] **Jay Gala**, Hrishikesh Shenai, Pranjal Chitale, Kaustubh Kekre, and Pratik Kanani, "Improving Image-Based Dialog by Reducing Modality Biases," in *International Conference on Advances in Computing and Data Sciences*, pp. 33–41, Springer, 2021.

[4] Hrishikesh Shenai*, **Jay Gala***, Kaustubh Kekre*, Pranjal Chitale*, and Ruhina Karani*, "Combating COVID-19 using object detection techniques for next-generation autonomous systems," in *Cyber-Physical Systems: AI and COVID-19*, ch. 4, Elsevier Science, 2021.

[5] Pranjal Chitale*, Kaustubh Kekre*, Hrishikesh Shenai*, Ruhina Karani*, and **Jay Gala***, "Pothole Detection and Dimension Estimation System using Deep Learning (YOLO) and Image Processing," in *2020 35th International Conference on Image and Vision Computing New Zealand (IVCNZ)*, pp. 1–6, 2020.

[6] Dev Savla, Amogh Parab, Kaustubh Kekre, **Jay Gala**, and Meera Narvekar, "IoT and ML based Smart System for Efficient Garbage Monitoring: Real Time AQI monitoring and Fire Detection for dump yards and Garbage Management System," in *2020 Third International Conference on Smart Systems and Inventive Technology (ICSSIT)*, pp. 315–321, 2020.

[7] Dev Savla, Amogh Parab, Kaustubh Kekre, **Jay Gala**, S. Ramchandra, and Pankaj Sonawane, "Virtual Farmer: Real Time Crop Prediction and Automatic Irrigation System," in *2020 11th International Conference on Computing, Communication and Networking Technologies (ICCCNT)*, pp. 1–5, 2020.

WORK EXPERIENCE

Unicode Aug 2018 - Jun 2021
Web Developer & Student Mentor
- Mentored a team of sophomores on projects such as Inventory Management, Masters and Placement Portals.
- Conducted workshop on web development and open-source development for over 100 students in the college.

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.

Ucadd EdTech Dec 2018 - Aug 2019
Web Developer (Remote)
- Built a learning platform with support for content streaming, adaptive assessments, doubt-solving, etc using MERN stack.
- Worked on optimizing lecture streaming with limited data bandwidth from hosting providers such as Vimeo.
- Spearheaded data analytics to generate useful insights about the courses for instructors based on user interactions.

Sensum Fintech Jan 2019 - Feb 2019
Web Developer
- Constructed visualization graphs using plotly to show and analyze the trends in the finance trading markets.
- Integrated backend APIs for stock recommendations and improved user experience by optimizing the builds.

PROJECTS

Ocubot - Image-based Dialog *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
- 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 and frameworks	PyTorch, Keras, Transformers, Scikit-learn, NumPy, Pandas, OpenCV, Gensim, SpaCy, NLTK, Flask, FastAPI, Streamlit, Gradio, ReactJs, NodeJs
Others	Git, Jupyter, Docker, Raspberry Pi, LaTeX

CO-CURRICULAR ACTIVITIES

1. 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.
2. Attended the Advanced Language Processing Winter School (ALPS) 2022.
3. Attended the Eastern European Machine Learning Summer School (EEML) 2022.
4. ML Collective Natural Language Processing Reading Group Moderator.
5. Cohere for AI Interactive Reading Group Organizer.