

# PRIYATAM NARAVAJHULA

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## EDUCATION

**University of Texas at Dallas**

**Aug 2023 - May 2025**

Master of Science, Computer Science | GPA:3.8

Specialization:

**Coursework:** Quantum Computing, Database Management, Machine Learning, NLP, Algorithms, Bigdata, HCI.

## TECHNICAL SKILLS

**Languages and Technologies:** Python, SQL, Android, ReactJS, Spring, Terraform, AWS, Django, Flask, Kubernetes, Docker, Spark, Scala, Pytorch, GPU CUDA programming, distributed networks.

## RESEARCH EXPERIENCE

**Master's Thesis, UTD**

**Jan 2024 – Present**

**Improving Accuracy of Retrieval Augmented Generation**

**Advisor: Dr. Vincent Ng**

- Conducted extensive analysis of RAG architectures and state-of-art models (DPR, ColBERT, REALM), identifying limitations in current dense passage retrievers particularly in query-passage interaction capture and computational efficiency. Research revealed opportunities for improvement in embedding quality through enhanced semantic understanding while maintaining deployment feasibility in production environments.
- Engineered a novel dual-encoder BERT architecture incorporating query reconstruction mechanism, where passage encoders (BERT-base, 12 layers) generate enhanced embeddings by leveraging synthetic query vectors during training. This approach enables richer semantic representation while maintaining the efficiency of traditional dual-encoder systems through pre-computation of passage embeddings and simple dot-product scoring during
- Developed an adversarial pre-training framework for query reconstruction module utilizing transformer-based generator and discriminator (6 layers each), trained with Wasserstein loss and gradient penalty. The generator produces diverse, contextually relevant questions while the discriminator ensures semantic validity and relevance to passage content, resulting in improved coverage of passage semantics in final embeddings.
- Implemented end-to-end training pipeline combining contrastive loss (temperature-scaled InfoNCE with hard negative mining) for retriever optimization and cross-entropy loss for query reconstruction, with gradient accumulation and dynamic batch sampling. Training utilizes AdamW optimizer ( $\text{lr}=1\text{e-}5$ ,  $\text{weight decay}=0.01$ ) with linear warmup and cosine decay scheduling across multiple GPUs using distributed data parallel.

**Amazon, Seattle**

**AWS Solution Architect Intern**

**May 2024 – Aug 2024**

- Developed and deployed a chatbot with domain-specific knowledge on Spark and EMR upgrade. Curated spark and EMR upgrade knowledge on Amazon Kendra and enriched the text with metadata for better indexing leading to 70% reduction in hallucination.
- Designed and developed automated step-functions to crawl webpage, convert to json format and create metadata tags for the data.
- Implemented efficient graph-RAG approach to develop chatbot by retrieving from knowledge graphs stored on AWS-Kendra and employing Bedrock models to formulate conversations.
- Conducted POC on autotuning spark configurations with ML by curating datasets of spark features from spark history logs. Utilized regression algorithms like Decision Tree Regression, SVR Regression, Linear Regression for predicting the duration of spark job based on spark configuration.
- Developed algorithm to parse spark history logs, extract low-level features and map them to CSV fields. Utilized the parsed features to predict duration of spark step on EMR on Ec2

**Discernibility Analysis of Low-Resolution Images , MIT**

**Jul 2021 – Sep 2021**

**Advisor: Dr. Kyle Keane, AI Researcher**

- Worked on the pioneering field of discernibility analysis of low-resolution images; used neural networks as tools for classification.
- Developed a labeled dataset of known mathematical plots of high resolution and transformed them into low-resolution images using image processing techniques; discernibility was achieved through l2 fractal analysis and classification through Computer vision neural architectures.

## Undergraduate Research Automated Essay Scoring Systems

Jan 2021-May 2021

Advisor: Ms. Srujana Inturi

- Engineered a novel 10-layer encoder-decoder neural architecture for automated essay scoring, combining word embedding, convolutional, LSTM/GRU, and attention layers to achieve deeper semantic analysis than traditional approaches. The architecture demonstrates superior performance in capturing both local word relationships and global essay context.
- Implemented comprehensive deep learning system using Python, Keras/TensorFlow, integrating GloVe embeddings, dual-level attention mechanisms, and optimized training processes with Adam optimizer. Achieved efficient processing through innovative pre-computation of sentence representations while maintaining semantic depth.
- Conducted rigorous experimentation on the ASAP dataset across 8 distinct essay prompts, utilizing 5-fold cross-validation and comprehensive evaluation metrics. Demonstrated statistically significant improvements ( $p < 0.05$ ) over baseline models and matched BERT performance, achieving 0.753 average QWK score.
- Developed multiple architectural variants (LSTM+LSTM, GRU+GRU, LSTM+BiLSTM) to analyze performance impacts, establishing new benchmarks in automated essay scoring through systematic comparison against traditional methods (SVR, BLRR) and neural baselines (CNN+LSTM)
- Created scalable and modular framework supporting multiple essay types (persuasive, source-dependent, narrative), with extensible architecture for future enhancements including prompt-agnostic scoring and multi-language support. Research demonstrates strong potential for broader applications in educational technology and natural language processing.

## PUBLICATIONS

- Priyatam Naravajhula, Sreedeeep Rayavarapu, and Srujana Inturi. 2021. [Encoder Decoder Approach to Automated Essay Scoring For Deeper Semantic Analysis](#). In *Proceedings of the 18th International Conference on Natural Language Processing (ICON)*, pages 399–407, National Institute of Technology Silchar, Silchar, India. NLP Association of India (NLP AI).
- Naravajhula, P., Naravajhula, A. Spam Classification: Genetically Optimized Passive-Aggressive Approach. *SN COMPUT. SCI.* 4, 93 (2023). <https://doi.org/10.1007/s42979-022-01517-y>

## PROFESSIONAL EXPERIENCE

J.P Morgan Chase & C.o., Hyderabad.

Feb 2021 – Aug 2023

Software Analyst | Cloud and DevOps Team

- Conceptualized and designed the project ‘Interactive EMR Controller’; developed REST API endpoints for creating EMR clusters and a housekeeping feature that ensures uninterrupted spark job submissions to clusters and increased efficiency by 90%
- Analyzed EMR logs and provided a solution to redact logs devoid of personal information and write them to S3 buckets. The NLP software designed, redacted the logs by 85%
- Developed Terraform codebase to deploy AWS lambdas and to provide support to the cross-account deployment of Interactive EMR Controller. This led to customer increase by 15%
- Integrated SQS/SNS features with EMR Controller to overcome the token auth constraint and this led to a customer-base increase by 10%.
- Designed and developed an architecture for multi-cert enablement of Load Balancers that allowed for increase in number of rules held from 100 to user choice through a mechanism called alb-peering. This resulted in customer usage increase by 70%.
- Handled deployments of various versions, delivering critical features that enhanced user experience and improved speed of interaction by 40%.
- Enabled Kerberos on EMR clusters and explored various security approaches while having uninterrupted livy and spark submissions.
- Engineered and implemented blue-green deployments in-line with CI/CD principles to make the process of migrating across different versions easier for the customer.

Internship | Software Engineering Intern | JP Morgan Chase, Hyderabad

Jun 2020 – Jul 2020

- Collaborated with a Hyderabad-based NGO, Learning Curve, on gamification of socioemotional learning to increase the reach and effectiveness of learning among children.
- Developed an android application with advanced UI and voice assistant for hosting games. To increase the reach among users by 90%

\*Code bases for these projects are available in [GitHub](#) profile