Rahul Nihalani

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EXPERIENCE

Grammatical Error Detection (GED) (arXiv)   July 2023 – June 2024
Research Intern, Sitare University   *Remote, India*
  • Collaborated with Prof. Kushal Shah (Ex-IIT Delhi) to develop an 8-step cleaning pipeline for refining Lang-8 dataset, reducing sentence count from 2.37M to 200K and increasing GED model accuracy by 15% through improved preprocessing techniques.
  • Fine-tuned BERT-base-uncased, BERT-large, RoBERTa-base, and RoBERTa-large on a cleaned Lang-8 dataset. BERT-base-uncased achieved an F1-score of 0.91 and 90.53% accuracy, outperforming larger models and proving the impact of data preprocessing.
  • Evaluated model performance on 500 test sentences, proving fine-tuned transformer models and generative approaches superior, with a peak F1-score of 0.99, significantly improving grammatical error detection in language learning applications.
  • Conducted a comparative analysis of fine-tuned and generative models (GPT-4, Llama-3-70B-instruct) on GED tasks, demonstrating a 9% accuracy improvement and validating transformer-based approaches for real-world language correction.

PROJECTS

AI-Powered Knowledge Assistant (GitHub)   February 2025 – March 2025
AI and NLP Project   *Python, FAISS, Docker, Hugging Face*
  • Developed a RAG pipeline using all-MiniLM-L6-v2 for embedding and Llama-3-8B-chat-hf for text generation, enabling document retrieval on 5000-character inputs via Facebook AI Similarity Search (FAISS), improving response accuracy in large-scale systems.
  • Built a summarization module using BART-large-CNN, truncating inputs to 1024 tokens and generating 142-word summaries, reducing text by 80% while preserving key insights for better readability and faster knowledge assimilation.
  • Enhanced document retrieval through keyword extraction, improving indexing precision and optimizing query efficiency, while reducing Docker container size by 15% to streamline deployment and ensure seamless execution in cloud-based AI applications.

Indian Sign Language Recognition using LSTM Model (GitHub)   June 2022 – October 2022
Deep Learning Project   *Python, TensorFlow, OpenCV*
  • Led a team of five to develop a real-time sign language recognition system for ten gestures, training on 200K images from eight individuals, enhancing accessibility and communication for the hearing-impaired through robust deep learning models.
  • Designed a 14-layer LSTM model for Indian Sign Language recognition, achieving 94.28% training and 91.50% evaluation accuracy, outperforming VGG16 and ResNet in real-time gesture classification and sequential data processing.
  • Compiled and annotated a custom dataset for digit recognition (0–9), refining classification using Adam optimizer and categorical cross-entropy loss, leading to an 8% improvement in model precision and enhancing the reliability of predictions.

EDUCATION

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

TECHNICAL SKILLS

Programming Languages: Python, Java, SQL

Machine Learning & Deep Learning: Supervised and Unsupervised Learning, Deep Learning, NLP, CV, 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), Airflow, AWS (RDS, EC2, S3)

AWARDS AND ACHIEVEMENTS

  • Earned an Advanced Large Language Models (LLMs) Certification from Self Shiksha & Pariksha (Oct 2023). Gained hands-on experience in parameter-efficient fine-tuning (PEFT) and prompt engineering, improving transformer model performance in NLP tasks.
  • Completed 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.