

## **Madan K C**

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### **PROFILE**

AI/ML-focused Software Engineer with experience in LLM/RAG-based applications, full-stack systems, and data science, supported by prior Graduate Research and Teaching Assistant roles. Interested in PhD research in ML/AI and data-driven intelligent systems at the intersection of computer science and real-world domains.

### **EDUCATION**

**M.S. in Data Science** | Grand Valley State University, Michigan, USA, 2023

*Coursework: Machine Learning, Statistical Programming, Multivariate Analysis, Statistical Modeling and Regression, Health & Bioinformatics, Data Mining, Information Visualization*

**B.E. in Computer Engineering** | Tribhuvan University, Nepal, 2020

*Coursework: Data Structure and Algorithms, AI, Databases, Math (Linear Algebra, Probability, Numerical Methods, Calculus), Operating Systems, Computer Network, Discrete Structure*

### **RESEARCH & TEACHING EXPERIENCE**

**Graduate Research Assistant** - Grand Valley State University | Aug 2022 - April 2023

- Explored deep learning models for image classification and evaluated different architectures.
- Conducted literature reviews and designed experiments, tuned hyperparameters, and analyzed model performance using standard metrics.
- Documented findings in structured reports to support faculty research.

**Graduate Teaching Assistant** - Grand Valley State University | Jan 2023 - April 2023

- Supported EGR 112 (C programming) classes, assisting in lab sessions and helping undergraduate students debug code and understand core programming concepts.
- Graded programming assignments and exams and provided written feedback to help students improve their code quality and problem-solving.

### **INDUSTRY EXPERIENCE**

**S3 Technical Solutions** - Software Engineer | Nov 2024 - Present

- Built an internal RAG assistant combining an LLM with a vector database of curated documents. Implemented document ingestion & embedding, similarity search, and prompt/context assembly, with logging for error analysis and quality monitoring.
- Work at the intersection of backend development and applied AI, designing, and implementing services and user-facing interfaces for internal tools.
- Implemented the document ingestion and embedding pipeline, similarity search over the vector store, and prompt/context construction, along with logging for error analysis and quality monitoring.

**Calcgen Solutions** - Data Analyst | Aug 2023 - Nov 2024

- Performed statistical modeling, data analysis, and visualization on real-world datasets.

- Built predictive models and evaluated them using appropriate statistical and ML metrics.
- Designed data cleaning and preprocessing workflows to improve model robustness.
- Communicated insights via reports and dashboards to support stakeholders' decisions.

#### **SmartSites Nepal** - Software Developer | Dec 2019 – Nov 2021

- Developed and maintained responsive client-facing websites and web applications.
- Collaborated with project managers and non-technical clients to translate requirements into reliable, maintainable software solutions.
- Performed performance and usability improvements (page load time, layout, and accessibility).

#### **ACADEMIC PROJECTS**

- **Coral Reef Image Classification (PyTorch, CNN):** Implemented and trained a convolutional neural network in PyTorch to classify coral reef images with normalization and augmentation, achieving 99% test accuracy and strengthening deep learning and computer vision skills.
- **MNIST Digit Classification (MLP in R):** Built a multi-layer perceptron from scratch in R for MNIST digit classification, implementing custom activation functions and He-Initialization, and trained it via backpropagation to reach 98.43% accuracy.
- **eBird Species Recommendation (KNN from Scratch):** Implemented a k-nearest neighbors-based recommendation system from scratch to suggest likely bird species based on eBird checklist data, practicing feature engineering and evaluation of distance-based models.
- **Multi-modal CITE-seq Prediction (Bioinformatics ML):** Predicted ADT values from CITE-seq data using parallel multivariate regression and gradient descent on high-dimensional biological data, demonstrating the application of ML in an interdisciplinary bioinformatics setting.
- **California Unemployment Analysis (EDA & Visualization):** Performed exploratory data analysis and cleaning on California unemployment data using pandas and built Tableau visualizations to highlight spatial and temporal patterns across counties and metro areas.

#### **TECHNICAL SKILLS**

**LLMs & GenAI:** RAG (ingestion, embeddings, vector search, context), Transformer, prompt design, dataset curation, model evaluation & error analysis.

**ML:** supervised/unsupervised learning, CNN/MLP, transfer learning, feature engineering, regularization & optimization.

**Evaluation & Research Practice:** metric design, baselines & ablations, error analysis, statistical testing, reproducibility, clear write-ups.

**Data & Retrieval:** text preprocessing, chunking & schema design, embedding selection, indexing, prompt/context versioning.

**Programming & Tools:** Python, PyTorch, NumPy/pandas, scikit-learn, Hugging Face, SQL, Git, Linux, Jupyter/RMarkdown, C, C++

**Systems & Deployment:** REST APIs, inference service design (batching, caching, rate limits, observability), GPU, AWS.

**Math & Foundations:** linear algebra, probability & statistics, regression/multivariate analysis, gradient-based optimization, calculus.