Krishna Raketla

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EDUCATION

Northeastern University Boston, USA

*Master’s in Computer Science Jan 2023 – Present*

Vellore Institute of Technology Vellore, India

*Bachelor of Technology in Computer Science and Engineering May 2019*

PROJECTS

**MyBookShelf |** *React, Node, Express, Mongoose, MongoDB, JWT, Locust May 2024 – Present*

* Engineered a responsive and intuitive user interface using React, implementing dynamic components for seamless user interactions, achieving an average page load time of 1s.
* Designed a scalable MongoDB database with comprehensive schemas for users, bookshelves, and books, capable of handling high volume data with peak loads of up to 10,000 concurrent users.
* Implemented secure user authentication and session management using JSON Web Tokens, ensuring robust protection and continuous verification of user-specific access.
* Developed RESTful APIs using Express.js and Node.js to facilitate efficient communication between the frontend and backend systems, ensuring response times maintained under 200 milliseconds, laying the groundwork for a reliable and responsive application.
* Implemented automated testing using React Testing Library and Jest, achieving 90% coverage.

**Book Recommendation System |** *ML, Python, Docker, GCP, Kubernetes, FastAPI, SciPy**May 2024 – Present*

* Processed and refined a dataset of approximately 2.3 million books and over 228 million user interactions, providing a robust foundation for developing book recommendation algorithms.
* Engineered a sophisticated hybrid collaborative filtering system, integrating user-user and item-item, and SVD achieving 85% personalization accuracy.
* Orchestrated Docker containerization of the model and engineered RESTful APIs using FastAPI, boosting deployment efficiency and facilitating seamless integration with front-end applications.
* Developing an advanced neural collaborative filtering model to address critical challenges like targeting data sparsity and scalability issues, while enhancing overall prediction accuracy.

**Advanced Image Captioning** | *ML, Python, TensorFlow, Pandas, Keras Jan 2024 – April 2024*

* Developed and compared advanced image captioning models (ResNet50-LSTM and DenseNet201-LSTM) using the Flickr8k dataset, enhancing automated description capabilities.
* Implemented transfer learning with pre-trained CNNs and LSTM networks, employing techniques like gradient clipping, learning rate scheduling, and early stopping to optimize model performance.
* Optimized image captioning model using DenseNet201-LSTM architecture, achieving superior performance with ROUGE-1 F1-score of 0.208, ROUGE-2 F1-score of 0.052, and ROUGE-L F1-score of 0.196, outperforming the baseline ResNet50-LSTM model by an average of 15% across all metrics.

**Vertical Search Engine |** *NLP, ML, Python, RocksDB, Elasticsearch, Algorithms, ETL* *Jan 2024 – April 2024*

* Developed a vertical search engine for hurricane/tropical storm data, implementing TF-IDF, BM25, and LM-Laplace retrieval models. Crawled and indexed 40,000 documents, improving search efficiency by 10% over baseline.
* Architected a custom indexing system and an ETL pipeline using RocksDB and gzip compression to replace Elasticsearch.
* Designed a frontier management system with min-heap, optimizing crawling efficiency by 40% and reducing query response times by 30%.
* Computed PageRank for all crawled pages to enhance search result relevance and quality.

**Text Summarisation of Research Papers |** *NLP, ML, Python, LLM, Transformers, OCR* *Sept 2023 – Dec 2023*

* Engineered an abstractive text summarization framework by fine-tuning a BERT-based sequence-to-sequence model for generating concise and accurate summaries.
* Processed and cleaned the CNN/Daily Mail dataset to ensure high-quality training data.
* Developed an algorithm to extract reading order from PDF documents using OCR, leveraging layoutparser and pdfplumber, which enhanced the retrieval of query relevant sections.
* Achieved a ROUGE-2 score of 16.10, validating model performance, integrated MiniLM-L6-v2 for advanced text processing.

**Image Processing Application |** *Object Oriented Design, Java, Junit Jan 2023 – April 2023*

* Developed a Java based image processing application with Java 8 and Swing, supporting multiple formats such as PPM, JPEG, BMP, and PNG, emphasizing clean, modular OOD for enhanced maintainability.
* Implemented MVC (Model-View-Controller) patterns, encapsulation, and dynamic dispatch techniques to optimize the application's scalability and performance.
* Directed continuous unit testing efforts utilizing JUnit 4 to ensure reliable software development and efficient debugging processes.

WORK EXPERIENCE

**Graduate Teaching Assistant** *Jan 2024 – April 2024*

*Northeastern University* *Boston, MA*

* Mentored and guided 68 students in Natural Language Processing, enhancing their understanding by addressing queries and providing detailed evaluations of their work.

**Intermediate Software Engineer** *Jan 2022 – Nov 2022*

*HP Inc* *Bangalore, India*

* Administered Fax UI workflow development using QML and JavaScript, developing over 50 feature specifications and facilitating cross functional team collaboration for design and API integration, achieving a 20% faster development cycle.
* Pioneered critical features: Schedule Fax, Forward Fax, Fax UI for enterprise models, by integrating Agile development practices and computer engineering principles to streamline development and ensure high reliability through rigorous unit testing.
* Guided two interns through robust microservice development for the Job layer, meticulously overseeing code quality and integration, culminating in the seamless delivery of enhanced UI features.

**Software Engineer** *Aug 2019 – Dec 2021*

*HP Inc* *Bangalore, India*

* Revamped fax system data management from XML to Google FlatBuffers, catering to a new microservices architecture, which streamlined storage efficiency. Significantly boosting system performance and reducing memory overhead by 65.12%.
* Designed a modular data collection interface across the network and job layers of the protocol stack in C++, leveraging abstract factory patterns and interfaces to ensure component decoupling, reducing issue debugging time by 35%.
* Implemented the Common Data Model (CDM) adapters for Receive Fax job ticket microservice to enable seamless communication between the firmware resource and application microservices.
* Architected and built the Synaptics Build Server using advanced bash scripting to automate modem firmware builds, enhancing productivity and compliance with legal restrictions on code sharing.
* Enhanced fax components' reliability by increasing unit test coverage by 40% through comprehensive Google Test suites for FaxControl, AnalogFax, and SendFax components.

**Research and Development Intern** *Jan 2019 – July 2019*

*HP Inc* *Bangalore, India*

* Identified failure commits by automating the testing process using a binary search algorithm to efficiently sift through last known pass and most recent fail, expediting the process from 3-man days to 20 minutes.
* Engineered a model of firmware architecture using C# .NET framework for printer’s native code to expedite the integration of a performance profiling tool with the firmware, thereby uncovering issues in advance.

SKILLS

**Languages**: Python, Java, C++, JavaScript, SQL.  
**Frameworks** **&** **Libraries**: React, Node.js, Express, MongoDB, TensorFlow, PyTorch, Scikit-learn, FastAPI, Flask.  
**Tools** **&** **Technologies**: Docker, Kubernetes, Git, RESTful APIs, GCP, Elasticsearch, RocksDB  
**Concepts**: Machine Learning, Natural Language Processing, Data Structures, Algorithms, Microservices.

**Soft Skills:** Communication, cross-team collaboration, conflict resolution, problem-solving.  
**Other**: Agile Methodologies, CI/CD, Object-Oriented Design, Unit Testing, Performance Optimization.