

SUDARSHAN BALAJI

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EDUCATION

Master of Science in Data Science | *University of Memphis, Memphis, TN*

GPA: 4.0/4.0

Relevant Coursework: Machine Learning, Database Systems, Data Mining, Fundamentals of Data Science, Adv. Stat. Learning I & II, Biostatistical Learning I & II, Business ML, Multivariate Statistical Methods.

Bachelor of Engineering in Electronics and Telecommunication Engg. | *RV College of Engineering, Bengaluru, Karnataka, India*

GPA: 8.58/10.0

WORK EXPERIENCE

University of Memphis, Memphis, TN

Jan 2025 – May 2025

Research Assistant

- Collaborated with Carnegie Learning and DataWhys under project "ASTRA" which aims at improving strategy analysis in educational contexts — under the topic of "Ratios and Proportion".
- Engineered a Visual Question Answering (VQA) system with LLM integration processing images from the COCO dataset and Compared performance of VQA system through Generative AI like ChatGPT, Gemini and Claude
- Communicated data-driven insights to collaborators, improving the interpretability of AI model performance, benchmarked LLMs on image-question tasks and summarized findings into a technical paper published at ACL 2025.

CharmHealth, Pleasanton, CA

Jun 2024 – Aug 2024

Research and Development Intern

- Generated synthetic medical records using Synthea framework in the FHIR format and developed a Python pipeline to convert data, optimized data processing time and performed Exploratory Data Analysis.
- Engineered NLP services - Named Entity Recognition (NER), Speech Diarization using NVIDIA RIVA, and used speech/text mining tools to uncover patterns in clinical conversations, and implemented best practices for reliable AI integration and addressing issues of accessibility and user experience.

TECHNICAL SKILLS

- *Languages:* SQL, Python (NumPy, Pandas, Scikit-learn, Matplotlib, NLTK, LangChain, LangGraph, PySpark), R (ggplot2), MATLAB, HTML, CSS
- *Tools:* Bash (*Scripting*), Tableau, Power BI, MySQL, MongoDB, Git, GitHub, Docker, Cloud SQL, Google Cloud Platform, MS Excel
- *Interests:* AI Agents, Large Language Models (LLMs), Data Analytics, Deep Learning, Web-Scrapping, Natural Language Processing.

PROJECTS

Visual Question Answering (VQA) System | Python, Pandas, Seaborn, OpenAI, VLMs, Stat. Analysis

Jan 2025 – Present

- Developing a methodology to evaluate Vision Language Models (VLMs) using textually modified questions from the VQA dataset, identifying Gemini-1.5-Flash as most sensitive and Claude-3.5-Sonnet as most robust.
- Conduct comprehensive evaluation of four state-of-the-art VLMs (GPT-4o, Claude-3.5-Sonnet, LLaVa-1.5, and Gemini-1.5-Flash) using BLEU, METEOR, ROUGE-L, and CIDEr metrics, with statistical validation via McNemar's and Wilcoxon signed-rank tests.
- Discovering consistent performance degradation across all tested VLMs when processing modified questions, with variations in sensitivity based on modification source while analyzing accuracy changes for different response types.

Relational DB Design for Mobile E-commerce | MySQL, MongoDB

Sep 2024 – Nov 2024

- Designed MySQL schema handling 80,000 products and 3000+ users with automated data generation scripts with status tracking system monitoring users, monthly activity and vendor metrics system tracking \$100K+ in simulated transactions.
- Optimized database performance through code reviews and architecture assessments, reducing query execution time by 30% while ensuring compliance with security and privacy standards.
- Created robust data migration processes between SQL and MongoDB, documenting dependencies and system interactions for collaborative development with focus on maintainability and extensibility.

SentimentSnap | Python, Pandas, NLTK, Streamlit, BeautifulSoup, OpenAI, LLMs

Aug 2024 – Nov 2024

- Built a Streamlit-based NLP application that mined unstructured data from multiple sources and generated sentiment predictions using BERT model (91%), and multiple LLM APIs - Gemini API (91.2%), and ChatGPT API (92%) on different datasets.
- Implemented a secure and accessible chatbot interface with proper user privacy considerations and login authentication, creating maintainable code that adheres to deployment best practices for safety.
- Developed production-ready data processing pipelines for web scraping that scales with increasing data volume, documenting system interactions and dependencies to support collaboration. Extracted trends and patterns from text using custom NLP pipelines, translating raw web data into actionable insights.

PUBLICATIONS

- Monika Shah, **Sudarshan Balaji**, Somdeb Sarkhel, Sanorita Dey, and Deepak Venugopal. 2025. *Analyzing the Sensitivity of Vision Language Models in Visual Question Answering*. In Proceedings of the Fourth Workshop on Generation, Evaluation and Metrics (GEM²), pages 431–438, Vienna, Austria and virtual meeting. Association for Computational Linguistics.