Rahul Nihalani

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Experience

Grammatical Error Detection (GED) (arXiv) July 2023 – June 2024
***Research Intern**, Sitare University* *Remote, India*

- Worked under **Prof. Kushal Shah**, former **IIT Delhi** professor, refining the Lang-8 dataset using an 8-step cleaning process, reducing sentences from **2,372,119** to **200,000**, significantly improving data quality for GED tasks.
- Enhanced test accuracy by **15%** on the cleaned dataset, demonstrating the critical role of data preprocessing in boosting model performance for GED.
- Fine-tuned **4** transformer models (BERT-base-uncased, BERT-large-uncased, RoBERTa-base, RoBERTa-large) to assess the impact of dataset quality and model size on GED performance.
- Achieved state-of-the-art results with BERT-base-uncased, obtaining an F1-score of **0.91** and test accuracy of **90.53%**, outperforming larger transformer models.
- Conducted inference on **500** test sentences using fine-tuned and generative models (GPT-4, Llama-3-70B-instruct), achieving an F1-score of **0.99**, highlighting the effectiveness of transformer-based GED models.

Projects

Indian Sign Language Recognition using LSTM Model (GitHub) June 2022 – October 2022
Deep Learning Project *Python, TensorFlow, OpenCV*

- Developed a deep learning-based sign language recognition system for **10** gestures, enhancing accessibility for individuals with hearing impairments by providing an efficient real-time classification model.
- Collected and processed a dataset of **200,000** images using Open-CV and Media-pipe Holistic, ensuring robust model training with contributions from **8** subjects and **2,500** samples per gesture.
- Designed and trained a custom LSTM neural network, surpassing baseline models like VGG16 and Res-Net, achieving **94.28%** training accuracy and **91.50%** evaluation accuracy.
- Implemented a **14**-layer sequential architecture with **4** dense layers, leveraging the 'Adam' optimizer and 'categorical cross-entropy' loss function for superior classification performance.
- Constructed and labeled a dataset for digit recognition (**0** to **9**), training the model to classify sign gestures with high precision and ensuring accurate interpretation of hand signs.

Education

Vellore Institute of Technology Bhopal, India
*Integrated M.Tech in Artificial Intelligence, Cumulative GPA **8.96*** *September 2021 – Expected May 2026*

- Completed coursework in Machine Learning, Deep Learning, Natural Language Processing, and Computer Vision, gaining expertise in building AI models for data-driven applications and solving real-world problems.
- Designed and implemented an Indian Sign Language Recognition system using Deep Learning, enabling real-time translation of hand gestures to text with high accuracy, improving accessibility for hearing-impaired users.

Technical Skills

Programming Languages: Python, Java, SQL

Machine Learning & Deep Learning: Supervised & Unsupervised Learning, Deep Learning, NLP, Computer Vision, LLMs, Generative AI

Libraries & Frameworks: TensorFlow, PyTorch, Keras, Scikit-Learn, Transformers, NLTK, OpenCV, NumPy, Pandas, Matplotlib, Seaborn

MLOps & DevOps: MLflow, DVC, DagsHub, Git, GitHub, Docker, CI/CD (GitHub Actions), Astroflow, AWS (RDS, EC2, S3)

Awards and Achievements

- Completed an Online Crash Course on Large Language Models (LLMs) from Self Shiksha & Pariksha (Oct 2023), applying advanced LLM techniques to optimize transformer-based models in research.
- Earned Coursera certification in Applied Machine Learning in Python (Jan 2023) with a **95.28%** score, demonstrating expertise in supervised learning, feature engineering, and model evaluation techniques.