

Vinith Kuruppu

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Education

University of California, Berkeley - Master of Science in Data Science (GPA: 3.962/4.0) December 2025

- **Relevant Coursework:** Applied Machine Learning, Natural Language Processing, Computer Vision, Generative AI, Python Programming, Research Design and Application, Probability and Statistics, Data Engineering, Experiments and Causal Inference

Loyola University Chicago - Bachelor of Science in Computational Neuroscience May 2022

- **Relevant Coursework:** Deep learning for Neuroscience, Computational Modeling, Experimental Statistics, Physics, Research Methods

Skills & Technologies

Languages: Python, R, Bash, SQL, HTML/CSS, MATLAB

Libraries/Frameworks: TensorFlow, Pytorch, Transformers, Scikit-learn, XGBoost, WhisperX, Pandas, NumPy, Hugging Face, Matplotlib, Seaborn

Technologies: AWS, Git, Github, Docker, Tableau, Jupyter, Power BI, MySQL, PostgreSQL, MongoDB, Neo4j, Redis, SPSS

Experience

Graduate Student Instructor, University of California, Berkeley Jan 2025 – Present

- Mentored graduate students on experimental design and causal inference, raising proposal quality by 20% as measured by rubric scores.
- Guided 80+ master's students through research design and ML applications, improving project quality and raising average project scores by 12%
- Delivered feedback on 40+ research projects, strengthening methodological rigor

AI/ML Research Associate, RAND Corporation May 2024 – May 2025

- Built fairness-aware allocation models that directed \$70 billion across 3,300+ hospitals, reducing variance between need and award and improving equity across US regions.
- Developed Python pipelines for hospital-expense modeling that improved predictive accuracy by 22% vs. baseline, establishing cost-ceiling estimates used in FEMA funding reviews.
- Designed and validated disaster-response modeling frameworks that informed federal preparedness policy decisions.
- Authored 30+ technical reports used by congressional committees, FEMA, and RAND leadership, driving ongoing allocation-QA workstreams.

Research Data Scientist, Exponent Incorporated July 2022 – May 2024

- Built Python pipelines ingesting data from 3,000+ biosensors, cutting integration time by 15% and reducing pipeline latency.
- Led end-to-end FDA-compliant validation for biosensor trials, achieving 100% pass on internal QA audits and enabling accurate real-time health monitoring.
- Analyzed high-frequency signals to prioritize design changes for a \$12B product line, shortening decision cycles by 20% and increasing signal-quality pass rate.
- Diagnosed and resolved defects in proprietary study software, raising automated test coverage from 42% to 78% and accelerating release cadence by 50%.

Computer Vision Research Assistant, Loyola University Chicago Jan 2020 – June 2022

- Led a 6-person team to build DL/CV models of human visual perception and established a lab benchmark for object recognition.

- Improved model accuracy by 11% vs. prior lab baseline on object recognition tasks by systematic TensorFlow hyperparameter search, targeted augmentations, and architecture refinements.
- Engineered Python data pipelines for image and behavioral datasets, reducing preprocessing time by 30% and cutting experiment turnaround time.
- Developed papers and technical documentation that supported new grant funding and standardized analysis methods across the lab.

Projects

SurgiRAG - Retrieval-Augmented Generation for Surgical QA 2025

- Engineered a domain-adaptive RAG system (SurgiRAG) integrating BioBert retriever, BGE reranker, FAISS, and LoRA-fine-tuned LLaMA-11B, achieving 40+ point gains in factual grounding over baselines for surgical QA.
- Designed and executed a 12-variant ablation study across retrieval, reranking, and generation modules, demonstrating the critical role of semantic retrieval in improving faithfulness by up to 40% in high-stakes medical QA tasks.
- Constructed a novel 32-item benchmark and curated a 1,527-chunk multimodal corpus, enabling reproducible evaluation of RAG in clinical domains.
- Developed a novel LLM-as-a-Judge evaluation framework (using GPT-4o-mini) to assess model outputs, uncovering a critical trade-off between fluency and faithfulness not captured by standard metrics; this framework verified SurgiRAG's superior faithfulness (0.6562) compared to random-retrieval baselines (0.2500).

PathoVision: A Hybrid Pipeline Combining Handcrafted Features with Self-Supervised Vision Transformer Embeddings for Brain Tumor MRI Classification 2025

- Developed a hybrid computer-vision pipeline combining handcrafted features (Canny, Difference-of-Gaussian) with DINOv2 Vision Transformer embeddings to classify brain MRIs into four classes (no tumor, glioma, meningioma, pituitary).
- Engineered a multi-stage preprocessing workflow (grayscale normalization, CLAHE, skull stripping) to standardize heterogeneous inputs and mitigate orientation, contrast, and compression artifacts.
- Benchmarked classical classifiers across 40+ experiments; identified logistic regression on DINOv2 embeddings as best, achieving 96.7% test accuracy with low compute suitable for resource-constrained clinical settings.
- Showed that DINOv2 embeddings encode anatomical orientation and slice depth without supervision, providing a strong inductive bias for downstream medical-imaging tasks.

Lifestyle Factors and Body Mass Index in U.S. Adults: An Analysis of the 2023 Behavioral Risk Factor Surveillance System (BRFSS) 2024

- Analyzed the CDC's 2023 Behavioral Risk Factor Surveillance System (BRFSS; N=433,321 adults) to study links between physical activity, alcohol use, smoking, and BMI.
- Engineered a reproducible cleaning pipeline to remove non-responses and implausible values, producing a high-quality analytical cohort (n=259,612).
- Developed and compared OLS models, culminating in a segmented "broken-stick" regression to capture non-linear effects of physical activity across activity strata.
- Co-authored a formal report with statistical findings, visualizations, and a candid discussion of limitations (self-report/recall bias, cross-sectional design, and the practical significance of small effect sizes).